

6 WASTE MANAGEMENT IMPLICATIONS

6.1 Introduction

- 6.1.1 This section identifies the type of wastes that are likely to be generated from the construction activities of the Project, based on their sequence and duration, and evaluates the potential environmental impacts that may result from waste generated. Mitigation measures and good site practices, including waste handling, storage and disposal, have been recommended with reference to applicable waste legislation and management guidelines. It is unlikely for the operation of the Project to generate considerable amount of wastes, adverse environmental impacts is thus not anticipated. As a result, operation impacts related to waste management will not be further discussed.

6.2 Environmental Legislation, Policies, Plans, Standards and Criteria

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

Waste Disposal Ordinance (Cap. 354)

- 6.2.3 The Waste Disposal Ordinance (WDO) prohibits any unauthorised disposal of wastes. 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 any sludge, screenings or matter removed or generated from any desludging, desilting or dredging works. Under the WDO, wastes 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)

- 6.2.4 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 wastes. EPD has also issued the Code of Practice on the Packaging, Labelling and Storage of Chemical Waste (1992), which details how the chemical waste producers should comply with the regulations on chemical waste.

Land (Miscellaneous Provisions) Ordinance (Cap. 28)

- 6.2.5 Current policy related to the disposal of C&D materials is documented in the WBTC No.2/93, 'Public Dumps'. 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.

- 6.2.6 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)

- 6.2.7 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)

- 6.2.8 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.

6.3 Environmental Guidelines

- 6.3.1 Other guidelines with 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;
- 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.

- 6.3.2 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.

- 6.3.3 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.

6.4 Assessment Approach and Methodology

- 6.4.1 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 generated;
- 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.

6.5 Identification of Waste Sources

- 6.5.1 Construction works is envisaged to commence in 2014 and to be completed by 2016. The types of waste generated and their respective sources during the construction phase are tabulated in **Table 6.1**.

Table 6.1 Identification of Waste Types and Sources during Construction Phase of the Project

Waste Types	Sources of Waste Identified	Examples
Construction and Demolition (C&D) Materials	<ul style="list-style-type: none"> • Excavated materials generated from Cut-and-Cover (C&C) method • Materials generated from site formation and demolition works 	<ul style="list-style-type: none"> • <i>Inert C&D materials</i> Soft materials (fill, etc.); Artificial Hard Materials (AHM) (concrete, etc) • <i>Non-inert C&D materials</i> Timbers, papers and plastic etc.
Chemical waste	<ul style="list-style-type: none"> • Plant operations and maintenance • Maintenance of mechanical equipments 	<ul style="list-style-type: none"> • Oil and grease; scrap batteries; used paint and cleaners etc.
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.

- 6.5.2 It is anticipated that negligible amount of waste would arise during operation phase of the Project, therefore no adverse impacts with implications on waste management is expected. Hence, it will not be discussed further in this assessment.

6.6 Evaluation of Waste Impacts

6.6.1 The construction activities of the Project would generate a variety of wastes which could be categorized into several types based on their composition and disposal methods. The identified waste types include the following:

- Construction & Demolition Materials;
- Chemical waste; and
- General refuse.

Construction and Demolition Materials

6.6.2 C&D materials comprise inert and non-inert materials. The inert portion, such as soil, rock, concrete etc., namely the 'public dump' could be reused upon suitable sorting while the non-inert portion, such as timber, paper etc. should be properly segregated and disposed at landfills. C&D materials would be generated in the construction work of the Project and the work activities could be summarized as follow:

- Removal of existing runway pavement
- Excavation for the foundations of landscape deck;
- Excavation for the underpass and associated structures; and
- Excavation for the drains, sewers, watermain, utilities and roadworks.

6.6.3 Prior to construction work, the work areas have to be cleared to provide the construction sites. Some of the existing structures like pavements will need to be demolished, and thereby it will generate artificial hard materials (AHM). It is estimated that 9,750m³ of AHM, including broken concrete and asphalt, would be generated as part of inert C&D materials.

6.6.4 C&D materials, mainly inert soft public fill, would be generated from excavation of runway. It is estimated that the total excavated C&D material would be in the order of 163,400m³.

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

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

6.6.6 About 650m³ of non-inert C&D materials is estimated to be generated, which would be reused and recycled as much as possible before disposal at landfills. It is the Contractor's responsibility to separate the inert and non-inert C&D materials properly on site.

6.6.7 The total volume of C&D materials generated from demolition, excavation and construction works is estimated to be about 163,400m³. **Table 6.2** below presents the annual generation of C&D materials in the Project.

Table 6.2 Annual Generation of C&D Materials

	2014	2015	2016	Sub-Total
Inert C&D Materials (Soft Public Fill)	27,900	100,880	24,220	153,000
Inert C&D Material (Artificial Hard Materials – Broken Concrete and asphalt) (m ³)	5,000	4,750	-	9,750
Non-inert C&D Materials (m ³)	50	200	400	650
Total	32,950	105,830	24,620	163,400

Notes: Quantities indicated is bulk volume (1.3 times the in-situ volume)

- 6.6.8 The C&D materials generated in the Project should be sorted on-site to segregate the reusable materials and recyclable materials like metals from other materials. Steel, which has value for resale, should be separated from other materials in this regard. Primary segregation from other C&D materials should be provided to enhance the reusable volume by on-site sorting facilities. Special designated area on-site should be provided for the separated storage with proper measures in mitigating the impacts as stipulated in **Sections 6.7.2 and 6.7.3**.
- 6.6.9 C&D Materials generated would be reused on-site as far as practicable before transportation off-site. Temporary stockpiling area would be set up for storage of materials for later reuse or disposal.
- 6.6.10 The Project would have ground levelling work to satisfy the design and performance requirement for the graded roads. Subject to the actual condition of the excavated inert C&D materials (soft public fill), about 10,300m³, can be sorted and temporarily stockpiled for re-use during the backfilling of the works to the proposed ground level after completion of installation of drains, sewers, watermain works.
- 6.6.11 After evaluating the opportunities of reuse on-site, possibility of reusing the generated materials in other concurrent projects have also been investigated. Potential sites for receiving excavated materials from the Project have been identified as follows:
- Tuen Mun-Chek Lap Kok Link (TM-CLKL);
 - Liantang / Heung Yuen Wai Boundary Control Point; and
 - Wan Chai Development Phase II (WDII);
 - Central - Wan Chai Bypass and Island Eastern Corridor Link
- 6.6.12 Subject to the actual site condition / implementation programme, it is anticipated that all of the **153,000m³** excavated surplus inert C&D materials (soft public fill) could be re-used (**10,300m³** in Road D3 project and **142,700m³** in other concurrent projects). Subject to actual sites conditions, other **9,750m³** surplus inert C&D materials, in particular the existing concrete / asphalt paved surface of the Runway of the ex-Airport, shall be broken down to less than 250mm in size for re-use as bulk filling as far as possible and disposal at the PFRFs will only be considered as last resort. The remaining **650m³** non-inert C&D materials would be disposed of at designated landfills.
- 6.6.13 It is the Contractor's responsibilities to properly manage the materials generated in the work area and investigate suitable disposal methods for the materials. With careful planning for handling, storage and disposal of the C&D materials on site and proper implementation of waste management practices, secondary environmental impacts from removal of the materials and potential impacts on waste handling is expected to be minimal.

Chemical Waste

- 6.6.14 Chemical waste is likely to be generated from the maintenance and servicing of construction plant and equipment and the maintenance of vehicles during construction phase. The possible types of chemical waste may include:
- Oils and grease associated with plant;
 - Scrap batteries from vehicles maintenance;
 - Spent mineral oils or cleansing fluids from mechanical plants;
 - Used paint, cleaners, solvents used in maintaining mechanical equipments; and
 - Used solvents or solutions from equipment cleansing.
- 6.6.15 It is difficult to quantify the amount of chemical waste that may arise from the construction activities since it would depend on the Contractor's on-site maintenance requirements and the number of plants and vehicles utilized. 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 would be quantified in the Waste Management Plan (WMP) to be prepared by the Contractors.
- 6.6.16 As stipulated in the Waste Disposal (Chemical Waste) (General) Regulations, chemical wastes arisen during 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.
- 6.6.17 Chemical waste will be collected by licensed collectors and disposed of at the Chemical Waste Treatment Centre (CWTC) in Tsing Yi for appropriate treatment. Wherever possible opportunities should be taken to reuse and recycle materials. Mitigation and control requirements for chemical wastes are detailed in **Sections 6.7.18 to 6.7.21**.
- 6.6.18 The handling, storage and disposal of chemical waste would follow EPD's Code of Practice on Packaging, Labelling and Storage of Chemical Wastes and the anticipated adverse environmental impacts are not anticipated.

General Waste

- 6.6.19 During the construction period, the workforce will 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 at 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, thus waste storage area should be well maintained and cleaned regularly.
- 6.6.20 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 at landfills.

- 6.6.21 The maximum number of construction workers to be employed on the Project is estimated to be about 200 workers. Based on a generation rate of 0.65 kg per worker per day, the maximum daily arisings of general refuse during the construction period are estimated to be approximately 130kg.
- 6.6.22 With the adoption of proper waste management practices, the secondary environmental impacts from the collection and handling of general refuse are expected to be minimal.
- 6.6.23 With the implementation of waste management practices at the site (as recommended in **Section 6.7** below), adverse environmental impacts on potential hazard, air and odour emissions, noise, wastewater discharge, and public transport would not be expected from the storage, handling and transportation of refuse.

6.7 Mitigation of Adverse Environmental Impacts

Waste Management Hierarchy

- 6.7.1 The waste management hierarchy has been applied in the development of mitigation measures for waste which aims at evaluating the desirability of waste management methods. It 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.

On-site Sorting, Reuse and Recycle of Materials

- 6.7.2 Whenever materials are excavated, minimal segregation should be provided in order to enhance the reusable volume. If stockpiling is required on-site, different areas should be provided for different materials in the stockpiling area. Specific areas should also be allocated for on-site sorting of the C&D materials and other waste generated within the works area and provide temporary storage of the materials. If provision of storage area is constrained, minimal segregation into inert and non-inert C&D materials should be performed. Possible categories of waste separation are recommended below:
- Excavated materials suitable for reuse;
 - Inert C&D materials for reuse at other concurrent projects;
 - Non-inert C&D materials for disposal at landfills;
 - Chemical waste; and
 - General refuse.
- 6.7.3 Prior to transport of materials off-site, possibility of reuse should be vigorously considered which should be coupled with the practices of on-site segregation. Inert C&D materials, like soft fill material should be reused as far as practicable as filling materials before the final outlets of disposal at PFRFs. Non-inert C&D materials should also be reused or recycled before disposal at designated landfills. Metals, in particular for steel which has resalable value, should be segregated and recycled from other C&D materials.
- 6.7.4 Opportunities of reusing the inert C&D materials have been explored. Approximately 10,300m³ could be reused as backfilling materials while 142,700m³ could be beneficially used in other projects. Possible outlets of reuse (such as Tuen Mun – Chek Lap Kok Link, Liantang / Heung Yuen Wai Boundary Control Point, Wan Chai Development Phase II and Central – Wan Chai Bypass and Island Eastern Corridor Link) will be closely liaised with

during the detailed design and construction stages.

Good Site Practices and Waste Reduction Measures

- 6.7.5 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 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 waste 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.
- 6.7.6 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.
- 6.7.7 The Contractor should prepare and implement a WMP as a part of the Environmental Management Plan (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, preferably in a monthly basis, by the Contractor.
- 6.7.8 All surplus C&D materials arising from or in connection with the works should 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 on-site sorting of C&D materials and promptly removing all sorted and process materials arising from the construction activities to minimize temporary stockpiling on-site. The system should be included in the EMP identifying the source of generation, estimated quantity, arrangement for on-site sorting,

collection, temporary storage areas and frequency of collection by recycling Contractors or frequency of removal off-site.

Storage, Collection and Transport of Materials

6.7.9 Storage of materials on site may induce adverse environmental impacts if not properly managed, 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.

6.7.10 Licensed waste hauliers should be employed for the collection and transportation of waste generated. The following measures should be enforced to minimize 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.

6.7.11 In order to monitor the disposal of C&D materials and to control fly-tipping at PFRFs or landfills, a trip-ticket system should be established in accordance with DEVB TC(W) No. 6/2010. A recording system for the amount of waste generated, recycled and disposed, including the disposal sites, should also be set up. Warning signs should be put up and close-circuited television should be installed at the vehicular accesses to remind the designated disposal sites and prevent fly-tipping.

6.7.12 In addition to the above general measures, other specific mitigation measures on handling the C&D materials and materials generated from site formation and demolition work are recommended below, which should form the basis of the WMP to be prepared by the Contractor in construction phase.

C&D Materials

6.7.13 Wheel wash facilities have to be provided before the trucks leave the works area. This can reduce the introduction of dust to the public road network.

6.7.14 The load of dusty materials carried by vehicle leaving a construction site should be covered entirely by clean impervious sheeting to ensure dusty materials do not leak from the vehicle.

6.7.15 All dusty materials should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.

6.7.16 The height from which excavated materials are dropped should be controlled to a minimum practical height to limit fugitive dust generation from unloading.

- 6.7.17 The waste delivered to landfill should not contain any free water or have water content more than 70% by weight. Concerning the requirement on the truck load of waste to landfill, the haulier must ensure suitable amount of waste would be loaded on different types of trucks used.

Chemical Wastes

- 6.7.18 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

- 6.7.19 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.

- 6.7.20 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.

- 6.7.21 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.

General Refuse

- 6.7.22 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 windblown light material.

- 6.7.23 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. The non-recyclable components should be collected by licensed collectors employed by the Contractor on daily basis to avoid any adverse impacts on storage of refuse, which would be disposed of at designated landfills.
- 6.7.24 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.
- 6.7.25 **Table 6.3** provides a summary of the various waste types likely to be generated in the Project with the recommended handling methods and disposal routes.

Table 6.3 Summary of Waste Generation and Recommended Disposal Methods for Construction and Demolition Works

Waste Materials Type	Generation from work items	Materials Generated	Total Quantity Generated	Disposal Quantity	Handling methods/Reuse	Destinations
C&D Materials	Excavation, Demolition Works, and Site Formation	Inert C&D materials – Soft Public Fill, Broken Concrete and Asphalt	162,750m ³ (153,000m ³ Soft Fill + 9,750m ³ Broken Concrete and Asphalt)	10,300m ³ soft fill (reused on site), 142,700m ³ soft fill (reused in other concurrent projects), 9,750m ³ broken concrete and asphalt (reused as bulk filling as far as possible and disposal at the PFRFs will only be considered as last resort)	<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. TMCLKL, WDII, Liantang & CWB) PFRFs
		Non-inert C&D materials – Timber, Papers & Plastics	650m ³	650m 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
Chemical Waste	Maintenance and Operation of Equipments and Machineries	Oils and grease, hydraulic fluids, paints, solvents, cleaners etc.	Few cubic metres per month	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 	Chemical Waste Treatment Centre at Tsing Yi
General Refuse	Resident Workers	Food waste, plastic, aluminium cans, waste papers etc.	130kg/day	130kg/day	<ul style="list-style-type: none"> Provide on-site collection points together with recycling bins Collected by licensed collectors on daily basis 	Designated Landfills

6.8 Evaluation of Residual Impacts

- 6.8.1 With the implementation of the recommended mitigation measures as stated in **Section 6.7** for the handling, transportation and disposal of the identified waste arisings, impacts associated with waste management with regards to potential hazard, air and odour emissions, noise, wastewater discharge, and public transport is expected to be minimal.

6.9 Environmental Monitoring and Audit Requirements

- 6.9.1 During the construction period of the Project, it is the Contractor's responsibility to ensure that all waste produced is handled, stored and disposed of in accordance with good waste management practices, relevant legislation and waste management guidelines.
- 6.9.2 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 would ensure the waste generated would be properly disposed of. The Contractor would be responsible for the implementation of any mitigation measures to minimize waste or mitigate problems arisen from waste materials.
- 6.9.3 A WMP, as a 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.

6.10 Conclusion

- 6.10.1 Waste types generated by the construction activities are likely to include C&D materials (from excavation, demolition of existing structures, and site formation), general refuse from workforce and chemical waste from 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.
- 6.10.2 It is predicted that amount of waste would be generated in the operation phase of the Project, which may include silt or grit from road gullies and litter collected from road surface, is minimal, thus adverse environmental impacts in the operation phase is expected to be minimal.

