

## **7. WASTE MANAGEMENT IMPLICATIONS ASSESSMENT**

### **7.1. INTRODUCTION**

7.1.1. This section identifies the types of waste that may arise from the construction phase and operation phase of the Project and evaluates the potential environmental impacts that may be resulted from waste generated. Mitigation measures and good site practices on waste handling, storage, collection, transportation and disposal are recommended with reference to relevant waste legislation and guidelines.

7.1.2. This assessment has based on the criteria and guidelines stated in Annexes 7 and 15 of the EIAO-TM and the scope outlined in *Section 3.4.7* and Appendix E of the EIA Study Brief (No. ESB-347/2021) for evaluating and assessing waste management implications.

### **7.2. RELEVANT ENVIRONMENTAL LEGISLATION, STANDARDS AND GUIDELINES**

7.2.1. The following legislations governing waste management and disposal in Hong Kong are considered in assessing potential waste management implications:

- The Waste Disposal Ordinance (Cap.354) and subsidiary legislation such as the Waste Disposal (Chemical Waste) (General) Regulation (Cap.354C) and Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap.354N);
- Environmental Impact Assessment Ordinance (Cap. 499), Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), Annexes 7 and 15;
- Public Health and Municipal Service Ordinance (Cap. 123BK), Public Cleansing and Prevention of Nuisances Regulation; and
- Land (Miscellaneous Provisions) Ordinance (Cap. 28).

7.2.2. Other relevant documents and guidelines that are applicable to waste management and disposal in Hong Kong include:

- Development Bureau Technical Circular (Works) (TC(W)) No. 6/2010, Trip Ticket System for Disposal of Construction & Demolition Materials;
- Development Bureau TC(W) No. 8/2010 Enhanced Specification for Site Cleanliness and Tidiness;
- ETWB TC(W) No. 19/2005, Environmental Management on Construction Sites;
- ETWB TC(W) No. 22/2003 and 22/2003A, Additional Measures to Improve Site Cleanliness and Control Mosquito Breeding on Construction Sites;
- Works Bureau TC No. 12/2002, Specifications Facilitating the Use of Recycled Aggregates;

- Works Bureau TC No. 2/93, Public Dumps;
- Works Bureau TC No. 2/93B, Public Filling Facilities, Works Branch, Hong Kong Government;
- Works Bureau TC No. 12/2000, Fill Management;
- Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes (1992), EPD, Hong Kong Government;
- *Section 4.1.3* of Chapter 4 of the Project Administration Handbook (PAH) for Civil Engineering Works, Management of Construction/Demolition Materials including Rocks. (Subsumed from WBTC Nos. 25/99, 25/99A, 25/99C and ETWB TC(W) No.33/2002);
- DEVB TC(W) No. 09/2011, Enhanced Control Measures for Management of Public Fill;
- Hong Kong Planning Standards and Guidelines, 2022 (Planning Department (PlanD));
- A Guide to the Chemical Waste Control Scheme (EPD); and

#### Construction Waste

- 7.2.3. The *Waste Disposal Ordinance (WDO)* prohibits the unauthorized disposal of wastes. Construction waste is defined under *Waste Disposal (Charges for Disposal of Construction Waste) Regulation* 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. It is specified under the *WDO* that wastes can only be disposed of at designated waste disposal facilities (e.g. landfill, public fill reception facility, etc.) licensed by EPD.
- 7.2.4. Under the *Waste Disposal (Charges for Disposal of Construction Waste) Regulation*, construction waste delivered to a landfill for disposal must not contain more than 50% by weight of inert C&D materials. Construction waste delivered to a sorting facility for disposal must contain more than 50% by weight of inert C&D materials, and construction waste delivered to a Public Fill Reception Facility for disposal must consist entirely of inert C&D materials. For construction work with a value of more than HK\$1 million, the Main Contractor is required to establish a billing account at EPD prior to transporting any construction waste to the designated waste disposal facilities. The vessels for delivering construction waste to the Public Fill Reception Facilities require prior approval from the Public Fill Committee (PFC). Any violation of these regulations may lead to fine and/or imprisonment.
- 7.2.5. *Land (Miscellaneous Provisions) Ordinance* provides control on dumping at public fill reception facility. It is specified that the inert C&D materials (also called public fill) may be taken to Public Fill Reception Facilities which are operated by the Civil Engineering and Development Department (CEDD). The Ordinance requires dumping licenses to be obtained by individuals or companies who deliver inert C&D materials to Public Fill Reception Facilities. The CEDD issues the licences under delegated powers from the Director of Lands.

Under the licence conditions, Public Fill Reception Facilities will only accept inert earth, soil, sand, rock, boulder, rubble, brick, tile, concrete, asphalt, masonry or used bentonite.

- 7.2.6. In accordance with *Development Bureau Technical Circular (Works) (TC(W)) No. 6/2010 "Trip Ticket System for Disposal of Construction and Demolition Materials"*, the PFC will advise on the acceptance criteria for disposal of inert Construction & Demolition (C&D) materials at Public Fill Reception Facilities. For contracts where the estimated amount of non-inert C&D materials requiring disposal at landfill facilities equals to or exceeds 50m<sup>3</sup>, the project office shall seek confirmation from the DEP in terms of the availability of landfill facilities for disposal of such materials and the DEP will designate landfill facilities, if available, for the contracts. For contracts where the estimated amount of non-inert C&D materials to be generated from the contract is less than 50m<sup>3</sup>, the project office is not required to apply to DEP for designated landfill facilities but it should still specify in the tender documents of the appropriate landfill facilities for disposal.
- 7.2.7. *Public Health and Municipal Service Ordinance (Cap. 132BK)- Public Cleansing and Prevention of Nuisances Regulation* provide further control on the illegal dumping of wastes in public places.

#### Chemical Waste

- 7.2.8. Chemical wastes may pose environmental, health and safety hazards. These hazards may include:
- Toxic effects to workers;
  - Adverse effects on air quality, water quality and land contamination due to spillage;
  - Hazards of fire; and
  - Disruption of downstream sewage treatment works if the chemical waste enters the sewerage system.
- 7.2.9. *Waste Disposal (Chemical Waste) (General) Regulation* provides for control of all aspects of chemical waste disposal, including handling, storage, collection, transportation and disposal of waste. Chemical waste is defined by the Regulation as any substance or thing being scrap material, effluent, or an unwanted substance or by-product arising from the application of or in the course of any process or trade activity, and which is or contains any substance or chemical specified in the prescribed schedule if such substance or chemical occurs in such form, quantity or concentration so as to cause pollution and constitute danger to health or risk of pollution to the environment.
- 7.2.10. Under the *Waste Disposal (Chemical Waste) (General) Regulation*, all producers of chemical waste must register with EPD or else it will be an offence and is liable to fine and/or imprisonment. The regulation requires waste producers to arrange proper packaging, labelling and storage of chemical waste before they are transported off-site to disposal facilities, in order to safeguard the health and safety of workers and the general public and to minimise potential hazards arising from improper handling of chemical waste. These requirements apply also to temporary storage of chemical waste prior to on-site or in-house

treatment. Registered chemical waste producers must treat their waste at an on-site plant licensed by EPD or by licensed collector to transport the wastes to a licensed facility.

#### General Refuse

- 7.2.11. The existence of a construction site, along with its workforce and the accompanying site office, will lead to the production of general refuse, primarily composed of food waste, waste papers, plastic containers, glass bottles and aluminium cans. Proper off-site disposal will be necessary for this waste. Storing this general waste has the potential to cause negative environmental effects, including the possibility of unpleasant odours if waste collection is infrequent, scattered litter due to wind, potential water quality degradation if waste enters nearby water bodies, and visual disturbances.

### **7.3. ASSESSMENT METHODOLOGY**

- 7.3.1. The assessment of waste management implications from the construction activities of the Project has been conducted in accordance with Annex 7 and Annex 15 of the EIAO-TM and the EIA Study Brief, including the following tasks:

- Identification of types and quantities of waste arising from various construction activities based on the latest understandings;
- Evaluation of opportunities for waste reduction, re-use and recycling on-site or off-site;
- Identification of disposal options, transportation routing and frequency for each type of waste;
- Evaluation of potential impacts from the handling, storage, collection, transportation and disposal of waste with respect to potential hazards, air and odour emissions, noise, wastewater discharges and public transport; and
- Proposing of mitigation measures and evaluation of residual impact.

- 7.3.2. The waste management hierarchy has been applied in the assessment and development of mitigation measures for waste arising from the Project. The waste management hierarchy is a concept which shows the desirability of various waste management methods and comprises the following in order of descending preference:

- (a) Avoidance;
- (b) Minimisation;
- (c) Recycling/reuse;
- (d) Treatment; and
- (e) Disposal.

## 7.4. IDENTIFICATION AND EVALUATION OF ENVIRONMENTAL IMPACTS

### *Construction Phase*

7.4.1. It is anticipated that the following key construction activities will generate a variety of wastes:

- Site Preparation and Road Works;
- Excavation and Foundation; and
- Construction of Annex Block and Refurbishment of Red House

7.4.2. The construction activities to be carried out for the construction of the Project would generate a variety of wastes that can broadly be divided into distinct categories based on their composition, timing of waste generation and ultimate disposal methods. The identified waste types associated with these activities include:

- C&D materials;
  - Inert C&D materials
  - Non-inert C&D materials
- Chemical waste; and
- General refuse.

7.4.3. Referring to the *Asbestos Investigation Report* prepared by the Registered Asbestos Consultant for the existing Red House and White House in [Appendix 7.1](#), Red House is a building built in 1922 with one storey. No asbestos containing materials are identified in Red House, hence asbestos containing wastes is not anticipated.

### *Operation Phase*

7.4.4. In general, waste generated during the operation phase will be primarily from typical office activities, including food waste, waste paper, plastic containers, glass bottles and aluminium cans.

7.4.5. As mentioned in *Section 2.3.1*, laboratory, workshop and battery room are to be provided at the new Annex Block. As confirmed by HKO, the Calibration Laboratory is for testing and calibration of electronic meteorological equipment. Electronics Workshop is for repairing and maintenance electronic meteorological equipment. Wasted lead-acid batteries are not generated from Electronics Workshop. 4 no. and 11 no. of staff will be regularly stationed in Calibration Laboratory and Electronics Workshop respectively. No special waste, including chemical waste, will be generated from equipment testing, calibration, repair, and maintenance.

7.4.6. The Battery room of MDCC is for housing batteries for uninterruptible power systems to support the MDCC Server Room. Wasted batteries and other chemical waste will not be generated in routine operation and maintenance of the equipment in the battery room. No

staff will regularly station and be working in the Battery room. Staff will only work there for repair and maintenance in case of need. Therefore, no special waste (e.g. chemical waste, radioactive waste) is expected to be generated in the operation phase of the new Annex Block.

## 7.5. EVALUATION OF IMPACTS

### C&D Materials

- 7.5.1. With reference to the *ETWB TC(W) No.19/2005*, Environmental Management on Construction Site, C&D materials mean both inert and non-inert materials generated from construction activities. Demolition activities are not anticipated. The inert portion of the C&D materials includes soil, building debris, broken rock, concrete, etc., and the non-inert portion comprises timber/woody materials, paper, plastics, general refuse, etc.
- 7.5.2. During the planning and design of the general Project layout, construction method and construction programme, considerations have been given to minimize the generation of inert C&D materials and maximize the reuse of the inert C&D materials for construction works.
- 7.5.3. Project layout is well planned and designed so that the quantity of construction materials can be predicted accurately and prevent over ordering and reduce wastage.
- 7.5.4. Although socketed H-Pile are selected as the piling method which generates more C&D materials, they minimise the prolonged adverse environmental impacts. With the implementation of good site practice, C&D materials generated by socketed H-Piles should be minimised. Also, innovative construction methods are adopted to enhance construction waste management. For example, the construction will adopt Modular Integrated Construction (MiC) and Building Information Modelling (BIM) tools.
- 7.5.5. Construction programme was developed in order to strike a balance between operation needs and environmental considerations. In view of the close proximity to nearby existing residences, sufficient time is allowed for the construction works so as to avoid concurrent works carried out onsite and thus minimize the waste impact to the residence, while not over-prolonging the duration of construction.
- 7.5.6. The total C&D materials generated from the Project will be arising from site preparation and road works, excavation and foundation, and construction of the new Annex Block and the refurbishment of the Red House. They shall be minimised by careful planning during detailed design and good site practice during construction period.

### Inert C&D materials

- 7.5.7. Inert C&D materials are mainly comprised of excavated materials for site preparation and road works and excavation and foundation works. A small amount of inert C&D materials is also generated from refurbishment of the Red House. The estimated quantity of inert C&D materials generated during construction phase is summarized in **Table 7-1**.

**Table 7-1 Summary of Inert C&D Materials Arising from the Project**

Work Stage	Estimated Quantity			Estimated No. of Truck Trips Required per day
	Generated	Re-used onsite	Delivered to fill bank	
Site Preparation and road works	691m <sup>3</sup>	138m <sup>3</sup>	553m <sup>3</sup>	3
Excavation and Foundation	6,210m <sup>3</sup>	1,242m <sup>3</sup>	4,968m <sup>3</sup>	4
Construction of Annex Block and Refurbishment of Red House	456m <sup>3</sup>	91m <sup>3</sup>	365m <sup>3</sup>	1
<b>Total</b>	<b>7,357m<sup>3</sup></b>	<b>1,471m<sup>3</sup></b>	<b>5,886m<sup>3</sup></b>	<b>Maximum No. of truck trips per day: 4</b>

- 7.5.8. A total of 7,357m<sup>3</sup> of inert C&D materials will be generated. Approximate 20% (1,471 m<sup>3</sup>) inert C&D material could be reused on-site as filled material, resulting in a delivery of about 5,886m<sup>3</sup>. Assuming a capacity of 7m<sup>3</sup> per truck, bulk factor of 1.4, 25 working days a month and the works will not be conducted simultaneously, it is estimated that a maximum of 4 truck trips per day would be required for the delivery of inert C&D materials at Tseung Kwan O Area 137 Fill bank. The delivery site of inert C&D materials is subject to the designation by the PFC according to the *DEVB TC(W) No.6/2010*.
- 7.5.9. In view of the estimated number of dump trucks arising from the transportation of inert C&D materials, the impacts from transportation off-site are expected to be limited.

#### Non-inert C&D Materials

- 7.5.10. The majority of non-inert C&D materials are comprised of materials generated from land-based works, including topsoil, dead vegetative materials, glass, steel, plastics, paper, and timber/ woody material.
- 7.5.11. A total of 1,781m<sup>3</sup> of non-inert C&D materials, mainly top soil, will be generated during the construction phase. The estimated quantity of non-inert C&D materials is summarized in **Table 7-2**. Such materials will be sorted for reuse and recycling as far as possible before disposal to landfill. The estimated non-inert C&D materials recycling rate would be up to 30%. It is estimated that 534m<sup>3</sup> of the non-inert C&D materials would be recycled, resulting in the disposal of about 1,247m<sup>3</sup>.

**Table 7-2 Summary of Non-inert C&D Materials Arising from the Project**

Work Stage	Estimated Quantity			Estimated No. of Truck Trips Required per day
	Generated	Recycled off-site	Disposal	
Site Preparation and road works	374m <sup>3</sup>	112m <sup>3</sup>	262m <sup>3</sup>	1
Excavation and Foundation	1,104m <sup>3</sup>	331m <sup>3</sup>	773m <sup>3</sup>	1
Construction of Annex Block and Refurbishment of Red House	303m <sup>3</sup>	91m <sup>3</sup>	212m <sup>3</sup>	1
<b>Total</b>	<b>1,781m<sup>3</sup></b>	<b>534m<sup>3</sup></b>	<b>1,247m<sup>3</sup></b>	<b>Maximum No. of Truck Trips per day: 1</b>

- 7.5.12. Non-inert C&D materials will be considered for reuse/recycling as far as possible before disposal. Timber/ woody materials from site preparation works will be sent to the Yard Waste Recycling Centre in Y-Park for recycling as far as possible. Surplus non-inert C&D materials are proposed to be disposed at West New Territories (WENT) Landfill at Tuen Mun. The designated disposal site of non-inert C&D materials shall be confirmed with the EPD. Since the works will not be conducted simultaneously, it is estimated that a maximum of 1 truck trip per day would be required for the disposal at WENT Landfill.
- 7.5.13. The separated recyclable non-inert C&D materials shall be collected by recycling companies for off-site reuse or recycling. The control measures proposed in *Section 10.6* shall be followed for the management of non-inert C&D materials.
- 7.5.14. The summary of C&D materials arising during the construction phase is summarised in *Table 7-3*.



**Table 7-3 Summary of C&D Materials**

Types of C&D Materials	Estimated Quantity				Disposal Options	Maximum No. of Truck Trips Required per day
	Reused on-site	Recycled off-site	Disposal/Delivery	Total		
Inert C&D materials	1,471m <sup>3</sup>	-	5,886m <sup>3</sup>	7,357m <sup>3</sup>	Tseung Kwan O Area 137 Fill bank*	4
Non-inert C&D materials	-	534m <sup>3</sup>	1,247m <sup>3</sup>	1,781m <sup>3</sup>	WENT Landfill #	1
<b>Total</b>	<b>1,471m<sup>3</sup></b>	<b>534m<sup>3</sup></b>	<b>7,133m<sup>3</sup></b>	<b>9,138m<sup>3</sup></b>		

Remarks: \*Delivery site is subject to the designation by the PFC according to the DEVB TC(W) No.6/2010  
#Disposal site of non-inert C&D materials shall be subject to confirmation with EPD

- 7.5.15. All C&D materials will need to be carefully stockpiled if it cannot be reused or removed directly to avoid dust and other nuisance impacts. A specific stockpiling area of C&D materials must be provided on site. The tentative location of proposed stockpiling area is shown in [Figure 7.1](#). No construction work is allowed to proceed until all issues on management of C&D materials have been resolved and all relevant arrangements have been agreed between the responsible Government departments and Contractors.
- 7.5.16. With the implementation of proper management for C&D materials and good site practices shown in *Section 7.6*, no unacceptable environmental and public transport impacts due to the handling and disposal of C&D materials arising from the Project are anticipated.

#### Chemical Waste

- 7.5.17. Chemical waste is defined in the *Cap 354C Waste Disposal(Chemical Waste) (General) Regulation*. Where the construction processes produce chemical waste, the Contractor must register with EPD as a chemical waste producer. Chemical waste that is likely to arise from the construction activities for the Project includes:
- Used paints, engine oils, hydraulic fluids and waste fuel;
  - Scrap batteries
  - Spent mineral oils / cleansing fluids from machineries; and
  - Spent solvent / solutions, some of which may be halogenated, from equipment cleansing activities.

- 7.5.18. Accidental spillages of chemicals in the works area may contaminate the top soils on exposed ground/ earth. It may also penetrate and percolate into deeper soil and groundwater. The contaminated soil particles may be washed away by construction runoff causing water pollution.
- 7.5.19. Chemical wastes pose environmental and health and safety hazards if not stored and disposed of in an appropriate manner as outlined in the *Waste Disposal (Chemical Waste) (General) Regulation*. These hazards include:
- Toxic effects to workers;
  - Adverse effects on water quality and land from spill; and
  - Fire hazards.
- 7.5.20. The amount of chemical waste to be generated throughout construction phase cannot be accurately predicted at this stage as it largely depends on the Contractor's housekeeping measures. It is expected the quantities of chemical waste will be small (less than 100L per month), which include oil / grease, cleaning fluids, solvents, lubrication oil, scrap batteries and fuel, used oil filter. The amount of chemical waste to be generated would be quantified in the WMP to be prepared by the Contractors. Given that the chemicals generated are to be handled, stored, collected, transported and disposed of by licensed chemical waste collectors, in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*, impacts such as potential land contamination, hazard and spillage will not be anticipated.

#### General Refuse

- 7.5.21. General refuse such as food waste, waste papers, plastic containers, glass bottles and aluminium cans, etc, will be generated by the construction workforce during construction phase of the Project.
- 7.5.22. Since no information regarding the number of on-site workers is available at this stage of the Project, it has been assumed that a maximum of 70 workers will work simultaneously at the Project site during the construction phase of the Project. The quantity of general refuse to be generated per day is therefore estimated to be 45.5 kg (assuming a waste generation rate of 0.65 kg per person per day and the density of the general refuse is 1029 kg/ m<sup>3</sup>) and the total amount generated during the construction period is therefore estimated to be 48 m<sup>3</sup> (assuming 25 working days a month and the construction phase approximately to be 43 months).
- 7.5.23. Recycling bins for waste papers, plastic containers, glass bottles and aluminium cans which should be provided and recyclables should be collected by contracted collectors to maximize reuse and recycle volume. For other non-recyclable general refuse, the Contractor shall employ a reliable waste collector to separate general refuse from C&D materials and remove general refuse from the site to WENT Landfill. The quantity of the general refuse is included in the non-inert C&D materials with an anticipation of no more than 1 trip per day, given an average truck capacity of 7m<sup>3</sup>. The impacts arising from increased traffic loading would be limited. With proper on-site handling and storage as well as regular disposal of the wastes, no adverse impact is envisaged.

Transportation Arrangement for Waste Disposal

- 7.5.24. No barging points or conveyor systems would be established for the Project. Land transport would be used for the disposal of waste to designated disposal outlets. The tentative transportation routes for the disposal of various waste are summarized in **Table 7-4**. The transportation routings may change subject to the actual traffic conditions. All dump trucks should be equipped with GPS or equivalent system for the monitoring of their travel routings and parking locations to prohibit illegal dumping and landfilling of C&D materials. No adverse impact is envisaged with the implementation of appropriate mitigation measures such as using trucks with covering and enclosed containers.

**Table 7-4 Tentative Transportation Routings for Waste Disposal**

Type of waste	Disposal Outlet	Tentative Transportation Routing
Inert C&D Materials	Tseung Kwan O Area 137 Fill Bank	Via Nathan Road, Chatham Road, East Kowloon Corridor, Kai Tak Tunnel, Kwun Tong Bypass, Tseung Kwan O Road, Tsueng Kwan O Tunnel, Tsueng Kwan O Tunnel Road and Wan Po Road
Non-inert C&D Materials	WENT Landfill	Via Nathan Road, Salisbury Road, Kowloon Park Drive, Canton Road, Austin Road West, Lin Cheung Road, Hing Wah Street West, Tsing Sha Highway, Cheung Tsing Highway, Tsing Long Highway, Ting Kau Bridge, New Territories Circular Road – Tuen Mun Road, Wong Chu Road, Lung Fu Road, Lung Mun Road, Lung Kwu Tan Road, Nim Wan Road
Chemical Waste	Chemical Waste Treatment Centre (CWTC) or other licensed facilities	Via Salisbury Road, Kowloon Park Drive, Canton Road, Austin Road West, Lin Cheung Road, West Kowloon Highway, Tsing Kwai Highway, Kwai Tsing Road, Tsing Yi Road
General Refuse	WENT Landfill	Via Nathan Road, Salisbury Road, Kowloon Park Drive, Canton Road, Austin Road West, Lin Cheung Road, Hing Wah Street West, Tsing Sha Highway, Cheung Tsing Highway, Tsing Long Highway, Ting Kau Bridge, New Territories Circular Road – Tuen Mun Road, Wong Chu Road, Lung Fu Road, Lung Mun Road, Lung Kwu Tan Road, Nim Wan Road

### ***Operation Phase***

- 7.5.25. Provided that waste is stored and handled properly and disposed of at regular intervals, no special wastes (e.g. chemical waste, radioactive waste) are expected to be generated in the operation phase of the new Annex Block. During operation phase, general refuse, including food waste, paper, plastic containers, aluminium cans and glass bottles, would be generated by staff and office activities. Based on the latest waste statistics in *Monitoring of Solid Waste in Hong Kong-Waste Statistics for 2021*, there is a generation rate of 0.59 kg per person per day for commercial waste. As referred to in *Section 2.4.2*, the total number of staff present on-site is estimated to be 127 per day, which generated about 75 kg of general refuse daily during the operation. Recyclables like plastic containers, papers, glass bottles and aluminium cans should be separated from general refuse and delivered to the local recyclers to maximise reuse and recycle volume. Other non-recyclable general refuse would be collected by licensed collectors daily and disposed of at WENT Landfill.
- 7.5.26. Provided that a sufficient number of trash bins and recycling bins (which are enclosed/covered with lids) have already been provided and will be retained for the collection of general refuse generated, no unacceptable environmental impact is anticipated. Therefore, environmental impacts associated with waste management are not expected during the operation of the new Annex Block and the refurbished Red House.

## **7.6. MITIGATION MEASURES**

### ***Construction Phase***

#### General

- 7.6.1. Adverse impact from waste management is not expected with the implementation of waste management hierarchy, i.e. in order of desirability: avoidance, minimization, recycling/reuse, treatment and disposal of waste.
- 7.6.2. The Contractor shall provide training for site staff on the concept of site cleanliness, chemical handling procedures and appropriate waste management procedures, including waste reduction, reuse and recycle.
- 7.6.3. The Contractor shall develop and provide toolbox talk for on-site sorting of C&D materials to enhance workers' awareness in handling, sorting, reuse and recycling of C&D materials. Requirements for staff training shall be included in the Contractor's Environmental Management Plan (EMP). WMP should be prepared as part of the EMP and submitted to the Engineer for approval before the commencement of work in accordance with *ETWB TC(W) No. 19/2005*.
- 7.6.4. Good planning and site management practices shall be employed to eliminate over ordering or mixing of construction materials and reduce wastage. Proper storage and site practices will minimize the damage or contamination of construction materials.
- 7.6.5. Where waste generation is unavoidable, the potential for recycling or reuse shall be considered. If waste cannot be recycled, disposal routes described in the EMP shall be

followed. The amount of waste generated, recycled, and disposed shall be recorded. Trip-ticket system shall also be implemented in accordance with *Development Bureau TC(W) No. 6/2010* to monitor the disposal of C&D material and control fly-tipping.

#### Good Site Practice

7.6.6. The proposed good site practices are as below:

- The Contractor shall nominate approved personnel, such as a site manager to be responsible for implementation of good site practices, arrangements for waste collection and effective disposal to an appropriate facility;
- The EMP incorporating waste management shall be prepared in accordance with the requirements set out in *ETWB TC(W) No. 19/2005*. The EMP shall include monthly and yearly Waste Flow Tables that indicate the amounts of waste generated, recycled and disposed of (including final disposal site), and which shall be regularly updated;
- The reuse/ recycling of all materials on site shall be investigated prior to treatment/ disposal off-site;
- Proper site practices shall be adopted from the commencement of works to avoid the generation of waste, reduce cross contamination of waste and to promote waste minimization;
- The Contractor shall comply with all relevant statutory requirements and guidelines and their updated versions that may be issued during the course of project construction;
- Adoption of appropriate measures to minimise windblown litter and dust during transportation of waste such as by either covering trucks or by transporting wastes in enclosed containers; and
- Adoption of a recording system for the amount of wastes generated, recycled and disposed (including the disposal sites).

7.6.7. Recommendations to achieve waste reduction are discussed as follow:

#### Waste Reduction Measures

- Encourage collection of aluminium cans, glass bottles, paper and plastic containers by providing separate labelled bins to enable these wastes to be segregated from other general refuse generated by the workforce;
- 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;
- Make provisions in contract documents to allow and promote the use of recycled aggregates where appropriate;
- Minimize over-ordering and wastage through careful planning during purchasing of construction materials;

- Use of steel formwork instead of timber formwork to reduce the generation of timber waste;
- Proper site practices to minimise the potential for damage or contamination of inert C&D materials; and
- Plan the delivery and stock of construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.

7.6.8. Recommended mitigation measures to be implemented throughout the course of the construction of the Project include:

#### C&D Materials

- All C&D materials shall be sorted on-site into inert and non-inert C&D materials, and where the materials can be recycled or reused, they shall be further segregated during stockpiling and transportation. Inert material, or public fill, will comprise stone, rock masonry, brick, concrete and soil which is suitable for land reclamation and site formation whilst non-inert C&D materials include all other wastes generated from the construction process such as packaging;
- The Contractor shall be responsible for identifying what materials can be reused/recycled, whether on-site or off-site. In the event of the latter, the Contractor shall make arrangements for the collection of the recyclable materials. Collected Timber and woody materials will be delivered to Yard Waste Recycling Centre in Y-Park as far as possible. Any remaining non-inert C&D materials shall be collected and disposed of at landfills whilst any inert C&D materials shall be re-used on site as far as possible. Alternatively, if no use of the inert material can be found on-site, the materials can be delivered to Public Fill Reception Facilities after obtaining the appropriate licence;
- With reference to *Development Bureau TC(W) No. 6/2010*, a trip ticket system shall be established at the outset of the construction to monitor the disposal of C&D materials and solid wastes from the site to public filling facilities and landfills. A recording system for the amount of waste generated, recycled and disposed, including the disposal sites, should also be set up. CCTV should also be installed at the vehicular entrance and exit of the site as additional measures to prevent fly-tipping;
- All dump trucks should be equipped with GPS or equivalent system for the monitoring of their travel routings and parking locations to prohibit illegal dumping and landfilling of C&D materials.
- C&D materials shall be properly covered with tarpaulin or similar impervious sheeting to prevent dust nuisance and site runoff especially when heavy rain storms are predicted;
- Ensuring secure containment of waste materials, such as soil, to minimize the risk of pollution.
- Land intake of stockpile areas should be minimised as far as possible. Surface of stockpiled soil should be regularly wetted with water especially during dry season where disturbance should be minimised;

- Prior to disposal off-site, non-inert C&D materials will have to be temporarily put in a suitably covered storage area where it will have to be regularly cleaned and maintained to avoid attracting vermin and pests; and
- Dump trucks with mechanical cover shall be used to minimize windblown litter and dust during transportation of waste.

#### Chemical Waste

- Under the *Waste Disposal (Chemical Waste) (General) Regulation*, the Contractor shall be registered as Chemical Waste Producer if chemical wastes such as spent lubricants and paints are generated on site. Only licensed chemical waste collectors shall be employed to collect chemical waste generated at site. The handling, storage, collection, transportation, and disposal of chemical wastes shall be conducted in accordance with the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* and *A Guide to the Chemical Waste Control Scheme*, both published by EPD;
- Suitable containers shall be used for specific types of chemical wastes. The containers shall be properly labelled (in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations), resistant to corrosion, stored safely and closely secured to prevent spillage/leakage in the vicinity. Stored volume shall not be kept more than 450 litres unless the specification has been approved by the EPD. Storage area shall be enclosed by three sides by a wall, partition of fence that is at least 2m height or height of tallest container with adequate ventilation and space;
- Lubricants, waste oils and other chemical wastes are likely to be generated during the maintenance of vehicles and mechanical equipment. 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;
- The registered chemical waste producer (i.e. the Contractor) has to arrange for the collection of chemical waste by a licensed chemical waste collector. The licensed chemical waste collector should regularly take chemical waste to a licensed chemical waste treatment facility (such as the CWTC in Tsing Yi);
- No lubricants, oils, solvents or paint products should be allowed to discharge into water courses, either by direct discharge, or as contaminants carried in surface water runoff from the construction site; and
- Drip tray should be provided to chemical waste containers. The drip tray should be cleaned up regularly. Clean up should be done before foreseeable inclement weather such as typhoon or heavy rain.

#### General Refuse

- A sufficient number of covered bins shall be provided on site for the containment of general refuse to prevent visual impacts and nuisance to the sensitive surroundings. These bins shall be cleared daily and the collected waste disposed of to the refuse transfer station. Further to the issue of *Development Bureau TC(W) No. 8/2010*, the

Contractor is required to maintain a clean and hygienic site throughout the Project works;

- Recyclable materials such as waste papers, plastic containers, glass bottles and aluminium cans shall be separated and delivered to the local recyclers;
- General refuse generated on-site shall be stored in enclosed bins or skips and collected separately from other construction and chemical wastes and disposed of at designated landfill by reliable waste collector. The removal of waste from the site shall be arranged on a daily basis or at least on every second day by the Contractor to minimize any potential odour impacts, the presence of pests, vermin and other scavengers and prevent unsightly accumulation of waste; and
- Disposal of general refuse is recommended before foreseeable inclement weather such as typhoon or heavy rain.

### ***Operation Phase***

7.6.9. Waste collection facilities (e.g. litter bins) and recycling bins for waste paper, plastic containers, glass bottles and aluminium cans shall be provided. Other non-recyclable general refuse would be collected by licensed collectors daily and disposed of at WENT Landfill.

7.6.10. General refuse shall be removed on a daily basis to minimize potential odour, pest and litter impact.

## **7.7. RESIDUAL IMPACTS**

7.7.1. With the implementation of the recommended mitigation measures for the handling, collection, transportation and reuse/disposal of the identified waste arising, no adverse residual impacts are anticipated during construction phase of the Project.

## **7.8. ENVIRONMENTAL MONITORING AND AUDIT**

7.8.1. It would be the Contractor's responsibility to ensure that any waste produced during construction of the Project are handled, stored, collected, transported and disposed of in accordance with good waste management practices and relevant regulations and requirements.

7.8.2. It is recommended that during the construction phase, site inspections and supervision of waste management procedures and auditing of the effectiveness of implemented mitigation measures should be carried out on a monthly basis. These tasks shall be scheduled in the EMP prepared by the Contractor, and a summary of the site audits shall be presented in the EM&A report.

7.8.3. Given the nature of use of the Project, waste generated during the operation phase will be from typical office activities such food waste, waste papers, plastic containers, glass bottles and aluminium cans. There is no environmental monitoring and audit requirement considered necessary during the operation phase.



## 7.9. CONCLUSION

- 7.9.1. Prior to considering the disposal methods for different types of waste, general layout, construction methods and programme are fully examined to minimise the generation of inert C&D materials.
- 7.9.2. While waste generation during the construction phase is inevitable, the type, quantity, and timing for the generation of waste have been assessed. The major waste types generated from the Project are C&D materials from site preparation and road works, excavation and foundation works, construction of Annex Block and Refurbishment of Red House; chemical waste from maintenance of construction plant and equipment and general refuse from the workforce.
- 7.9.3. Approximately 7,357m<sup>3</sup> of inert C&D materials would be generated of which 1,471m<sup>3</sup> would be reused on-site and 5,886m<sup>3</sup> would be delivered to Tseung Kwan O Area 137 Fill bank. Approximately 1,781m<sup>3</sup> of non-inert C&D materials would be generated of which 534m<sup>3</sup> would be recycled and 1,247m<sup>3</sup> would be disposed of at WENT Landfill. It is estimated that less than 100 litres of chemical waste would be generated per month and collected by licensed chemical waste collector for disposal at licensed treatment facilities. About 45.5 kg of general refuse would be generated per day. Recyclables like plastic containers, papers, glass bottles and aluminium cans should be separated from general refuse and delivered to the local recyclers. Non- recyclables are collected by waste collector for disposal of at waste transfer/disposal facilities and then to landfill.
- 7.9.4. Monthly site inspections shall be conducted during construction phase to ensure the mitigation measures are implemented properly. A summary of the site audits shall be presented in the EM&A report.
- 7.9.5. Due to the nature of the Project, waste paper and general refuse would be the main type of waste to be generated during the operation phase. About 75 kg of general refuse would be generated per day. Recyclables should be treated with the same measures as in construction phase.
- 7.9.6. No special wastes (e.g. chemical waste, radioactive waste) are expected to be generated in the operation phase of the Project.
- 7.9.7. With the implementation of the mitigation measures during the construction and operation phases of the Project, no significant impact on waste management is anticipated.

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