

3 ASSESSMENT OF IMPACT TO WASTE MANAGEMENT

3.1 Introduction

3.1.1 This Annex identifies the types of wastes that are likely to be generated during the construction and operation of the Project and evaluates the potential environmental impacts that may result from these wastes. The main solid waste management implications are related to construction and demolition (C&D) material from site formation works for provision of new facilities and demolition of existing facilities. Mitigation measures and good site practice, including waste handling, storage and disposal have been recommended with reference to the applicable waste legislation and guidelines.

3.2 Environmental Legislation, Policies, Standards and Criteria

3.2.1 The criteria and guidelines for assessing waste management implication are outlined in Annex 7 and Annex 15 respectively of the Technical Memorandum on Environmental Impact Assessment Ordinance (EIAO TM).

3.2.2 The following legislations relates to the handling, treatment and disposal of waste in Hong Kong SAR was used in assessing the potential impacts:

- *Waste Disposal Ordinance* (Cap 354);
- *Waste Disposal (Chemical Waste) (General) Regulation* (Cap 354);
- *Land (Miscellaneous Provisions) Ordinance* (Cap 28); and
- *Public Health and Municipal Services Ordinance* (Cap 132) – *Regulations as to Cleansing and Prevention of Nuisances*.

Waste Management

3.2.3 The Waste Disposal Ordinance (WDO) prohibits the unauthorized disposal of wastes. Construction waste is not directly defined in the WDO but is considered to fall within the category of “trade waste”. Trade waste is defined as waste from any trade, manufacturer or business, or any waste building, or civil engineering materials, but does not include animal waste. Under the WDO, wastes can be disposed of at sites licensed by the EPD.

3.2.4 The *Regulations as to Cleansing and Prevention of Nuisances* provide control on illegal tipping of wastes on unauthorised (unlicensed) sites.

Construction and Demolition (C&D) Materials

3.2.5 The current policy related to the dumping of C&D material⁽¹⁾ is documented in the Works Branch Technical Circular No. 2/93B, ‘Public Filling Facilities’. Construction and demolition materials that are wholly inert, namely public fill, should not be disposed of to landfill, but taken to public filling facilities. The Land

(1) “C&D material” contains a mixture of inert and non-inert material. The inert portion is the “public fill” and the non-inert portion is the “C&D waste”.

(Miscellaneous Provisions) Ordinance requires that dumping licences are obtained by individuals or companies who deliver public fill to public filling facilities. The licences are issued by the Civil Engineering and Development (CEDD) under delegated powers from the Director of Lands.

- 3.2.6 In addition, EPD and CEDD have produced a leaflet titled ‘New Disposal Arrangements for Construction Waste’ (1992) which states that C&D material with less than 30% by weight of inert material (that is, public fill) will be accepted at landfill. If the material contains more than 30% inert material, the waste must be sorted with suitable material sent to public filling facility and the non-inert material (that is, C&D waste) sent to landfill for final disposal.
- 3.2.7 Measures have recently been introduced under Environment, Transport and Works Bureau (ETWB) TC No. 33/2002 to enhance the management of C&D material including rock, and to minimize its generation at source. The enhancement measures include: (i) drawing up a Construction and Demolition Material Management Plan (C&DMMP) at an early design stage to minimize C&D material generation; (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 less than 50,000m³ C&D material or importing less than 50,000m³ fill material are exempt from the C&DMMP.
- 3.2.8 Two new technical circulars ETWB TCW No. 15/2003 “Waste Management on Construction Sites” and ETWB TCW No. 31/2004 “Trip Ticket System for Disposal of Construction & Demolition Materials” have been issued recently to introduce the additional measures to enhance waste management on construction sites, and to ensure proper disposal of C&D materials generated from public works contracts.

3.3 *Assessment Methodology*

Construction and Operation Phase

- 3.3.1 The methods for assessing the potential waste management impacts during construction follow those presented in Annexes 7 and 15 of the EIAO TM and include the following:
- Estimation of the types and quantities of the wastes generated;
 - Examination of opportunities for waste reduction and re-use (both on-site and off-site) and the required disposal options for each type of waste;
 - Assessment of potential impacts from the management of solid waste with respect to potential hazards, air and odour emissions, noise, wastewater discharges and transport; and
 - Impact on the capacity of waste collection, transfer and disposal facilities.

- 3.3.2 Mitigation measures and good site practices have been recommended with reference to the applicable waste legislation and guidelines.

3.4 Identification and Evaluation of Environmental Impacts

Construction Phase

- 3.4.1 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:
- C&D materials;
 - General refuse; and
 - Chemical waste.
- 3.4.2 During the construction phase, the sludge handling arrangements would remain the same as far as possible. The installation of temporary sludge handling arrangements during the construction period is considered unnecessary at this stage.
- 3.4.3 The nature of each type of waste arising is described in the following sections, together with an evaluation of the potential environmental impacts associated with these waste arisings.

Construction and Demolition Materials

- 3.4.4 Construction and demolition (C&D) materials would be generated from site clearance works, excavation works for the provision of new treatment facilities, and demolition of some of the existing facilities.
- 3.4.5 Site clearance works will be very limited and will produce a small amount of refuse and low-grade natural vegetation. With the implementation of the recommended waste management practices on site, adverse environmental impact would not arise from the storage, handling and disposal of site clearance waste.
- 3.4.6 The estimated volume of excavated materials was 29,000 m³. The excavated material would be mostly general fill material (i.e. public fill). It was estimated that approximately 2,000 m³ of excavated material could be reused on-site (e.g. for backfilling of trenches), resulting in approximately 27,000 m³ of excavated material requiring off-site disposal to the designated public filling facility.
- 3.4.7 C&D materials would also be generated from the demolition of some of the existing facilities. The C&D materials would comprise reinforced concrete and other demolition wastes, such as brick, metallic handrails/pipes, plastic products (e.g. PVC pipe) and general building waste (e.g. door, window, building finishes). It was estimated that the demolition works would generate about 550m³ public fill (the inert portion) and 50m³ C&D wastes (the non-inert portion).

- 3.4.8 Inert and non-inert C&D materials would be sorted on-site and then delivered to the designated public filling facility and landfill site accordingly. The estimated volumes of C&D materials generated from the Project are summarized in **Table 3-1** below, together with the estimated volumes of C&D materials to be disposed to public filling facility designated by Public Fill Committee (PFC) of CEDD and that of C&D wastes to landfill. It should be noted that the Project is exempt from the C&DMMP requirements as less than 50,000m³ C&D materials would be generated.

Table 3-1: Summary of C&D Materials (In Bulk Volumes)

Construction Activities	C&D Materials (m ³)	Inert C&D material to be reused on site (m ³)	C&D waste to be disposed to landfill ⁽¹⁾ (m ³)	Inert C&D material to be disposed to public filling facility designed by PFC (m ³)
Excavation works	29,000	2,000	-	27,000
Demolition of existing facilities	600	-	50	550
Total	29,600	2,000	50	27,550

Note:

- (1) The estimated amount of general refuse produced is considered minimal when compared with the waste generated from the demolition works and is deemed to be included in the estimated amount of C&D waste to be disposed at landfill

General Refuse

- 3.4.9 General refuse including paper and food waste will be generated from the works site. The storage of general refuse has the potential to give rise to adverse impacts. These include odour if waste is not collected frequently, windblown litter, water quality impacts if waste enters water bodies, and visual impact. The works site may also attract pests and vermin if the waste storage area is not well maintained and cleaned regularly. In addition, disposal of waste at sites other than approved waste transfer or disposal facilities, can also lead to similar impacts.
- 3.4.10 With the implementation of the recommended waste management practices at the site, adverse environmental impacts would not arise from the storage, handling and transportation of refuse.

Chemical Waste

- 3.4.11 The maintenance and servicing of construction plant and equipment may possibly generate some chemical wastes, for instance, cleaning fluids, solvents, lubrication oil and fuel. Maintenance of vehicles may also involve the use of a variety of chemicals, oil and lubricants.
- 3.4.12 Chemical wastes arising 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;
 - Soil and water contamination from spills;
 - Fire hazards; and

- Disruption of sewage treatment works in the event that the waste enters the sewerage system.
- 3.4.13 It is difficult to quantify the exact amount of chemical waste which will arise from the construction activities since it will be highly dependent on the Contractor's on-site maintenance practices and the number of plant and vehicles utilised. However, it is anticipated that the quantity of chemical wastes, such as lubricating oil and solvent, produced from plant maintenance will be relatively small. These types of wastes are accepted at the Chemical Waste Treatment Centre (CWTC) at Tsing Yi.
- 3.4.14 Provided that the storage, handling, transport and disposal of chemical waste is managed in accordance with the *Code of Practice on the Packaging, Labelling and Storage of Chemical Waste* published by the EPD, and the chemical waste is disposed at a licenced chemical waste treatment and disposal facility, the potential environmental impacts arising from the storage, handling and disposal of the chemical waste generated from the construction activities will not be significant.

Operation Phase

- 3.4.15 The major waste type that will be produced from the operation of the SWHSTW expansion would be the dewatered sludge cakes, screenings and grits. The sludge arising from the sewage treatment process is thickened, digested and dewatered in the sludge handling facilities within the SWHSTW to become sludge cakes. Currently, the dewatered sludge cakes, screenings and grits currently would be stored in skips before being trucked away by vehicle (together with the skips) for disposal at the NENT landfill. The same storage and disposal arrangement would be followed after the expansion works.
- 3.4.16 Currently the quantity of digested sludge produced from the treatment process is approximately 570 m³/d, which is reduced to 36 m³/d (with expected solids content of 30%) after dewatering by membrane filter press. Upon commissioning of the Project, the estimated quantity of digested sludge would be increased to 700 m³/d, which is reduced to 44 m³/d by dewatering. The quantity of screenings and grits generated from the operation of the STW after the expansion works was estimated to increase from the present 7 m³/d to 8m³/d.
- 3.4.17 The capacity of a skip is approximately 7.5m³, therefore the increased sludge cakes, screening and grits would increase about 2 vehicular trips. Such additional quantity is not considered large enough to have any major impacts on the traffic flow. The skips for the temporary storage and transportation of the sludge cakes, screenings and grits would be suitably covered and cleaned. In addition, the dewatered sludge cakes, screenings and grits are removed from the SHWSTW on a daily basis, the potential impact to air quality would be minimal.

3.5 Mitigation Measures

Waste Reduction Measures

- 3.5.1 Good management and control can prevent the generation of significant amounts 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:

Planning and Design Stage

- The levels of structures should be designed such that excavation could be minimized as far as practicable.
- Excavated materials generated from construction works to be re-used on-site as far as practicable to reduce off-site disposal.
- Control measures recommended under the prevailing ETWB circulars should be strictly followed to ensure proper management of the C&D materials with an aim to minimize the generation of C&D material and maximize the use of inert C&D material.

Construction Stage

- Measures recommended in the ETWB TCW No. 15/2003 should be followed to require the contractor to prepare and implement an enhanced Waste Management Plan (WMP) to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction.
- For the demolition works, the contractor shall submit a method statement for the works as part of the WMP. The Contractor shall include in the method statement the sequence of demolition and the work programme to facilitate effective recovery of reusable and/or recyclable portions of the C&D materials at the earliest stage, so as to minimise the need for subsequent sorting.
- 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.
- Separate labelled bins shall be provided to segregate aluminium cans from other general refuse generated by the work force, and to encourage collection of by individual collectors.
- Any unused chemicals or those with remaining functional capacity shall be recycled.
- Maximising the use of reusable steel formwork to reduce the amount of C&D material.
- Prior to disposal of C&D waste, it is recommended that wood, steel and other metals shall be separated for re-use and / or recycling to minimise the quantity of waste to be disposed of to landfill.
- 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.
- Minimize over ordering of concrete, mortars and cement grout by doing careful check before ordering.

Good Site Practices

- 3.5.2 Appropriate waste handling, transportation and disposal methods for all waste arisings generated during the construction works at the SWHSTW should be implemented to ensure that construction wastes do not enter the nearby River Indus.
- 3.5.3 It is expected that adverse impacts from waste management would not arise, provided that good site practices are strictly followed. Recommendations for good site practices during construction include:
- nomination of approved personnel, such as a site manager, to be responsible for good site practices, and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility
 - 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;
 - regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;
 - a Waste Management Plan should be prepared and should be submitted to the Engineer for approval; and
 - a recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed.
- 3.5.4 In order to monitor the disposal of C&D material at landfills and public filling facilities, as appropriate, and to control fly tipping, a trip-ticket system should be included as one of the contractual requirements to be implemented by an Environmental Team undertaking the Environmental Monitoring and Audit work. The measures recommended in ETWB TCW No. 31/2004 should be followed.
- 3.5.5 In addition to the above good site practices and waste reduction measures, specific mitigation measures are recommended below for the identified waste arisings to minimise environmental impacts during handling, transportation and disposal of these wastes.

General Refuse

- 3.5.6 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. An enclosed and covered area is preferred to reduce the occurrence of 'wind blown' light material.

Construction and Demolition Material

- 3.5.7 The C&D material generated from the site formation and demolition works should be sorted on-site into inert C&D material (that is, public fill) and C&D waste. In order to minimise the impact resulting from collection and transportation of C&D material for off-site disposal, the excavated material comprising fill material should be reused

on-site as backfilling material as far as practicable. C&D waste, such as wood, plastic, steel and other metals should be reused or recycled and, as a last resort, disposed of to landfill. A suitable area should be designated within the site for temporary stockpiling of C&D material and to facilitate the sorting process.

Chemical Wastes

- 3.5.8 When 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 requirements 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. Appropriate labels should be securely attached on each chemical waste container indicating the chemical characteristics of the chemical waste, such as explosives, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed waste collector to transport and dispose of the chemical wastes in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.

3.6 *Evaluation of Residual Impacts*

- 3.6.1 With the implementation of the recommended mitigation measures for the handling, transportation and disposal of the identified waste arisings, no residual impact was anticipated during the construction and operation of the Project.

3.7 *Environmental Audit Requirements*

- 3.7.1 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 should form the basis of the site Waste Management Plan to be developed by the Contractor at the construction stage.

3.8 *Conclusions*

- 3.8.1 The environmental issues related to waste management resulting from the construction and operation of the Project have been assessed. Key issues discussed including the handling and disposal of solid wastes, such as general refuse, construction and demolition materials, produced during construction phase and the environmental implication of sludge cakes, screenings and grits generated during the operation phase.
- 3.8.2 Provided that the mitigation measures proposed for the management of solid wastes produced from the construction activities are implemented, the residual environmental impacts was expected to be minimal.

*** END ***