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6. WASTE MANAGEMENT IMPLICATIONS

6.1 Introduction

6.1.1 This *Section* identifies the potential wastes arising from the construction and operation of the Project and evaluates the potential environmental impacts associated with the storage, handling, transportation and disposal of the wastes.

6.2 Legislations, Standards and Guidelines

6.2.1 The criteria for evaluating waste management implications are stated in *Annex 7* of the *EIAO-TM*. *Annex 15* of the *EIAO-TM* prescribes the general approach and methodology for assessing the waste management implications caused by a project or proposal.

6.2.2 The following legislation relates to the handling, treatment and disposal of wastes in Hong Kong which are relevant to the Project, and is used in assessing potential impacts related to waste management of the Project:

- *Waste Disposal Ordinance (Cap. 354)*;
- *Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N)*;
- *Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C)*;
- *Land (Miscellaneous Provisions) Ordinance (Cap. 28)*;
- *Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation*; and
- *Dumping at Sea Ordinance (Cap. 466)*.

Waste Disposal Ordinance (WDO) (Cap. 354)

6.2.3 The *WDO* prohibits the unauthorised disposal of wastes, with waste defined as any substance or article which is abandoned. Under the *WDO*, wastes can only be disposed of at licensed waste disposal facilities licensed by Environmental Protection Department (EPD).

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

6.2.4 The *Waste Disposal (Charges for Disposal of Construction Waste) Regulation* defined construction waste as any substance, matters or things 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, screening, or matter removed in or generated from any desludging, desilting or dredging works.

- 6.2.5 The *Construction Waste Disposal Charging Scheme* came into operation on 1 December 2005. Processing of account applications by the EPD started on the same day. A contractor who undertakes construction work with value of HK\$1 million or above is required to open a billing account solely for the contract. Charging for the disposal of construction waste started on 20 January 2006.
- 6.2.6 Depending on the percentage of inert materials in the waste, construction waste can be disposed of at public fill reception facilities, construction waste sorting facilities, landfills and outlying islands transfer facilities, where differing disposal costs would be applied. This scheme encourages waste reduction and hence minimise the costs of the contractor or project proponent.
- 6.2.7 **Table 6.1** summarises the Government waste disposal facilities for construction waste.

Table 6.1 - Government Waste Disposal Facilities for Construction Waste

Government Waste Disposal Facilities	Type of Construction Waste Accepted
Public fill reception facilities	Consisting entirely of inert construction waste ^(a)
Sorting facilities	Containing more than 50% by weight of inert construction waste ^(a)
Landfills ^(b)	Containing not more than 50% by weight of inert construction waste ^(a)
Outlying Islands Transfer Facilities ^(b)	Containing any percentage of inert construction waste ^(a)
Notes:	
(a) Inert construction waste means rock, rubble, boulder, earth, soil, sand, concrete, asphalt, brick, tile, masonry or used bentonite.	
(b) If a load of waste contains construction waste and other wastes, that load will be regarded as consisting entirely of construction waste for the purpose of calculating the applicable charge.	

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

- 6.2.8 Chemical waste as defined under the *Waste Disposal (Chemical Waste) (General) Regulation* includes any substance being scrap material, or unwanted substances specified under Schedule 1 of the Regulation, if such a substance or chemical occurs in such a form, quantity or concentration so as to cause pollution or constitute a danger to health or risk of pollution to the environment.
- 6.2.9 Chemical waste producers shall register with the EPD. Any person who contravenes this requirement commits an offence and is liable to a fine and imprisonment. Producers of chemical wastes must treat their wastes, utilising on-site plants licensed by the EPD or have a licensed collector take the wastes to a licensed facility. For each consignment of wastes, the waste producer, collector and disposer of the wastes must sign all relevant parts of a computerised trip ticket. The system is designed to allow the transfer of wastes to be traced from cradle-to-grave.

- 6.2.10 The *Regulation* prescribes the storage facilities to be provided on site including labelling and warning signs. To minimise the risks of pollution and danger to human health or life, the waste producer is required to prepare and make available written procedures to be observed in the case of emergencies due to spillage, leakage or accidents arising from the storage of chemical wastes. He/she must also provide employees with training in such procedures.

Land (Miscellaneous Provisions) Ordinance (Cap. 28)

- 6.2.11 The inert portion of construction waste² (also called public fill) may be taken to public fill reception facilities. Public fill reception facilities are operated by the Civil Engineering and Development Department (CEDD). The *Land (Miscellaneous Provisions) Ordinance* requires that individuals or companies who deliver public fill to the public fill reception facilities to obtain Dumping Licences. The licences are issued by the CEDD under delegated authority from the Director of Lands.
- 6.2.12 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. In addition, in accordance with paragraph 11 of *Development Bureau (DevB) Technical Circular (Works) (DevB TC(W)) No. 6/2010*, the Public Fill Committee will advise on the acceptance criteria (e.g. no mixing of construction waste, nominal size of the materials less than 250mm, etc.). The material should, 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.

Public Cleansing and Prevention of Nuisances Regulation (Cap. 132)

- 6.2.13 This *Regulation* provides further control on the illegal dumping of wastes on unauthorised (unlicensed) sites. The illegal dumping of wastes can lead to a fine and/or imprisonment.

Dumping at Sea Ordinance (Cap. 466)

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

² "Construction waste" refers to materials arising from any land excavation or formation, civil/building construction, road works, building renovation or demolition activities. It includes various types of reusable materials, building debris, rubble, earth, concrete, timber and mixed site clearance materials. When sorted properly, materials suitable for land reclamation and site formation (known as public fill) should be reused at public fill reception facilities. The rock and concrete can be crushed and processed to produce aggregates for various civil and building engineering applications. The remaining construction waste (comprising timber, paper, plastics, and general refuse) are to be disposed of at landfills.

which include the following specifications, but not limited to:

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

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

Other Relevant Guidelines and Documents

6.2.16 Other relevant guidelines/ circulars applicable to waste management and disposal for this Project include:

- Works Branch Technical Circular (WBTC) No. 2/93, Public Dumps;
- WBTC No. 2/93B, Public Filling Facilities;
- WBTC Nos. 4/98 and 4/98A, Use of Public Fill in Reclamation and Earth Filling Projects;
- WBTC No. 12/2000, Fill Management;
- WBTC No. 19/2001, Metallic Site Hoardings and Signboards;
- WBTC No. 12/2002, Specification Facilitating the Use of Recycled Aggregates;
- ETWB TC(W) No. 19/2005, Environmental Management on Construction Sites;
- Development Bureau Technical Circular (Works) (DEVB TC(W)) No. 6/2010, Trip Ticket System for Disposal of Construction and Demolition Materials;
- DEVB TC(W) No. 8/2010, Enhanced Specification for Site Cleanliness and Tidiness;
- DEVB TC(W) No. 2/2011, Encouraging the Use of Recycled and other Green Materials in Public Works Projects;
- DEVB TC(W) No. 9/2011, Enhanced Control Measures for Management of Public Fill;

- CEDD TC No. 11/2019, Management of Construction and Demolition Materials;
- Project Administration Handbook (PAH) for Civil Engineering Works (2020 Edition), Section 4.1.3 of Chapter 4 – Management of Construction and Demolition Material Including Rock;
- Hong Kong Planning Standards and Guidelines, Chapter 9 (Section 6 – Waste Management); and
- Code of Practice on the Packaging, Labelling and Storage of Chemical Waste.

6.2.17 In accordance with policies related to construction and demolition (C&D) materials disposal documented in the WBTC No. 2/93 Public Dumps, inert C&D materials (i.e., public fill) should be transported to Public Fill Reception Facilities (PFRFs) instead of disposing of at landfill. According to *The Land (Miscellaneous Provisions) Ordinance*, individuals or companies delivering public fill to PFRFs are required to hold dumping licences issued under delegated powers from the Director of Lands.

6.2.18 Under DEVB TCW No. 6/2010 Trip Ticket System for Disposal of Construction and Demolition Materials, for all contracts that are expected to generate inert C&D materials 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 equals to or exceeds 50 m³, 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 50 m³, 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.

6.2.19 Under Section 4.1.3 of Chapter 4 of PAH for Civil Engineering Works (2020 Edition), measures have been introduced to enhance the management of C&D materials, and to minimise its generation at source. The enhancement measures include:

- Drawing up a Construction and Demolition Materials Management Plan (C&DMMP) at an early design stage to minimise C&D materials generation and to encourage proper management of such materials;
- Vetting of the C&DMMP prior to upgrading of the project to Category A in the Public Works Programme; and
- Providing the contractor with information from the C&DMMP in order to facilitate the preparation of Waste Management Plan (WMP) and to minimise C&D materials generation during construction.

6.2.20 The *ETWB TCW No. 19/2005 - Environmental Management on Construction Sites* introduces additional measures to enhance waste management on construction sites. The circular sets out the policies and procedures that require the contractors to prepare and implement an Environmental Management Plan (EMP), which includes the WMP to encourage on-site sorting of C&D materials and to minimise generation of C&D materials during the course of construction.

6.3 Expected Waste Arising During the Construction Phase

6.3.1 The type of wastes expected to be generated during the construction phase of the Project include:

- C&D materials and excavated materials (e.g. excavated soil and rock) arising from river reprofiling and drainage improvement works;
- Excavated river sediment arising from the construction of tidal gate, construction of mechanical penstock, modification of agricultural weirs, construction of fish ladders and river reprofiling works;
- Chemical waste from the construction activities; and
- General refuse from construction workforce.

C&D Materials

6.3.2 C&D materials will be generated from different construction works of the Project, including site clearance, excavation works, as well as piling and superstructure works for the construction of stormwater pumping station. The C&D materials would comprise both inert C&D materials (i.e. excavated soil, rock, broken concrete) and non-inert C&D materials (i.e. vegetation, wood, plastics, packaging materials, etc). Chapter 2 of this EIA Report presents the design of this Project, taking into account the environmental benefits of reducing the C&D materials being generated. In particular, the adoption of trenchless excavation for drainage works at river crossing would substantially reduce the excavation volume and generation of C&D materials as excavation of the overlying topsoil is not required using this technique. The omission of construction of diversion box culvert at Nam Bin Wai will also minimize the C&D materials arising from the Project.

6.3.3 Based on the latest construction scheme and best available project information, it is estimated that a total of 60,918m³ of C&D materials will be generated during the construction phase. A summary of the estimated generation of the C&D materials is provided in **Table 6.2**. It should be noted that these quantities are initial estimates only and would require further review by the Contractor.

Table 6.2 - Summary of Estimated Generation of C&D Materials during Construction Phase

Type of C&D Materials		Volume (m ³)
Inert C&D materials	Total generation	53,607
	<ul style="list-style-type: none"> On-site reuse (i.e. backfilling) 	<ul style="list-style-type: none"> 3,839
	<ul style="list-style-type: none"> Disposed of surplus at public fill reception facilities 	<ul style="list-style-type: none"> 49,768
Non-inert C&D materials		7,311
Total:		60,918

- 6.3.4 The C&D materials generated on site will be sorted into inert portion (i.e. public fill comprising excavated soil, rock and broken concrete) and non-inert portion (i.e. construction waste comprising vegetation, wood, plastics, packaging materials, etc.).
- 6.3.5 It is estimated that a total of 53,607m³ of inert C&D materials will be generated during the construction phase (over a period of 51 months). As shown in **Table 6.2**, some inert C&D materials generated could be reused on site (i.e. 3,839m³), while the surplus materials (i.e. 49,768m³) will require off-site disposal. The surplus inert C&D materials will be delivered to the public fill reception facilities (i.e. Mui Wo Temporary Public Fill Reception Facility), via Ngan Kwong Road and Mui Wo Ferry Pier Road, for subsequent reuse by other construction projects.
- 6.3.6 It is estimated that a total of 7,311m³ of non-inert C&D materials will be generated during the construction phase. Recyclables in the non-inert C&D materials, such as plastics and packaging materials, will be segregated on site for recycling as far as practicable. The remaining non-inert C&D materials will be delivered to Mui Wo Transfer Facility (via Ngan Kwong Road and Mui Wo Ferry Pier Road) for onward transfer to the West New Territories Landfill (WENT) or the proposed WENT extension for disposal, while the recyclables will be sent to the recyclers for recycling.
- 6.3.7 In view of the relatively small quantity of C&D materials to be disposed off-site (i.e. 57,079m³) over a period of 51 months, it is not expected that the disposal of the anticipated quantity of C&D materials to the public filling reception facilities and landfill will cause adverse impact to the operation of these facilities.
- 6.3.8 The inert C&D materials will primarily be generated during the construction of Stormwater Pumping Station, which are anticipated to last for about 29 months during the construction phase. With an estimated 49,768m³ of surplus inert C&D materials to be generated from the Project during the construction phase, an average of about 7 truck trips per day (with an estimated maximum of 12 truck trips per day) will be required to deliver the surplus inert C&D materials to the public filling reception facilities. The non-inert C&D materials may be generated any time throughout the construction phase (i.e. 51 months). With an estimated 7,311m³ of non-inert C&D materials to be generated from the Project, about 1 truck trip per day will be required to deliver the non-inert C&D materials to Mui Wo Transfer Facility or recyclers during

the construction phase. In view of the limited truck trips required, adverse environmental impact (including potential hazard, air and odour emissions, noise and wastewater discharge) or public transport impact arising from handling, collection, transportation and reuse/ disposal of C&D materials is not anticipated with the implementation of good construction site practices.

Excavated Sediment

- 6.3.9 River sediment may have to be removed for the construction of tidal gate, construction of mechanical penstock, modification of agricultural weirs, construction of fish ladders and river reprofiling works (around 394m³). The Project will seek to minimise the quantity of river sediment to be excavated. All excavated sediment will be reused at Tai Tei Tong River as natural bedding substrate and/or as backfilling material at other works area. Should there be found any non-inert substances in the excavated sediment, they will be sorted out onsite for proper disposal at the Mui Wo Transfer Facility for onward transfer to the landfills (i.e. WENT Landfill or proposed WENT extension).
- 6.3.10 The recommended mitigation measures are discussed in **Section 6.5**. No adverse waste management implications are anticipated with the implementation of the recommended mitigation measures.

Chemical Waste

- 6.3.11 Chemical waste, as defined under the *Waste Disposal (Chemical Waste) (General) Regulation*, includes any unwanted substances specified under Schedule 1 of the Regulation. Substances likely to be generated from the construction works of the Project will include:
- Used paint, engine oils, hydraulic fluids and waste fuel;
 - Spent mineral oils/cleaning fluids from mechanical machinery; and
 - Spent solvents/solutions from equipment cleaning activities.
- 6.3.12 Chemical wastes will pose environmental, health and safety hazards if not stored and disposed of in an appropriate manner as outlined in the *Waste Disposal (Chemical Waste) (General) Regulation* and the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. These hazards may include:
- Toxic effects to workers;
 - Adverse effects on air, water and land from spills; and
 - Fire hazards.
- 6.3.13 Chemical waste may be generated any time throughout the construction phase of the Project (i.e. 51 months). The amount of chemical waste that will arise from the construction activities will be highly dependent on the Contractor's on-site maintenance activities and the quantity of plant and equipment utilised. With respect

to the scale of the construction activities, it is anticipated that the quantity of chemical waste to be generated will be small (less than a few hundred litres per month). The chemical waste will be properly stored on site and will be collected by licensed chemical waste collectors regularly for disposal at the licensed chemical waste treatment facilities (i.e. Chemical Waste Treatment Centre (CWTC) in Tsing Yi). Tentatively, upon leaving the site, the chemical waste collection vehicles will enter Ngan Kwong Road, Tung Chung Road, Route 8 and Tsing Yi Road, and ultimately to the CWTC.

- 6.3.14 With the incorporation of suitable arrangements for the storage, handling, transportation and disposal of chemical wastes under the requirements stated in the *Waste Disposal (Chemical Waste) (General) Regulation* and the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*, adverse environmental impact (including potential hazard, air and odour emissions, noise and wastewater discharge) or public transport impact arising from the handling, collection, transportation and disposal of chemical waste is not anticipated.

General Refuse

- 6.3.15 The presence of a construction site with workers and associate site office will result in the generation of general refuse (mainly consists of food waste, plastic bottles, aluminium cans and waste paper) which requires off-site disposal. The storage of general refuse has the potential to give rise to adverse environmental impacts, if not properly managed. These include odour if the waste is not collected frequently, windblown litter and visual impact.
- 6.3.16 It is estimated that a maximum of about 60 construction workers will be working on site at any one time during the construction phase of the Project. With a general refuse generation rate of 0.65 kg per worker per day, the maximum amount of general refuse to be generated will be about 39kg per day. General refuse will be produced any time throughout the construction phase of the Project (i.e. 51 months).
- 6.3.17 In order to reduce the quantity of general refuse to be disposed of at landfill, recyclable materials (i.e. paper, plastic bottles, glass bottles and aluminium cans) will be segregated on site for off-site recycling. Adequate number of enclosed waste containers will be provided to facilitate on-site segregation and to avoid over-spillage of waste and/ or recyclable materials.
- 6.3.18 The non-recyclable refuse will be placed in bags and stored in enclosed containers, and disposed of at the Mui Wo Transfer Facility (via Ngan Kwong Road, Mui Wo Ferry Pier Road) for onward transfer to the landfills (i.e. WENT Landfill or proposed WENT extension) on a daily basis (1 truck trip per day). The recyclables collected will also be sent to the recyclers regularly for off-site recycling. Given that the quantity of general refuse to be disposed of at landfill is small, no adverse impact on the operation of the Mui Wo Transfer Facility and WENT Landfill is anticipated.
- 6.3.19 With the implementation of the mitigation measures recommended in **Section 6.5**, adverse environmental impacts (including potential hazard, air and odour emissions,

noise and wastewater discharge) caused by handling, collection, transportation and reuse/ disposal of general refuse are not expected. Also, as the off-site disposal of the general refuse is estimated to only generate 1 truck per day, there will be no adverse impact on the local traffic and public transport.

6.4 Expected Waste Arising During the Operation Phase

6.4.1 During the operation phase of the Project, a small amount of desilted materials and screened debris will be generated from the routine maintenance of the stormwater pumping station, tidal gate and mechanical penstock. According to the DSD tide gauge record in vicinity of Mui Wo coastal area for past years, approximately 10 days per year are estimated to be with tide level above +3.0 mPD which the proposed tidal gate and pumping station will be under operated. During the operation phase of the Project, a small amount of desilted materials (around 72m³ per year) and screened debris (around 20m³ per year) will be generated from the routine maintenance of the stormwater pumping station, tidal gate and mechanical penstock.

6.4.2 Debris intercepted by the screen of the pumping station and deposited silt will be removed regularly (i.e. monthly during wet season and after every rainfall event with tidal gate and pumping station operation during dry season) to maintain the function of the pumping station as well as to preclude any potential odour impact during operation. The screenings and desilted materials will be properly packed and handled within the pumping station structure to avoid odour and hygiene nuisance, and transported to Mui Wo Transfer Facility or directly to the WENT Landfill for disposal. No unacceptable environmental impacts are thus anticipated.

6.5 Mitigation Measures

6.5.1 The assessment indicates that with the implementation of the proposed waste management practices at the work site, no adverse environmental impacts are envisaged for the handling, collection and disposal of waste arising during the construction phases of the Project.

6.5.2 This Section further describes the good construction site practices to avoid or further reduce the potential environmental impacts associated with the handling, collection and disposal of C&D materials, chemical waste and general refuse arising from the construction works.

6.5.3 The Contractor must ensure that all the necessary waste disposal or licences are obtained prior to the commencement of the construction works.

Waste Management Hierarchy

6.5.4 The various waste management options are categorised in terms of preference from an environmental viewpoint. The options considered to be most preferable have the least environmental impacts and are more sustainable in the long term. The hierarchy is as follows:

- Avoidance and reduction;

- Re-use of materials;
- Recovery and recycling; and
- Treatment and disposal.

6.5.5 The above hierarchy is used to evaluate and select waste management options. The aim is to reduce waste generation and reduce waste handling and disposal costs.

6.5.6 The Contractor will consult the relevant authorities for the final disposal of wastes and, as appropriate, implement the good site practices and mitigation measures recommended in this EIA Report and those given below.

- Nomination of approved personnel to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site;
- Training of site personnel in proper waste management and chemical handling procedures;
- Provision of sufficient waste disposal points and regular collection for disposal;
- Adoption of appropriate measures to reduce windblown/ floating litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;
- Separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Centre; and
- A recording system for the amount of wastes generated, recycled and disposed of and the disposal sites.

Waste Reduction Measures

6.5.7 Good management and control can prevent the generation of significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:

- Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance re-use or recycling of waste materials and their proper disposal;
- Encourage collection of aluminum cans and waste paper by individual collectors during construction with separate labelled bins provided to segregate these wastes from other general refuse by the workforce;
- Any unused chemicals, and those with remaining functional capacity, be recycled as far as possible;

- Use of reusable non-timber formwork to reduce the amount of C&D materials;
- Prior to disposal of C&D materials, wood, steel and other metals will be separated, to the extent practical for re-use and/or recycling to reduce the quantity of waste to be disposed in a landfill;
- Proper storage and site practices to reduce the potential for damage or contamination of construction materials; and
- Plan and stock construction materials carefully to reduce amount of waste generated and avoid unnecessary generation of waste.

Management of Waste Disposal

- 6.5.8 The Contractor will open a billing account with the EPD in accordance with the *Waste Disposal (Charges for Disposal of Construction Waste) Regulation*. Every construction waste or public fill load to be transferred to Government waste disposal facilities (e.g. public fill reception facilities, sorting facilities and landfills) will be provided with a valid “chit” which contains the information of the account holder to facilitate waste transaction recording and billing to the waste producer. A trip-ticket system will also be established in accordance with *DevB TC(W) No. 6/2010* to monitor the disposal of construction waste at landfill and to control fly-tipping. In addition, all dump trucks should be equipped with GPS or equivalent system for monitoring of their transportation routes and parking locations to prohibit illegal dumping and landfilling of C&D materials, particularly on ecological sensitive areas in Mui Wo and South Lantau. The Contractor should maintain a recording system to record the amount of C&D materials generated, recycled and disposed of at the disposal sites as well as the transportation routing and parking locations of the dump trucks. The trip-ticket system and the abovementioned recording system will be included as part of the contractual requirements and implemented by the Contractor(s).
- 6.5.9 Recyclables (e.g. plastics, cardboard) generated during the construction phase will be segregated and sent to recycler for recycling as far as practicable.
- 6.5.10 As per recommendation under *ETWB TC(W) No. 19/2005*, a WMP, with details of the amount of waste generated, recycled and disposed of (including the disposal sites), will be established and implemented during the construction phase as part of the EMP. The Contractor will be required to prepare the EMP and submit it to the Engineer with the Project Proponent under the Contract for approval prior to implementation.

Measures for Management of C&D Materials

- 6.5.11 C&D materials will be segregated on-site into public fill and non-inert C&D materials and stored in different containers or skips to facilitate re-use of the public fill and proper disposal of the non-inert C&D materials. Specific areas within the construction sites will be designated for such segregation and storage, if immediate re-use is not practicable. Prefabrication will be adopted as far as practicable to reduce the C&D materials arising.

6.5.12 The C&D materials generated during the construction phase will be transported by trucks with cover or enclosed containers to minimize the potential environmental impact. All dump trucks for transportation and disposal of C&D materials will be equipped with GPS or equivalent system for real time tracking and monitoring of their travel routings and parking locations to prohibit illegal dumping or landfilling of C&D materials. The data collected by GPS or equivalent system relating to travel routings and parking locations of dump trucks engaged will be recorded properly.

Measures for Management of Chemical Waste

6.5.13 The Contractor will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes* as listed below.

6.5.14 Containers used for storage of chemical wastes will:

- Be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed;
- Have a capacity of less than 450L unless the specifications have been approved by the EPD; and
- Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations.

6.5.15 The storage area for chemical wastes will:

- Be clearly labelled and used solely for the storage of chemical waste;
- 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 entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and
- Be arranged so that incompatible materials are appropriately separated.

6.5.16 Chemical waste will be disposed of:

- Via a licensed waste collector; and
- To a facility licensed to receive chemical waste, such as the CWTC which also offers a chemical waste collection service and can supply the necessary chemical waste storage containers.

Measures for Management of General Refuse

- 6.5.17 General refuse will be stored in enclosed bins separately from C&D materials and chemical wastes. General refuse will be delivered separately from C&D materials and chemical wastes for offsite disposal on a daily basis to reduce odour, pest and litter impacts.
- 6.5.18 Recycling bins will be provided at strategic locations within the construction site to facilitate recovery of recyclable materials (including aluminium can, waste paper, glass bottles and plastic bottles) from the construction site. Materials recovered will be sold for recycling.

Measures for Management of Excavated Sediment

- 6.5.19 The sediment will be excavated and handled in a manner that would minimize adverse environmental impacts. For minimization of sediment disposal, all excavated sediment will be reused on-site during the construction stage.
- 6.5.20 Requirements of the *Air Pollution Ordinance (Construction Dust) Regulation*, where relevant, should be adhered to during excavation, transportation and disposal of the sediment.
- 6.5.21 The workers will wear appropriate personal protective equipment (PPE) when handling contaminated sediment to minimize the exposure to contaminated materials. Adequate washing and cleaning facilities will also be provided on site.
- 6.5.22 Stockpiling of contaminated sediment will be avoided as far as possible. If temporary stockpiling of contaminated sediment is necessary, the excavated sediment will be covered by tarpaulin and the area should be placed within earth bunds or sand bags to prevent leachate from entering the ground, nearby drains and surrounding water bodies. The stockpiling areas for contaminated sediment should be paved with impermeable linings to avoid contamination to underlying soil or groundwater. Separate and clearly defined areas should be provided for stockpiling of contaminated and uncontaminated materials. Leachate, if any, should be collected and discharged according to the Water Pollution Control Ordinance (WPCO).
- 6.5.23 In order to minimize the potential odour / dust emissions during excavation and transportation of the sediment, the excavated sediment will be wetted during excavation / material handling and shall be properly covered when placed on trucks or barges. Loading of the excavated sediment to the barge will be controlled to avoid splashing and overflowing of the sediment slurry to the surrounding water.

Staff Training

- 6.5.24 At the commencement of the construction works, training will be provided to workers on the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, re-use and recycling.

6.6 Residual Impact

6.6.1 No residual environmental impact related to waste management is envisaged during the construction and operation phases of the Project.

6.7 Environmental Monitoring and Auditing

Construction Phase

6.7.1 It is recommended that regular site inspections and audits of the waste management practices would be carried out during the construction phase to determine if wastes are being managed in accordance with the recommended good site practices and WMP. The site inspections and audits will investigate all aspects of waste management including waste generation, storage, handling, recycling, transportation and disposal.

Operation Phase

6.7.2 As the operation of the Project will generate minimal quantity of waste, waste monitoring and audit programme will not be required during the operation phase of the Project.

6.8 Conclusion

6.8.1 With the implementation of good site practices, adverse environmental impact (potential hazard, air and odour emissions, noise and wastewater discharge) arising from the management and disposal of waste during the construction and operation phases of the Project are not anticipated.

6.8.2 The estimated waste arising and recommended waste management arrangements during the construction and operation phases of the Project are summarised in **Table 6.3**.

Table 6.3 - Summary of Estimated Waste Arising and Recommended Waste Management Arrangements

Type of Waste	Waste Generated	Approximate Quantity and Timing of Generation	Waste Management Arrangements	Tentative Transportation Routings to Disposal Sites
Construction Phase				
C&D materials	Inert C&D materials (e.g. excavated soil, rock, broken concrete)	53,607m ³ (2025 to 2029)	<ul style="list-style-type: none"> On-site reuse for backfilling: 3,839m³ Sent to public fill reception facilities (i.e. Mui Wo Temporary Public Fill Reception Facility): 49,768m³ 	<ul style="list-style-type: none"> Via Ngan Kwong Road, Mui Wo Ferry Pier Road

Type of Waste	Waste Generated	Approximate Quantity and Timing of Generation	Waste Management Arrangements	Tentative Transportation Routings to Disposal Sites
	Non-inert C&D materials (e.g. vegetation, wood, plastics, packaging materials)	7,311m ³ (2025 to 2029)	<ul style="list-style-type: none"> On-site segregation and off-site recycling for recyclables Disposed of non-recyclables at Mui Wo Transfer Facility for onward transfer to WENT Landfill 	<ul style="list-style-type: none"> Via Ngan Kwong Road, Mui Wo Ferry Pier Road
Excavated sediment	Excavated sediment from construction of tidal gate, construction of mechanical penstock, modification of agricultural weirs, construction of fish ladders and river reprofiling works	394m ³ (2026 to 2028)	<ul style="list-style-type: none"> On-site reuse or as backfilling material at other works area 	NA
Chemical waste	Used paint, engine oils, hydraulic fluids and waste fuel, cleaning fluids and solvents from construction plant and equipment	Few hundred litres per month (2025 to 2029)	<ul style="list-style-type: none"> Disposed of at CWTC or other licensed chemical waste treatment facilities 	<ul style="list-style-type: none"> Via Ngan Kwong Road, Tung Chung Road, Route 8, Tsing Yi Road
General refuse	Food waste, plastic bottles, aluminium cans and waste papers from construction workers	39kg/day (2025 to 2029)	<ul style="list-style-type: none"> On-site segregation and off-site recycling for recyclables Non-recyclables will be delivered to the Mui Wo Transfer Facility for onward transfer to WENT Landfill for disposal 	<ul style="list-style-type: none"> Via Ngan Kwong Road, Mui Wo Ferry Pier Road
Operation Phase				
General refuse	Desilted materials and screened debris from routine maintenance of the stormwater pumping station, tidal gate and mechanical penstock	<ul style="list-style-type: none"> Desilted materials: 72m³/year Screened debris: 20m³/year 	<ul style="list-style-type: none"> Disposed of at Mui Wo Transfer Facility or directly to WENT Landfill 	<ul style="list-style-type: none"> Via Ngan Kwong Road, Mui Wo Ferry Pier Road