6. WASTE MANAGEMENT

6.1 Introduction

This ***Section i***dentifies the potential waste management implications arising from the construction and operation of the Project and the potential environmental impacts associated with the storage, handling, transportation and disposal of the wastes with reference to the criteria and guidelines as stated in the requirements in *Clause 3.4.6* and *Appendix E Requirements for Assessment of Waste Management Implications* of the Study Brief, as well as *Annex 7* and *Annex 15* of the *EIAO-TM*.

6.2 Legislation Regulations and Evaluation Criteria

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.

The following legislation covers the handling, treatment and disposal of wastes in Hong Kong which are relevant to the types of waste to be generated from the Project, and has been considered in the assessment.

- *Waste Disposal Ordinance (WDO) (Cap 354);*
- *Waste Disposal (Chemical Waste) (General) Regulation (Cap 354C);*
- *Marine Fish Culture Ordinance (Cap 353);*
- *Land (Miscellaneous Provisions) Ordinance (Cap 28);*
- *Public Health and Municipal Services Ordinance - Public Cleansing and Prevention of Nuisances Regulation (Cap 132BK);*
- *Merchant Shipping (Prevention and Control of Pollution) Ordinance (Cap 413); and*
- *Waste Disposal (Charging for Municipal Solid Waste) (Amendment) Ordinance 2021.*

6.2.1 Waste Disposal Ordinance (WDO) (Cap 354)

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 sites. A breach of these regulations can lead to the imposition of a fine and / or a prison sentence. The *WDO* also provides for the issuing of licences for the collection and transport of wastes.

The *Waste Disposal (Charges for Disposal of Construction Waste) Regulation* defined construction waste as any substance, matters or things that are 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.

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.

Depending on the percentage of inert materials in the material, 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 the Project Proponent.

Table 6.1 summarises the Government waste disposal facilities for construction waste and various charge levels.

Table 6.1 Government Waste Disposal Facilities for Construction Waste

Government Waste Disposal Facilities	Type of Construction Waste Accepted	Charge per Tonne [a]
Public fill reception facilities	Consisting entirely of inert construction waste [b]	HK$71
Sorting facilities	Containing more than 50% by weight of inert construction waste [b]	HK$175
Landfills [c]	Containing not more than 50% by weight of inert construction waste [b]	HK$200
Outlying Islands Transfer Facilities [c]	Containing any percentage of inert construction waste [b]	HK$200

Notes:

(a) Except for the Outlying Islands Transfer Facilities, the minimum charge load is 1 tonne, i.e. if a load of waste weighs 1 tonne or less, it will be charged as 1 tonne. A load of waste weighing more than 1 tonne will be charged at 0.1 tonne increment. For Outlying Islands Transfer Facilities, the charge is $20 per 0.1 tonne and the minimum charge load is 0.1 tonne.

(b) Inert construction waste means rock, rubble, boulder, earth, soil, sand, concrete, asphalt, brick, tile, masonry or used bentonite.

(c) 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.

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

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.

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.

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.

6.2.3 Marine Fish Culture Ordinance (Cap 353)

Under *Section 10* of the *Marine Fish Culture Ordinance*, the Director of Agriculture, Fisheries and Conservation could provide instructions to licensees in writing regarding the disposal or destruction of any fish within any site found or suspected to be suffering from any infectious disease, or the disposal of any noxious or waste matter resulting from the fish collection or fish harvest. It is the existing practice/license condition for marine fish culture licensees under Cap. 353 to dispose of the anticipated waste arising (e.g. general refuse, floating refuse, organic wastes, etc.) at Food and Environmental Hygiene Department (FEHD)'s refuse collection points during construction and operation phases.

6.2.4 Land (Miscellaneous Provisions) Ordinance (Cap 28)

The inert portion of construction waste [85] (also called public fill) may be taken to public fill reception facilities. Public fill reception facilities are operated by the Civil Engineering and Development

(85) "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,

Department (CEDD). *The Land (Miscellaneous Provisions) Ordinance* requires that individuals or companies who deliver public fill to the public fill reception facilities need to obtain Dumping Licences. The licences are issued by the CEDD under delegated authority 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. 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 to the public fill reception facility.

6.2.5 Public Cleansing and Prevention of Nuisances Regulation (Cap 132BK)

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

6.2.6 Merchant Shipping (Prevention and Control of Pollution) Ordinance (Cap 413)

The Merchant Shipping (Prevention and Control of Pollution) Ordinance and its subsidiary regulations prohibit the discharge of wastewater and garbage from vessels.

Hong Kong has implemented the International Convention for the Prevention of Pollution from Ships 1973 as amended by the 1978 Protocol (universally known as MARPOL) and the MARPOL related requirements are mainly implemented under the Merchant Shipping (Prevention and Control of Pollution) Ordinance. Under the requirements, liquid oil waste or any other mixtures which contain oil and noxious liquid substances or any such residues shall not be discharged into the sea. In Hong Kong, the Chemical Waste Treatment Centre (CWTC) is the reception facility for oily waste discharged from vessels.

6.2.7 Waste Disposal (Charging for Municipal Solid Waste) (Amendment) Ordinance 2021

This Ordinance served to amend the Waste Disposal Ordinance and the Waste Disposal (Refuse Transfer Station) Regulation to establish the quantity-based charging scheme for the disposal of municipal solid waste in Hong Kong. The Ordinance also describes the production, sale, supply and the mandatory use of designated bags or designated labels for disposal of municipal solid waste.

6.2.8 Other Relevant Guidelines

Other relevant guidance documents, which detail how the Project Proponent or the Operator should comply with the local regulations, are as follows:

- *Waste Disposal Plan for Hong Kong (December 1989), Planning, Environment and Lands Branch Government Secretariat, HKSAR Government;*
- *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* (1992), EPD, HKSAR Government;
- *Hong Kong Planning Standards and Guidelines* (2021), Planning Department, HKSAR Government;

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 re-used 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 and plastics) are to be disposed of at landfills.

- *WBTC No. 2/93 - Public Dumps,* Works Branch, HKSAR Government;
- *WBTC No. 2/93B - Public Filling Facilities,* Works Branch, HKSAR Government;
- *WBTC No. 16/96 - Wet Soil in Public Dumps,* Works Branch, HKSAR Government;
- *Waste Reduction Framework Plan, 1998 to 2007*, Planning, Environment and Lands Bureau, Government Secretariat, 5 November 1998;
- *WBTC No. 4/98 and 4/98A - Use of Public Fill in Reclamation and Earth Filling Projects*, Works Bureau, HKSAR Government;
- *WBTC No. 12/2000 - Fill Management,* Works Bureau, HKSAR Government;
- *WBTC No. 19/2001 - Metallic Site Hoardings and Signboards*; Works Bureau, HKSAR Government;
- *WBTC No. 12/2002 - Specifications Facilitating the Use of Recycled Aggregates*, Works Bureau, HKSAR Government;
- *Project Administration Handbook for Civil Engineering Works, Section 4.1.3 of Chapter 4 - Management of Construction and Demolition Material Including Rock*, HKSAR Government; and
- *DevB TC(W) No. 6/2010 - Trip Ticket System for Disposal of Construction & Demolition Materials*, Development Bureau, HKSAR Government.

It should be noted that the establishment of FCZ is not categorised as a public works contract. As such, *ETWB TC(W) No. 19/2005 - Environmental Management on Construction Sites* is not applicable for this Project.

6.3 Expected Waste Arisings during the Construction Phase

During the construction phase, no barging points, conveyor system and stockpiling areas would be used. The main activities include on-site assembly and anchoring of fish rafts / cages, and installation of auxiliary facilities, such as storages and shelters for contractor(s) [86] on some of the fish rafts. These activities will potentially result in the generation of wastes.

The typical waste types associated with these activities include:

- General refuse from construction workforce; and
- Floating refuse entrapment.

The fish rafts / cages will be manufactured off-site and thus no on-site construction of the fish rafts / cages will be involved. The fish rafts / cages will be towed to the FCZ directly by tug boats for on-site assembly and anchoring, no heavy construction plant would be used, and as such no construction and demolition (C&D) materials (both inert and non-inert) and chemical waste are anticipated to be generated at the Project site. Non-inert C&D materials (e.g. wooden pallets, bamboo, timber, packaging wastes, metals, etc.) would not be anticipated from the Project construction works. The general refuse and floating refuse as discussed in detail below will be generated during the construction phase which normally last about a few weeks for each fish raft and is expected to commence in 2024, subject to the application and approval of the new marine fish culture licence.

6.3.1 General Refuse

General refuse, such as food waste, aluminium cans, plastic bottles, waste paper and glass bottles, will be generated from the licensed contractor(s) during the construction and anchorage of fish rafts and cages which require off-site disposal. The storage of general refuse has the potential to give rise

(86) Contractor(s) refer to licensee(s) or the contractor(s) supporting the construction of fish raft structures.

to adverse environmental impacts, if not properly managed. These include odour if the general refuse is not collected frequently, floating / windblown litter and visual impact.

Assuming there will be no more than 20 licensed contractor(s) and workers participated in the construction of the FCZ area each day, 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 approximately 13 kg per day. It is anticipated that the duration of construction of each fish raft, including towing the fish rafts / cages to the Site, assembly and anchoring of the fish rafts / cages and provision of auxiliary facilities are expected to be completed within a few weeks.

To reduce the quantity of general refuse to be disposed of at landfill, recyclable materials (i.e. paper, plastic bottles, aluminium cans and glass bottles) will be segregated on-site and delivered to recyclers, as far as practicable. Adequate number of enclosed waste containers will be provided on the marine vessels to avoid over-spillage of waste / recyclable materials and accidental spillage of waste / recyclable materials to the sea. The non-recyclable general refuse will be collected and transported to the nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353, for example, Wong Shek Pier via marine vessels (1 trip per day), and ultimately sent to NENT landfill for disposal. As the quantity of general refuse to be disposed of at landfill is small, no adverse impact on the operation of the landfill is anticipated.

The waste disposal arrangement will follow the requirements stipulated under Marine Fish Culture Ordinance (Cap. 353) as appropriate. With the implementation of the mitigation measures recommended in ***Section 6.5***, no adverse environmental impacts (including potential hazard, dust and odour emissions, noise and wastewater discharge) caused by storage, handling, transport and disposal of general refuse are expected.

6.3.2 Floating Refuse

As the Project site is located in sheltered water area, floating refuse entrapment [87] may occur during the anchorage of fish cages, fish rafts and the auxiliary facilities. Floating refuse may be trapped on the surface of the anchored fish cages, fish rafts and vessels within the Project site, which will require collection and off-site disposal. Similar to general refuse, the storage of floating refuse has the potential to give rise to adverse environmental impacts, if not properly managed. These include odour if the floating refuse is not collected frequently, floating/windblown litter and visual impact.

The amount of floating refuse, i.e. not generated by this Project as licensed fish farmers and workers are not allowed to dump rubbish into the sea, is highly variable and influenced by the strength and direction of water currents. Since none of the shorelines surrounded the Project site is considered vulnerable to accumulation of floating refuse under both wet and dry seasons [88], the likelihood of entrapment of floating refuse within the Project site is expected to be low. It is expected that the amount of floating refuse requiring disposal is approximately 10 kg per week [89]. Floating refuse will be collected regularly and disposed of as general refuse. The floating refuse collected will be transported to the nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353, for example, Wong Shek Pier via marine vessels (1 trip per day), and ultimately sent to NENT landfill for disposal. As the quantity of floating refuse to be disposed of at landfill is small, no adverse impact on the operation of the landfill is anticipated.

(87) Floating refuse entrapment refers to those marine refuse that were washed to, and trapped in the Project site by water current. They are not generated by the Project as licensed contractor(s) are not allowed to dump rubbish into the sea.

(88) Based on the EPD's Study Report of Investigation on the Sources and Fates of Marine Refuse in Hong Kong issued in April 2015.

(89) It should be noted that minimal amount of floating refuse is collected regularly from the existing FCZs. For conservative assessment, it is assumed that a fish cage/ fish raft may trap up to 1 kg per week floating refuse requiring disposal during construction. The Project site is approximately 55 hectares and may support ~10 fish cages/ fish rafts. Therefore, the amount of floating refuse collected is estimated to be approximately 10 kg per week.

For the case that the floating refuse contains recyclable materials (i.e. paper, plastic bottles, aluminium cans and glass bottles), the contractor(s) will divert these materials from landfill disposal using the same waste segregation, storage and recycling approach as that for recyclable materials from general refuse as described in ***Section 6.3.1***, as far as practicable.

The waste disposal arrangement will follow the requirements stipulated under Marine Fish Culture Ordinance (Cap. 353) as appropriate. With the implementation of the mitigation measures recommended in ***Section 6.5***, no adverse environmental impacts (including potential hazard, dust and odour emissions, noise and wastewater discharge) caused by storage, handling, transport and disposal of floating refuse are expected.

6.3.3 Summary of Transportation Routings

The tentative transportation routings for the disposal of general refuse (including the floating refuse collected) generated during the construction phase are shown in ***Table 6.2***. The transportation routings may change subject to the actual traffic conditions. It should be noted that public transport will not be used for handling (including stockpiling, labelling, packaging & storage), collection, transportation and re-use / disposal of wastes generated under the Project. Thus, impacts to public transport is not expected and specific mitigation measure for public transport is considered not necessary.

Table 6.2 Tentative Transportation Routings for Waste Disposal of General Refuse during Construction Phase

Type of Waste	Disposal Outlet	Tentative Transportation Routing
General Refuse (including floating refuse)	Refuse Collection Point at Wong Shek Pier	Outer Tap Mun → Wong Shek Pier

6.4 Expected Waste Arisings during the Operation Phase

During the operation phase of the Project, no barging points, conveyor system and stockpiling areas would be used. The major waste types to be generated potentially from the licensed area within the Project site include:

- Organic waste, such as fish feed wastage, fish excretions and fish carcasses;
- Chemical waste;
- General refuse from site operation; and
- Floating refuse entrapment.

As it is expected that mariculture activities would not require maintenance dredging or removal of sediments, generation of marine sediments is not anticipated during the operation phase. Organic waste, chemical waste, general refuse and floating refuse as discussed in detail below will be generated during the operation phase (i.e. during operation of the FCZ).

6.4.1 Organic Waste

Organic waste mainly consists of solid organic materials or debris including uneaten fish feed, fecal waste from marine organisms, fish carcasses and dead fish arising from the fish culture operation. These waste could potentially be harmful to fish species as they are easily decomposed which boost the nutrient level of water. Hence, these waste should be removed from the licensed area to avoid affecting the health conditions of cultured fish, as well as nutrients enrichment within the Project site and to the adjacent water.

The quantity of fish feed wastage generated from each fish raft is highly variable depending on a number of factors, including feed type and composition, fish stocking density, feeding method and feeding rates. The quantity of fish fecal waste, fish carcasses and dead fish will also be varied with the type and quality of fish feed applied, cultured species of fish stock and stocking intensity. In any case, it is expected that the quantity of organic waste generated from the Project site would be no more than 38 kg per day on average [(90)]. The licensed contractor(s) should remove these organic waste from the licensed area regularly, especially after the fish feed was added. In the unlikely case that significant amount of dead fish occur, the licensed fish farmers would inform AFCD immediately. AFCD will then liaise with relevant Government departments (e.g. Food and Environmental Hygiene Department, Marine Department) to collect the dead fish from the Project site directly as necessary.

The collected marine debris and dead fish will be treated with disinfectant or other pharmaceutical drugs, and will be placed in enclosed waste containers or garbage bags located within the Project site. These organic waste will be transported to the nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353, for example, Wong Shek Pier via marine vessels (a few trips per day), and ultimately sent to NENT landfill for disposal.

The waste disposal arrangement will follow the requirements stipulated under Marine Fish Culture Ordinance (Cap. 353) as appropriate. With the implementation of the mitigation measures recommended in ***Section 6.5***, no adverse environmental impacts (including potential hazard, dust and odour emissions, noise and wastewater discharge) caused by storage, handling, transport and disposal of organic waste are expected.

6.4.2 Chemical Waste

It is anticipated that a small amount of chemicals, including pharmaceutical drugs / antibiotics / vaccines and chemical disinfectant, will be stored and used for treating diseased fish and disinfection of operation waste and equipment, resulting in generation of chemical wastes such as empty chemical containers and syringes. Chemical waste, such as lubricant oil, may also be generated due to maintenance of powered mechanical equipment. The amount of chemical waste generated will depend on the frequency of chemical usage and number of equipment used on site. Nevertheless, the quantity of chemical waste to be generated is expected to be insignificant (about a few cubic metres per month). These chemical wastes will be collected by a licensed chemical waste collector regularly (about 1-2 trips per month) and delivered to the licensed chemical waste treatment facilities (i.e. CWTC) at Tsing Yi via marine vessels for disposal. With the incorporation of suitable arrangements for the storage, handling, collection and transportation and disposal of chemical waste 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*, no adverse environmental (including air and odour emissions, noise and waste water discharge) impacts and hazards are anticipated.

6.4.3 General Refuse

General refuse will arise from the licensed contractor(s) and occasional visitors during site operation. General refuse may consist of food waste, plastics, aluminium cans, papers and glass bottles, which require proper storage for 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 general refuse is not collected frequently, floating / windblown litter and visual impact.

It is expected there will be no more than 20 contractor(s) supporting the mariculture operation as well as occasional visitors at the Project site at any one time. With a general refuse generation rate of 0.65 kg per worker per day, the total amount of general refuse generated from the licensed area is estimated to be approximately 13 kg per day.

(90) The quantity of organic waste is estimated based on the mariculture operation at the existing FCZs. With the use of advanced mariculture operation at the Project site, it is expected that the organic waste generated will be much lowered.

To reduce the quantity of general refuse to be disposed of at landfill, recyclable materials (i.e. paper, plastic bottles, aluminium cans and glass bottles) will be segregated on-site and delivered to landside recyclers, as far as practicable. Adequate number of enclosed waste containers will be provided on site (e.g. marine vessels, communal rafts) to avoid over-spillage of waste / recyclable materials and accidental spillage of waste / recyclable materials to the sea. The non-recyclable general refuse will be collected and transported (together with the organic waste) to the nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353, for example, Wong Shek Pier via marine vessels (1 trip per day), and ultimately sent to NENT landfill for disposal. Given that the quantity of general refuse to be disposed of at landfill is low, no adverse impact on the operation of the landfill is anticipated.

The waste disposal arrangement will follow the requirements stipulated under Marine Fish Culture Ordinance (Cap. 353) as appropriate. With the implementation of the mitigation measures recommended in ***Section 6.5***, no adverse environmental impacts (including potential hazard, dust and odour emissions, noise and wastewater discharge) caused by storage, handling, transport and disposal of general refuse are expected.

6.4.4 Floating Refuse

Floating refuse may be trapped on the surface of fish cages, fish rafts and vessels within the Project site. However, since none of the shorelines surrounded the Project site is considered vulnerable to accumulation of floating refuse under both wet and dry seasons, the quantity of floating refuse trapped within the Project site during the operation stage is expected to be low (~ 20 kg per week) [(91)]. Floating refuse will be collected regularly (1 trip per day), handled, stored, recycled and disposed of as general refuse as described in ***Section 6.4.3***.

Given that the quantity of floating refuse to be disposed of at landfill is low, no adverse impact on the operation of the landfill is anticipated.

The waste disposal arrangement will follow the requirements stipulated under Marine Fish Culture Ordinance (Cap. 353) as appropriate. With the implementation of the mitigation measures recommended in ***Section 6.5***, no adverse environmental impacts (including potential hazard, dust and odour emissions, noise and wastewater discharge) caused by storage, handling, transport and disposal of floating refuse are expected.

6.4.5 Summary of Transportation Routings

The tentative transportation routings for the disposal of organic waste, general refuse (including the floating refuse collected) and chemical waste generated during the operation phase are shown in ***Table 6.3***. The transportation routings may change subject to the actual traffic conditions. It should be noted that public transport will not be used for handling (including stockpiling, labelling, packaging & storage), collection, transportation and re-use / disposal of wastes generated under the Project. Thus, impacts to public transport is not expected and specific mitigation measure for public transport is considered not necessary.

(91) It should be noted that minimal amount of floating refuse is collected regularly from the existing FCZs. For conservative assessment, it is assumed that a fish cage/ fish raft may trap up to 2 kg per week floating refuse requiring disposal during operation. The Project site is approximately 55 hectares and may support ~10 fish cages/ fish rafts. Therefore, the amount of floating refuse collected is estimated to be approximately 20 kg per week.

Table 6.3 Tentative Transportation Routings for Waste Disposal of Various Waste during Operation Phase

Type of Waste	Disposal Outlet	Tentative Transportation Routing
Organic Waste	Refuse Collection Point at Wong Shek Pier	Outer Tap Mun → Wong Shek Pier
General Refuse (including floating refuse)		
Chemical Waste	Chemical Waste Treatment Centre (CWTC)	Outer Tap Mun → Licensed Chemical Waste Collector → Mirs Bay → Tathong Channel → Victoria Harbour → CWTC

6.5 Mitigation Measures

6.5.1 Waste Management Hierarchy

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.

The above hierarchy has been used to evaluate and select waste management options. The aim has been to reduce waste generation and reduce waste handling and disposal costs. The contractor(s) shall implement the following control measures:

Under Marine Fish Culture Ordinance (Cap. 353):

- Submit an Environmental Management Plan under the Fish Farm Operational Plan (see ***Appendix 2A*** for details) on the control of environmental impacts from the mariculture activities for agreement with AFCD;
- Disposal or destruction of any fish within any site found or suspected to be suffering from any infectious disease;
- Disposal of any noxious or waste matter resulting from the fish collection or fish harvest.

Under Merchant Shipping (Prevention and Control of Pollution) Ordinance (Cap. 413):

- Liquid oil waste or any other mixtures which contain oil and noxious liquid substances or any such residues shall not be discharged into the sea;
- Oily waste from vessels should be discharged to CWTC.

They will also consult AFCD 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 (e.g. environmental officer of the contractor(s), representative of the project proponent) 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 handling procedures by AFCD;
- Provision of sufficient waste disposal points and regular collection for disposal;

- Appropriate measures to reduce windblown / floating litter and dust during transportation of waste by transporting wastes in enclosed containers; and
- A recording system (e.g. log book for mariculture operation) for the amount of wastes generated, recycled and disposed of and the disposal sites for checking by AFCD.

6.5.2 Construction Phase

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

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 general refuse and floating refuse arising from the construction works.

The contractor(s) must ensure that all the necessary waste disposal permits or licences are obtained prior to the commencement of the construction works.

6.5.2.1 Measures for Management of General Refuse and Floating Refuse

General refuse (including the floating refuse collected) will be stored in enclosed bins. The garbage bins will be placed at appropriate locations to facilitate disposal by the contractor(s) on site. The contractor(s) will be prohibited from throwing rubbish into the sea and adequate bins will be provided on the Project site and marine vessels. General refuse will be delivered for offsite disposal on a regular basis to reduce odour, pest and litter impacts. General refuse will be collected and disposed of at the nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353 (e.g. Wong Shek Pier via marine vessels), and ultimately sent to NENT landfill for disposal. General refuse requiring disposal will be collected in designated garbage bags after the official implementation of MSW charging scheme.

Recycling bins with proper labelling will be provided at appropriate locations to facilitate collection of recyclable materials (including aluminium can, plastic bottles and paper) from the Project site. Materials recovered will be sent to authorised recyclers.

To avoid entrapment of floating refuse within the Project site, the fish cages / rafts and vessels should be properly designed such that there are no sharp turns or abrupt indentation in order to avoid or minimise any trapped or accumulated refuse. With the proper design of fish cages / rafts and vessels, entrapment of floating refuse and the need for its subsequent disposal can be minimised.

Public transport will not be used for handling (including stockpiling, labelling, packaging & storage), collection, transportation and re-use / disposal of wastes generated under the Project. Thus, impacts to public transport is not expected and specific mitigation measure for public transport is considered not necessary.

6.5.2.2 Staff Training

Prior to the commencement of the construction works, AFCD will provide training to the contractor(s) on the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, re-use and recycling. In particular, the training will emphasize no dumping of waste into the sea is allowed, particularly within the licensed area and on marine vessels.

6.5.3 Operation Phase

6.5.3.1 Measures for Management of Organic Waste

Effective management of feed with the application of modern feeding practices and technologies can minimise fish feed wastage and the subsequent negative impacts to the environment. Good quality

feed, such as pellet feed, should be used for feeding instead of trash fish as it effectively reduces the feed conversion ratio, and thus the quantity of uneaten feed wastage. Depending on the cultured species and the stocking intensity, optimal feed input should be implemented while the fish feed should be even distributed within the licensed area. The feed will also be sieved to remove broken pieces and dust before feeding. The contractor(s) will keep detailed operational records for each licensed area including the type and quantity of feed used, estimated number of fish stock and biomass, water temperature and growth rates of cultured organisms to allow more accurate estimation of fish feed input and to minimise unnecessary wastage of feeds. The contractor(s) and other personnel are also required to take all precautions to prevent spillage during the delivery of feed to the Project site. The uneaten feeds should be cleaned up immediately, especially during summer times when the decomposition of organic waste is more rapid, so as to minimise leaching to the adjacent water. The quantity of feed delivered to the licensed area will also be recorded in order to ensure an appropriate quantity of feed stock is procured. Feed will be stored in covered areas on the fish rafts within the licensed area to avoid exposure to external climatic and weather conditions that might result in unnecessary spillage and spoilage.

Organic waste including residue feed, fish carcasses, fecal waste and dead fish will be removed from the licensed area after each feeding process and the waste will be stored in enclosed bins. The treated organic waste will be securely sent offsite to the nearest accessible FEHD refuse collection points with public pier suitable refuse following the existing practice under Cap. 353, for example, Wong Shek Pier via marine vessels, and ultimately to NENT landfill for disposal. Designated garbage bags will be used to collect the organic waste after the official implementation of MSW charging scheme.

Public transport will not be used for handling (including stockpiling, labelling, packaging & storage), collection, transportation and re-use / disposal of wastes generated under the Project. Thus, impacts to public transport is not expected and specific mitigation measure for public transport is considered not necessary.

In case of large quantity of organic waste generated as a result of extensive fish deaths, for example, due to algal bloom or fish diseases, the contractor(s) will report to AFCD in due course, and AFCD, Food and Environmental Hygiene Department (FEHD), Marine Department (MD) and other relevant departments will provide assistance to the contractor(s) to transport the organic waste directly to NENT landfill for disposal.

6.5.3.2 Measures for Management of Chemical Waste

The contractor(s) 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, Labelling and Storage of Chemical Wastes* as listed below.

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*.

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.

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.

6.5.3.3 Measures for Management of General Refuse and Floating Refuse

The management of general refuse (including the floating refuse collected) from the Project site during the operation phase will be similar to that in the construction phase (see ***Section 6.5.2.1***). General refuse will be stored in enclosed bins and disposed offsite to the nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353, for example, Wong Shek Pier via marine vessels, on a regular basis for avoidance of pest and odour nuisance. Designated garbage bags will be used to collect general refuse after the official implementation of MSW charging scheme. Recycling bins with proper labelling will be placed at the fish rafts to collect recyclables which will be transported off-site for recycling via vessels on a regular basis.

To avoid entrapment of floating refuse within the Project site, the fish cages / rafts and vessels should be properly designed such that there are no any sharp turns or abrupt indentation in order to avoid or minimise any trapped or accumulated refuse. With the proper design of fish cages / rafts and vessels, entrapment of floating refuse and the need for its subsequent disposal can be minimised.

Public transport will not be used for handling (including stockpiling, labelling, packaging & storage), collection, transportation and re-use / disposal of wastes generated under the Project. Thus, impacts to public transport is not expected and specific mitigation measure for public transport is considered not necessary.

6.5.3.4 Staff Training

Prior to the commencement of the operation phase, AFCD will provide on-farm training to all staff working at the Project site on the concepts of sustainable mariculture practice, site cleanliness and appropriate waste management procedures, including waste reduction, re-use and recycling. In particular, the training will emphasize no dumping of waste into the sea is allowed.

6.6 Residual Environmental Impacts

With the implementation of mitigation measures specified in ***Section 6.5***, no adverse residual waste management impact is envisaged during the construction and operation phases of the Project.

6.7 Environmental Monitoring and Audit

No adverse waste management impact is anticipated during the construction and operation phases of the Project. To ensure the waste management performance during construction phase of the Project, EM&A is recommended to be conducted during construction phase. Site inspections at the Project site (on marine vessels) are recommended on a regular basis at bi-weekly interval during the time of construction activities by the Environmental Team (ET) to check if wastes are being managed in accordance with good site practices and the mitigation measures as recommended in ***Section 6.5***

during the construction phase as part of the EM&A. All aspects of waste management will be investigated during the regular inspections, including waste generation, storage, handling, recycling, transportation and disposal, to prevent any dumping of waste into the sea or malpractice of waste disposal.

During operation phase, the waste management issues of the Project will be controlled by licensing under the Marine Fish Culture Ordinance (Cap. 353). EM&A is not required to be conducted during operation phase of the Project. AFCD will conduct regular inspections at monthly interval and review on FCZ operation to check if wastes are being managed in accordance with good site practices and the mitigation measures as recommended in ***Section 6.5*** during the operation phase. All aspects of waste management will be investigated during the regular inspections, including waste generation, storage, handling, recycling, transportation and disposal, to prevent any dumping of waste into the sea or malpractice of waste disposal.

6.8 Conclusions

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

The estimated waste arising and the recommend waste management arrangements during the construction phase and operations phase of the Project are summarised in ***Table 6.4***.

Table 6.4 Summary of Estimated Waste Arisings and Recommended Waste Management Arrangements

Types of Waste	Approximate Quantity	Disposal Locations
Construction Phase		
General refuse	~ 13 kg per day	Recyclable materials: on-site sorting and off-site recycling. Non-recyclable refuse: Nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353 (e.g. Wong Shek Pier), and then transported to NENT landfill for disposal.
Floating refuse	~ 10 kg per week	Recyclable materials: on-site sorting and off-site recycling. Non-recyclable refuse: Nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353 (e.g. Wong Shek Pier), and then transported to NENT landfill for disposal.
Operation Phase		
Organic waste	< 38 kg per day	Nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353 (e.g. Wong Shek Pier), and then transported to NENT landfill for disposal.
Chemical waste	A few cubic metres per month	CWTC

Types of Waste	Approximate Quantity	Disposal Locations
General refuse	~ 13 kg per day	Recyclable materials: on-site sorting and off-site recycling. Non-recyclable refuse: Nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353 (e.g. Wong Shek Pier), and then transported to NENT landfill for disposal.
Floating refuse	~ 20 kg per week	Recyclable materials: on-site sorting and off-site recycling. Non-recyclable refuse: Nearest accessible FEHD refuse collection points with public pier following the existing practice under Cap. 353 (e.g. Wong Shek Pier), and then transported to NENT landfill for disposal.