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7. WASTE MANAGEMENT IMPLICATIONS

7.1 Introduction

7.1.1.1 This section identifies the types of waste that are likely to be generated during the construction and operation phases of the Project and evaluates the potential waste management implications that may result from waste generated during these phases.

7.1.1.2 Mitigation measures and good site practices, including waste handling, storage and disposal, have been recommended with reference to relevant waste legislation and management guidelines.

7.1.1.3 The waste management implications have been assessed in accordance with the requirements outlined in Annex 7 and Annex 15 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) as well as the requirements set out under Clause 3.4.8 of the EIA Study Brief (No. ESB-360/2023).

7.2 Environmental Legislation, Standards and Guidelines

7.2.1 Overview

7.2.1.1 The relevant legislation, standards and guidelines related to the study for the assessment of waste management implications include:

- Waste Disposal Ordinance (Cap. 354);
- Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C);
- Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N);
- 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 (Cap. 354)

7.2.1.2 The *Waste Disposal Ordinance (WDO) (Cap. 354)* prohibits any unauthorised disposal of waste. Construction waste defined under Cap. 354N of the *WDO*, refers to a substance, matter or thing that is generated from construction works. It includes all abandoned materials, whether processed or stockpiled or not, before being abandoned, but does not include sludge, screenings or matter removed or generated from desludging, desilting or dredging works. Under the *WDO*, waste can be disposed of only at designated waste disposal facilities licenced by EPD.

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

7.2.1.3 Under the WDO, the *Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C)* provides regulations for chemical waste control, and administers the possession, storage, collection, transport and disposal of chemical wastes. EPD has also issued three statutory guidelines:

- *A Guide to the Chemical Waste Control Scheme* to introduce and explain the legislative controls over the management of chemical waste in Hong Kong;
- *A Guide to the Registration of Chemical Waste Producers* to introduce the registration provisions of the *Waste Disposal (Chemical Waste) (General) Regulation* and the procedure for identifying chemical waste generation; and

- *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* which details how the chemical waste producers should comply with the regulations on chemical waste.

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

7.2.1.4 Construction waste as defined under the *Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap.354N)* includes 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, screening or matter removed in or generated from any desludging, desilting or dredging works. This regulation stipulated that construction waste delivered to a landfill for disposal must not contain more than 50% by weight of inert material; construction waste delivered to a sorting facility for disposal must contain more than 50% by weight of inert material; whereas construction waste delivered to a public fill reception facility (PFRF) for disposal must consist entirely of inert material.

Land (Miscellaneous Provisions) Ordinance (Cap. 28)

7.2.1.5 The inert portion of construction and demolition (C&D) materials (including rocks, soil, broken concrete, building debris, etc.) may be taken to public filling facilities including public filling areas, public filling barging points and stockpiling areas. These facilities usually form part of land reclamation schemes and are operated by the Civil Engineering & Development Department (CEDD).

7.2.1.6 The *Land (Miscellaneous Provisions) Ordinance (Cap. 28)* requires that individuals or companies who deliver public fill to the public filling facilities to obtain Dumping Licences. The licences are issued by CEDD under delegated authority from the Director of Lands.

Public Health and Municipal Services Ordinance (Cap. 132)

7.2.1.7 The *Public Cleansing and Prevention of Nuisances Regulation* under the *Public Health and Municipal Services Ordinance (Cap. 132)* provides control on dumping of litter in public places.

Dumping at Sea Ordinance (Cap. 466)

7.2.1.8 The *Dumping at Sea Ordinance* (DASO) 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 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.

7.2.2 Other Relevant Guidelines

7.2.2.1 Other relevant circulars / guidelines that are applicable to waste management practices for the Project include:

- Environment, Transport and Works Bureau Technical Circular (Works) ETWB TC(W) No. 19/2005 “Environmental Management on Construction Sites”;
- Development Bureau Technical Circular (Works) DEVB TC(W) No.06/2010 “Trip Ticket System for Disposal of C&D Materials”;

- 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”;
- DEVB TC(W) No. 08/2010 “Enhanced Specification for Site Cleanliness and Tidiness”;
- Works Branch Technical Circular WBTC No. 2/93 “Public Dumps”;
- WBTC No. 2/93B “Public Filling Facilities”;
- WBTC No. 16/96 “Wet Soil in Public Dumps”;
- WBTC No. 12/2000 “Fill Management”;
- WBTC No. 4/98 and 4/98A “Use of Public Fill in Reclamation and Earth Filling Projects”;
- WBTC No. 12/2002 “Specifications Facilitating the Use of Recycled Aggregates”;
- CEDD TC No. 11/2019 “Management of Construction and Demolition Materials”;
- Project Administration Handbook for Civil Engineering Works (PAH), Paragraph 4.1.3 of Chapter 4 “Construction and Demolition Materials” (subsumed from WBTC Nos. 25/99, 25/99A, 25/99C “Incorporation of Information on Construction and Demolition Material Management in Public Works Subcommittee Papers” and ETWB TCW No. 33/2002 “Management of Construction & Demolition Materials Including Rock)”;
- PAH, Paragraph 4.2.1 of Chapter 4 “Management of Dredged/Excavated Sediment” (subsumed from ETWB TCW No. 34/2002 “Management of Dredged/Excavated Sediment”);
- Relevant guidelines on handling of yard waste on EPD’s website (https://www.epd.gov.hk/epd/english/environmentinhk/waste/manage_facility/ypark.html) and Y Park’s website (https://www.ypark.hk/zh-hant/);
- The Greening, Landscape and Tree Management Section of the Development Bureau “Guidelines on Yard Waste Reduction and Treatment”; and
- DEVB TC(W) No. 4/2020 “Tree Preservation”.

7.2.2.2 *ETWB TC(W) No. 19/2005 - Environmental Management on Construction Site* includes procedures on waste management requiring contractors to reduce the C&D materials to be disposed of during the course of construction. The contractor is required to prepare and implement an Environmental Management Plan (EMP) and the Waste Management Plan (WMP) becomes part of the EMP.

7.2.2.3 The *WBTC No. 2/93 - Public Dumps* documents the current policy related to the disposal of C&D materials. C&D materials that are wholly inert, i.e. public fill, should be taken to PFRFs for reuse instead of being disposed of at landfill.

7.2.2.4 *Project Administration Handbook for Civil Engineering Works (PAH), Paragraph 4.1.3 of Chapter 4 - Construction and Demolition Materials* published by CEDD to enhance the management of C&D materials and to minimise their generation at source. The enhancement measures include drawing up a Construction and Demolition Material Management Plan (C&DMMP) at an early design stage to minimise C&D materials generation and encourage proper management of such materials.

7.2.2.5 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 should 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 m^3, the project office should seek confirmation from the DEP in terms of the availability of landfill facilities for disposal of such materials and the DEP would 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 m^3, 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.

7.2.2.6 *PAH, Paragraph 4.2.1 of Chapter 4 - Management of Dredged/Excavated Sediment* sets out the procedure for seeking approval to and the management framework for marine disposal of dredged/excavated sediment. It outlines the requirements to be followed in assessing and classifying the sediment and explains the marine disposal arrangement for the classified material. The sediment quality criteria for the classification of sediment were referred as the Lower Chemical Exceedance Level (LCEL) and Upper Chemical Exceedance Level (UCEL). The LCEL and UCEL are presented in Appendix 4.28 of the *PAH*. Subject to the results of the chemical screening, biological screening may be required to determine the disposal requirement of the sediment. There are three types of disposal options for dredged/excavated sediments stipulated in the *PAH* as listed below.

- Type 1 – Open Sea Disposal;
- Type 2 – Confined Marine Disposal; and
- Type 3 – Special Treatment/Disposal.

7.3 Assessment Methodology

7.3.1.1 The assessment of waste management implications during the construction and operation phases of the Project has been carried out in accordance with the EIA Study Brief and criteria given in Annexes 7 and 15 of the *EIAO-TM,* including the following tasks:

- Identification of the construction and operation activities of the Project which could give rise to waste arising;
- Estimation of types and quantities of waste generated;
- Examination of opportunities for waste reduction and re-use (both on-site and off-site) and the required disposal options for each type of waste; and
- Evaluation of potential impacts caused by improper handling, collection, transportation and re-use / disposal of wastes with respect to potential hazards, air and odour emissions, noise, wastewater discharges, ecology and public transport.

7.3.1.2 Prior to considering the disposal options for various types of waste, opportunities for reducing waste generation, on-site or off-site re-use and recycling have been evaluated. Measures which can be taken in the planning and design phases (e.g. by modifying the design approach) and in the construction phase for maximising waste reduction have been separately considered.

7.3.1.3 After considering all the opportunities for reducing waste generation and maximising re-use, the types and quantities of the waste required to be disposed of have been estimated and the disposal options for each type of waste have been described. The disposal method recommended for each type of waste has taken into account the result of the assessment. The impacts caused by handling (including stockpiling, labelling, packaging and storage), collection, transportation and reuse / disposal of waste have been addressed and appropriate mitigation measures have been proposed.

7.4 Identification and Evaluation of Waste Management Implications

7.4.1 Construction Phase

7.4.1.1 The following activities, including the DPs under Schedule 2 and Schedule 3 and some non-DP elements in the Revised RODP (**Sections 1.5 and 2.4**), have been included in the waste management implication assessment for the construction phase:

- Construction of Carriageway Bridge at TKO 132 (DP1);

- Reclamation works at TKO 137 and TKO 132 (DP2);
- Construction of an Effluent Polishing Plant (EPP) at TKO 137(DP3);
- Construction of a Refuse Transfer Station (RTS) at TKO 132 (DP4);
- Construction of a Construction Waste Handling Facility at TKO 132 (DP5);
- Construction of Electricity Facilities at TKO 132 (DP6);
- Construction of a Concrete Batching Plant (CBP), a Public Fill Transfer Facility (PFTF) and a Sewage Pumping Station (SPS) at TKO 132;
- Residential development, construction of "Government, Institution or Community" ("G/IC") facilities, "Education" ("E") (e.g. schools), open space ("O"), "Amenity" ("A"), and other specified uses ("OU") / key infrastructures including a Fresh Water Service Reservoir (FWSR), a Salt Water Service Reservoir (SWSR) and a green fuel station at TKO 137; and
- Other associated construction / infrastructural works, e.g. buildings, roads, utilities (including water, sewerage and drainage works), etc at TKO 137 and TKO 132.

7.4.1.2 Typical waste types arising from the proposed works are identified in this section, together with an evaluation of the potential waste management impacts associated with the handling and disposal of waste. **Table 7.1** lists out the sources and examples of the identified waste types.

Table 7.1 Identification of Waste Types during the Construction Phase of the Project

Waste Type	Source of Waste	Example of Waste
Construction and Demolition (C&D) Materials	• Materials generated from reclamation works at TKO 137 and TKO 132 • Materials generated from site clearance and site formation works (including natural terrain mitigation measures) at TKO 137 and TKO 132 • Materials generated from construction of viaducts at TKO 132 • Materials generated from construction of buildings and infrastructure at TKO 137 and TKO 132	Non-inert C&D materials • Top soil, vegetation and wood waste, etc. • Bamboo, timber, paper and plastic,etc. Inert C&D materials • Soft materials • Artificial hard materials • All grade granite • Rock including granite/tuff
Sediment	• Marine-based sediment removed from the reclamation works at TKO 137 and TKO 132 • Land-based sediment excavated from piling works and substructures for the construction of Effluent Polishing Plant (EPP) at TKO 137 • Removal of marine-based sediment from obstruction for berthing for Concrete Batching Plant (CBP) at TKO 132	• Marine-based sediment and land-based sediment
Chemical Waste	• Plant operation and maintenance at TKO 137 and TKO 132 • Maintenance of	• Oil and grease, scrap batteries, used paint, fuel, etc. • Cleansing fluids and solvents from construction plant and

Waste Type	Source of Waste	Example of Waste
	mechanical equipment at TKO 137 and TKO 132	equipment
General Refuse	• Refuse generated from construction works and site-based staff and workers at TKO 137 and TKO 132	• Food waste, containers, cans and wastepaper, etc.
Floating Refuse	• Construction activities at / near the sea at TKO 137 and TKO 132 • Accumulation along seawall	• Litter and debris

Notes:
1. Non-inert C&D material includes, but not limited to, bamboo, timber, paper and plastic, etc.
2. Soft material includes, but not limited to, excavated soil, fill, etc.
3. Artificial hard material includes, but not limited to, broken concrete, asphalt, bitumen and granular materials, etc.
4. Granite includes, but not limited to, all grades and types of rock.

7.4.1.3 The construction phase of the Project will be implemented in development stages through a number of construction activities. The anticipated timing for major construction activities in each development stage is summarised in **Table 7.2**.

Table 7.2 Anticipated Timing for Major Construction Activities in Each Development Stage

Construction Activities	Development Stage	Anticipated Timing
Reclamation of Phase 1, and construction of buildings at TKO 137	Initial Phase	2025 - 2030
Reclamation at TKO 132	Initial Phase	2025 - 2028
Site formation at TKO 132		2026 - 2028
Marine viaduct works at 132		2025 - 2030
Site Development for Infrastructure works at TKO 132		2027 - 2030
Site Development for Public Facilities at TKO 132		2029 - 2035
Reclamation of Phase 2 at TKO 137	Main Phase	2030 - 2034
Site formation and development at TKO137		2027 - 2041
Site development at TKO 137	Remaining Phase	2036 - 2041

Construction and Demolition Materials

7.4.1.4 C&D materials will be generated from reclamation works, site clearance and site formation works including natural terrain hazard mitigation measures, construction of marine viaduct, and construction of buildings and infrastructure. These C&D materials will comprise both non-inert and inert components.

Reclamation Works

7.4.1.5 Inert C&D materials will be generated from reclamation works at TKO 137 and TKO 132 and demolition of existing seawall at TKO 137 and will comprise soft materials (e.g. fill), artificial hard materials and rock materials. The estimated volumes of C&D materials generated from reclamation works are illustrated in **Table 7.3** and the corresponding estimated volumes under different recommended outlets are presented in **Table 7.4**.

Table 7.3 Estimated Volumes of C&D Materials Generated from Reclamation Works

Development Site	Volume of Non-Inert C&D Material (m^3)[2]	Volume of Inert C&D Material (m^3)[1]			
		Soft Material	Artificial Hard Material	Rock	Total
TKO 137	22,100	123,500	222,300	222,300	568,100
TKO 132	58,310	0	6,500	6,500	13,000
Total	**80,410**	**123,500**	**228,800**	**228,800**	**581,100**

Notes:
1. A bulking factor of 1.3 is applied.
2. The estimated volumes are rounded to the nearest 10 m^3.

Table 7.4 Estimated Volumes of C&D Materials Generated from Reclamation Works under Different Recommended Outlets

Recommended Outlet	Volume of Non-Inert C&D Material (m^3)[2]	Volume of Inert C&D Material (m^3)[1][2]			
		Soft Material	Artificial Hard Material	Rock	Total (Inert C&D Material)
Reuse on Site (Total)	***0***	***52,170***	***96,660***	***96,660***	***245,490***
- from TKO 137	*0*	*52,170*	*93,910*	*93,910*	*239,990*
- from TKO 132	*0*	*0*	*2,750*	*2,750*	*5,500*
Reuse in Other Projects or Delivered to PFRFs (Total)	***0***	***71,330***	***132,140***	***132,140***	***335,610***
- from TKO 137	*0*	*71,330*	*128,390*	*128,390*	*328,110*
- from TKO 132	*0*	*0*	*3,750*	*3,750*	*7,500*
Dispose of at Landfill (Total)	***80,410***	***0***	***0***	***0***	***0***
- from TKO 137	*22,100*	*0*	*0*	*0*	*0*
- from TKO 132	*58,310*	*0*	*0*	*0*	*0*

Notes:
1. A bulking factor of 1.3 is applied.
2. The estimated volumes are rounded to the nearest 10 m^3.

7.4.1.6 It is estimated that around 80,410 m^3 of non-inert C&D materials, and 581,100 m^3 of inert C&D materials (including 123,500 m^3 of soft materials, 228,800 m^3 of artificial hard materials and 228,800 m^3 of rock materials) will be generated from the reclamation works. It is anticipated that around 245,490 m^3 of inert C&D material (comprising 52,170 m^3 of soft materials, 96,660 m^3 of artificial hard materials and 96,660 m^3 of rock materials) will be reused on-site, and around 335,610 m^3 of inert C&D materials will be transported to other concurrent projects for reuse. Potential concurrent projects shall be sourced for reuse of inert C&D materials. Delivery to the Public Fill Reception Facilities (PFRFs) should only be considered as the last resort. The non-inert C&D materials should be reused on-site before disposing at the South East New Territories Landfill Extension (SENTX), North East New Territories (NENT), West New Territories (WENT) Landfill, or their extensions. With proper implementation of good construction site practice and mitigation measures, the on-site handling and reuse of reclamation waste would not cause adverse environmental impacts.

7.4.1.7 It is estimated that up to 4,397,000 m^3 and 3,340,000 m^3 of fill materials would need to be imported for the reclamation works at TKO 137 and TKO 132 respectively. In addition, it is estimated that up to 870,000 m^3 and 310,000 m^3 of rock fill would need to be imported for construction of the new seawalls at TKO 137 and TKO 132 respectively. The imported fill materials are sourced from suitable inert C&D materials generated from the construction of new buildings and infrastructure as well as other concurrent projects. The Contractor should review the programme during early construction stage to maximise the quantity of on-site reuse of surplus fill materials.

Site Clearance and Site Formation Works

7.4.1.8 Site clearance waste will mainly come from the demolition of existing structures, tree felling and preparation of the existing ground surface and will comprise top soil, vegetation, broken concrete and asphalt. Site formation waste will mainly come from excavation works and will comprise excavated soil and granite. To minimise the generation of site formation waste, the phasing plan and general layout of the Project are considered holistically and thoroughly. The minimisation of cast in-place concrete construction method would be beneficial to reduce

generation of public fill/inert C&D materials. The estimated volumes of C&D materials generated from site formation works are illustrated in **Table 7.5** and the corresponding estimated volumes under different recommended outlets are presented in **Table 7.6**.

Table 7.5 Estimated Volumes of C&D Materials Generated from Site Clearance and Site Formation Works

Development Site	Volume of Non-Inert C&D Material (m^3)	Volume of Inert C&D Material (m^3)[1][2]			
		Soft Material	Artificial Hard Material	Rock	Total
TKO 137	35,600	338,000	1,800	117,000	456,800
TKO 132	850	77,060	0	32,760	109,820
Total	**36,450**	**415,060**	**1,800**	**149,760**	**566,620**

Notes:
1. A bulking factor of 1.3 is applied.
2. The estimated volumes are rounded to the nearest 10 m^3.

Table 7.6 Estimated Volumes of C&D Materials Generated from Site Clearance and Site Formation Works under Different Recommended Outlets

Recommended Outlet	Volume of Non-Inert C&D Material (m^3)	Volume of Inert C&D Material (m^3)[1][2]			
		Soft Material	Artificial Hard Material	Rock	Total (Inert C&D Material)
Reuse on Site (Total)	***0***	***175,340***	***0***	***63,270***	***238,610***
- from TKO 137	*0*	*142,790*	*0*	*49,430*	*192,220*
- from TKO 132	*0*	*32,550*	*0*	*13,840*	*46,390*
Reuse in Other Projects or Delivered to PFRFs (Total)	***0***	***239,720***	***1,800***	***86,490***	***328,010***
- from TKO 137	*0*	*195,210*	*1,800*	*67,570*	*264,580*
- from TKO 132	*0*	*44,510*	*0*	*18,920*	*63,430*
Dispose of at Landfill (Total)	***36,450***	***0***	***0***	***0***	***0***
- from TKO 137	*35,600*	*0*	*0*	*0*	*0*
- from TKO 132	*850*	*0*	*0*	*0*	*0*

Notes:
1. A bulking factor of 1.3 is applied
2. The estimated volumes are rounded to the nearest 10 m^3.

7.4.1.9 It is estimated that around 36,450 m^3 of non-inert C&D materials, and 566,620 m^3 of inert C&D materials (including 415,060 m^3 of soft materials, 1,800 m^3 of artificial hard materials and 149,760 m^3 of rock materials) will be generated from site clearance and site formation works. It is anticipated that 238,610 m^3 of inert C&D materials (175,340 m^3 of soft materials and 63,270 m^3 of rock materials) generated from the site clearance and site formation works would be reused on-site. Approximately 328,010 m^3 of inert C&D materials will be transported to other concurrent projects for reuse. Potential concurrent projects shall be sourced for reuse of inert C&D materials. Delivery to the PFRFs should only be considered as the last resort. The non-inert C&D materials should be reused on-site before disposing at the SENTX, NENT, WENT Landfill, or their extensions. With proper implementation of good construction site practice and mitigation measures, the on-site handling and reuse of site clearance and site formation waste would not cause adverse environmental impacts.

7.4.1.10 It is estimated that around 62,000 m^3 of fill materials will need to be imported for the site formation works at TKO 137. The imported fill materials are sourced from suitable inert C&D materials generated from the construction of new buildings and infrastructure as well as other concurrent projects. The reusable portion of the inert C&D materials generated from the site clearance and site formation works will be reused on-site as backfilling materials. The Contractor should review the programme during early construction stage to maximise the quantity of on-site reuse of surplus fill materials.

Construction of Marine Viaduct at TKO 132

7.4.1.11 C&D materials will be generated from construction of marine viaduct at TKO 132 and will comprise non-inert C&D materials and inert C&D materials including fill, concrete and granite/tuff. To minimise the generation of C&D materials, the use of precast construction will be maximised and the *in-situ* site works will be minimised. Precast will be adopted for pile cap, precast hollow columns to precast segmental deck. The estimated volumes of C&D materials generated from construction of marine viaduct at TKO 132 and under different recommended outlets are illustrated in **Table 7.7**.

Table 7.7 Estimated Volumes of C&D Materials Generated from Construction of Marine Viaduct at TKO 132 and the Recommended Outlets

Development Site / Recommended Outlet	Volume of Non-Inert C&D Material (m^3)	Volume of Inert C&D Material (m^3)[1][2]			
		Soft Material	Artificial Hard Material	Rock	Total
TKO 132	140	4,420	3,120	3,510	**11,050**
Reuse on Site	*0*	*1,870*	*1,320*	*1,480*	*4,670*
Reuse in Other Projects or Delivered to PFRFs	*0*	*2,550*	*1,800*	*2,030*	*6,380*
Disposed of at Landfill	***140***	*0*	*0*	*0*	*0*

Notes:
1. A bulking factor of 1.3 is applied.
2. The estimated volumes are rounded to the nearest 10 m^3.

7.4.1.12 It is estimated that around 11,050 m^3 of inert C&D materials (including 4,420 m^3 of soft materials, 3,120 m^3 of artificial hard materials and 3,510 m^3 of rock materials) and around 140 m^3 of non-inert C&D materials will be generated from the construction of marine viaduct at TKO 132. It is anticipated that around 4,670 m^3 of inert C&D materials (comprising 1,870 m^3 of soft materials,1,320 m^3 of artificial hard materials and 1,480 m^3 of rock materials) generated from the construction of marine viaduct at TKO 132 would be reused on-site. Approximately 6,380 m^3 of the inert C&D materials will be transported to other concurrent projects for reuse. Potential concurrent projects shall be sourced for reuse of inert C&D materials. Delivery to the PFRFs should only be considered as the last resort. The non-inert C&D materials should be reused on-site before disposing at the SENTX, NENT, WENT Landfill, or their extensions. With proper implementation of good construction site practice and mitigation measures, the on-site handling and reuse of site clearance waste would not cause adverse environmental impacts.

Construction of Buildings and Infrastructures

7.4.1.13 C&D materials will also be generated from construction of buildings and infrastructures at TKO 137 and TKO 132. The buildings and infrastructures in TKO 137 include residential development, G/IC facilities, schools and other specified uses (including the EPP, electricity substations, service reservoirs and green fuel station), roads and utilities, while buildings and

infrastructures in TKO 132 includes the electricity facilities, construction waste handling facility, PFTF, RTS, SPS, CBP, roads and utilities. The C&D materials generated will comprise non-inert C&D materials and inert C&D materials including fill and granite. The estimated volumes of C&D materials generated from construction of buildings and infrastructures are shown in **Table 7.8** and the corresponding estimated volumes under different recommended outlets are presented in **Table 7.9**.

Table 7.8 Estimated Volumes of C&D Materials Generated from Construction of Buildings and Infrastructures

Development Site	Volume of Non-Inert C&D Material (m^3)	Volume of Inert C&D Material (m^3)[1][2]			
		Soft Material	Artificial Hard Material	Rock	Total
TKO 137	6,500	3,454,250	0	137,180	3,591,430
TKO 132	0	411,120	0	3,650	414,770
Total	**6,500**	**3,865,370**	**0**	**140,830**	**4,006,200**

Notes:
1. A bulking factor of 1.3 is applied.
2. The estimated volumes are rounded to the nearest 10 m^3.

Table 7.9 Estimated Volumes of C&D Materials Generated from Construction of Buildings and Infrastructures under Different Recommended Outlets

Recommended Outlet	Volume of Non-Inert C&D Material (m^3)	Volume of Inert C&D Material (m^3)[1][2]			
		Soft Material	Artificial Hard Material	Rock	Total (Inert C&D Material)
Reuse on Site (Total)	***0***	***1,632,480***	***0***	***59,490***	***1,691,970***
- from TKO 137	*0*	*1,458,800*	*0*	*57,950*	*1,516,750*
- from TKO 132	*0*	*173,680*	*0*	*1,540*	*175,220*
Reuse in Other Projects or Delivered to PFRFs (Total)	***0***	***2,232,890***	***0***	***81,340***	***2,314,230***
- from TKO 137	*0*	*1,995,450*	*0*	*79,230*	*2,074,680*
- from TKO 132	*0*	*237,440*	*0*	*2,110*	*239,550*
Dispose of at Landfill (Total)	***6,500***	***0***	***0***	***0***	***0***
- from TKO 137	*6,500*	*0*	*0*	*0*	*0*
- from TKO 132	*0*	*0*	*0*	*0*	*0*

Notes:
1. A bulking factor of 1.3 is applied.
2. The estimated volumes are rounded to the nearest 10 m^3.

7.4.1.14 It is estimated that around 4,006,200 m^3 of inert C&D materials (including 3,865,370 m^3 of soft materials, and 140,830 m^3 of rock materials) will be generated from the construction of buildings and infrastructures at TKO 137 and TKO 132. Approximately 6,500 m^3 of non-inert C&D materials would also be generated from the construction of infrastructures at TKO 137. It is estimated that approximately 1,691,970 m^3 of inert C&D materials generated from the construction of buildings and infrastructures will be reused on-site. However, as the construction of buildings is carried out by different entities based on land use, the reuse of C&D materials on-site is subject to further coordination with the respective parties involved. The non-inert C&D materials generated from construction of buildings and infrastructures will be reused

and recycled on-site before disposal to the SENTX, NENT, WENT Landfill, or their extensions. The inert C&D materials will be reused and recycled on-site before delivery to concurrent projects if suitable project proponents are identified, or the PFRFs subject to the designation from the Public Fill Committee (PFC). The generation of C&D materials can be minimised through careful planning during the detailed design stage and with good site practice during construction. This includes the use of non-timber formwork and temporary works and on-site sorting of the C&D materials for reuse and recycling. Mitigation and control requirements for C&D materials are detailed in **Section 7.5.2.1 to 7.5.2.5**. With proper implementation of good construction site practice and mitigation measures, the on-site handling and reuse of C&D materials would not cause adverse environmental impacts.

7.4.1.15 It is estimated that around 185,170 m^3 and 7,140 m^3 of fill materials will need to be imported for the construction of infrastructures at TKO 137 and TKO 132 respectively. The imported fill materials are sourced from suitable inert C&D materials generated from the construction of new buildings and infrastructure as well as other concurrent projects. The reusable portion of the inert C&D materials generated from the construction of infrastructures will be reused on-site as backfilling materials. The Contractor should review the programme during early construction stage to maximise the quantity of on-site reuse of surplus fill materials.

Barging Points with Conveyors and Temporary Stockpiling Areas

7.4.1.16 Barging points, conveyor system and temporary stockpiling areas are expected at TKO 137 and TKO 132. Since the Project will be implemented in stages, temporary stockpiling areas have been identified to store the C&D materials for reuse under the Project. Barging points with conveyors have also been identified to support the transportation of waste generated from TKO 132. The locations of the barging points with conveyors and temporary stockpiling areas at TKO 137 and TKO 132 are shown in **Figure 7.1** and **Figure 7.2** respectively. For TKO 137, It is worth mentioning that major construction will commence in year 2026. In view of the minimal demand of C&D materials after year 2035 at TKO 137, majority of the excavated C&D materials would be delivered to concurrent projects for reuse or the PFRFs. Therefore, no additional stockpiling areas would be considered after year 2035. For TKO 132, no temporary stockpiling area is expected from 2025 to May 2027 as temporary stockpiling area will only be available after partial completion of reclamation works after May 2027 in accordance with the construction programme. The remaining available sites after year 2029 are required to be handed over to the relevant land users for their own construction, and the C&D materials generated could be delivered to TKO 137 for stockpiling as necessary. The storage and stockpiling of C&D materials prior to utilisation on-site may contribute to the generation of dust, visual impacts from unsightliness and water quality impacts from runoff. The disposal of C&D materials also has the potential to result in noise and dust impacts from loading and unloading and emissions from haul vehicles. Mitigation and control requirements for C&D materials are detailed in **Section 7.5.2.1 to 7.5.2.5**. Provided that the handling, storage and disposal of C&D materials are in accordance with these requirements, adverse waste management implications, including potential hazards, air and odour emissions, noise and wastewater discharge, ecology and public transport, associated with handling, storage and disposal of C&D materials during the construction phase of the Project are not expected.

Sediment

7.4.1.17 Based on the latest engineering design, sediment may need to be removed at/off TKO 137 and TKO 132. The types of works that require sediment removal are as follow:

TKO 137

- Removal of marine-based sediment for the reclamation works (with maximum sediment removal depth of 2 m) (Period of generation: Q3 2026 to Q4 2034); and
- Excavation of land-based sediment from piling works and substructures for the construction of EPP (Period of generation: Q3 2029 to Q1 2031 & Q3 2037 to Q3 2038).

TKO 132

- Removal of marine-based sediment for the reclamation works at TKO 132 (Period of generation: Q3 2026 to Q4 2028); and
- Removal of marine-based sediment from obstruction for berthing for CBP at TKO 132 (Period of generation: Q2 2028 to Q4 2028).

Review of Existing Sediment Quality Data

7.4.1.18 EPD conducts routine monitoring of the bottom sediment quality at 60 stations across the territory of Hong Kong waters. Among these 60 stations, the closest monitoring stations to TKO 137 are ES1 and ES4 located in Eastern Buffer Water Control Zone, while the closest monitoring station to TKO 132 is JS2 located in Junk Bay Water Control Zone. The latest available sediment quality data (from 2018 to 2022) are summarised in the *Annual Marine Water Quality Report 2022* published by EPD.

7.4.1.19 Based on EPD's annual report, for ES1 and ES4 near TKO 137, except for mercury, copper, silver and zinc, all the levels of metals, organic-PAHs and non-organic PAHs were not exceeding LCEL. For mercury, the highest level measured at ES1 and ES4 (mercury at ES1: 0.41 mg/kg; ES4: 0.31 mg/kg) were above the LCEL but not exceeding UCEL. For copper, silver and zinc, the highest levels measured at ES4 (copper: 83 mg/kg, silver: 1.6 mg/kg and zinc: 210 mg/kg) were above the LCEL but not exceeding UCEL.

7.4.1.20 For JS2 near TKO 132, except for copper, mercury and silver, all the levels of metals, organic-PAHs and non-organic PAHs were not exceeding LCEL. For copper, the mean level (69 mg/kg) was above the corresponding LCEL but not exceeding UCEL and the highest level (130 mg/kg) was above the corresponding UCEL but not exceeding 10 times of LCEL. For mercury and silver, the highest levels (mercury: 0.64 mg/kg and silver: 1.3 mg/kg) were above the corresponding LCEL but not exceeding UCEL.

Sediment Sampling and Testing Plan (SSTP)

7.4.1.21 In order to characterise the proposed sediment removal for marine disposal option at/off TKO 137 and TKO 132 and pursuant to Clause 3 in Appendix F of the EIA Study Brief, a Sediment Sampling and Testing Plan (SSTP) was prepared with reference to Paragraph 4.2.1 of the *PAH* and was agreed by EPD on 9 February 2024. The SSTP details the ranges of parameters to be analysed; the number, type and methods of sampling; sample preservation; chemical and biological laboratory test methods to be used. The agreed SSTP is enclosed in **Appendix 7.1**. It should be noted that the SSTP and the related sediment sampling and testing would only serve the purpose for fulfilling the EIA Study of the Project. To fulfil the requirements under the DASO, separate SSTP and additional ground investigation (GI) works may need to be carried out at a later stage of the Project.

7.4.1.22 As proposed in the agreed SSTP, a volume-based approach with reference to Appendix 4.21 of the *PAH* was adopted to determine the number of sampling locations. Based on the adopted sampling arrangement, a total of 28 sediment sampling locations (24 marine-based and 4 land-based) are proposed at TKO 137 and 30 marine-based sediment sampling locations are proposed at TKO 132. The proposed sampling locations and sampling grids for TKO 137 and TKO 132 are shown in **60720423/B09B/703 and 704** in **Appendix 7.1** respectively.

7.4.1.23 For TKO 137, further to EPD's agreement on the SSTP and based on the latest engineering design, the sediment removal extent for reclamation works was largely reduced (refer to **Figure 7.3**). As shown in **Figure 7.3**, of the marine-based sampling locations proposed in the SSTP, only MEA1, MEA3, MEA17 and MEA19 are relevant to the reduced sediment removal extent. Furthermore, the submarine outfall of the EPP (named as Sewage Treatment Works (STW) in the SSTP) (both marine and land sections) is no longer required as the treated effluent will be discharged via proposed sewerage network and drainage box culvert at a relatively

shallow level. No sediment excavation/removal is anticipated for the construction of the sewerage network and drainage box culvert and within the marine-based sampling grids of MEA22, MEA23 and MEA24 and land-based sampling grids of EA3 and EA4. Referring to **Table 7.10** below, the number of the relevant marine-based sampling locations for reclamation works in the SSTP would still comply with the recommended minimum number of sampling stations in the *PAH* for the latest estimated sediment removal quantities. For land-based sediment, only land-based Category L sediment was identified (refer to **Table 7.13**). Further sampling and testing works are expected to be carried out for the purpose of site allocation and marine dumping permit application under DASO at a later stage of the Project (refer to **Section 7.5.2.16**).

7.4.1.24 For TKO 132, further to EPD's agreement on the SSTP, the engineering layout was formulated and the proposed sediment removal extent was updated. Based on the engineering layout, breakwater was no longer required. As shown in **Figure 7.4,** the proposed relevant sediment sampling locations in the SSTP (i.e. MEB1 to MEB22) and the corresponding grids covered the potential sediment removal areas. In addition, referring to **Table 7.10** below, the number of these relevant sampling locations in the SSTP would still comply with the recommended minimum number of sampling stations in the *PAH* for the latest estimated sediment removal quantities.

7.4.1.25 The proposed sampling locations, sampling grids, latest possible reclamation areas and potential sediment removal area for TKO 137 and TKO 132 are shown in **Figure 7.3** and **7.4** respectively. Referring to **Section 2.13**, alternatives for construction methodologies were considered. The extent of sediment removal was minimised by adopting non-dredged seawall with ground improvement (by Deep Cement Mixing (DCM)) and non-dredged reclamation (using DCM) construction methods and leaving sediment in place subject to site condition.

Table 7.10 Comparison of the Recommended Minimum Number of Sampling Stations in the *PAH* and the Proposed Number of Relevant Sampling Locations in SSTP for the Sediment Removal/Excavation Works

Types of Construction Works	Types of Sediment to be Removed/Excavated	Estimated *In-situ* Volume of Removed/Excavated Sediment for Marine Disposal (m^3)[(a)]	Recommended Minimum No. of Sampling Stations in *PAH*	No. of Relevant Sampling Locations in SSTP[(b)]
TKO 137				
Reclamation works	Marine-Based Sediment	9,951	3	4
Piling works and substructures for EPP construction	Land-Based Sediment	0	-	2
TKO 132				
Reclamation Works and removal of obstruction for berthing for CBP	Marine-Based Sediment	184,601	12	22

Notes:
(a) Sediment removal volumes estimated based on the latest engineering design (refer to **Table 7.13** and **Table 7.14**)
(b) Relevant sampling locations in SSTP include MEA1, MEA3, MEA17, MEA19 and EA1 to EA2 (for TKO 137) and MEB1 to MEB22 (for TKO 132).

Sediment Sampling and Testing Works

General

7.4.1.26 Ground Investigation (GI) works was conducted between February and March 2024 according to the agreed SSTP. The sampling works were conducted by Fugro Geotechnical Services

Limited (for marine-based sampling works) and Intrafor Hong Kong Limited (for land-based sampling works). The laboratory testing was carried out by ALS Technichem (HK) Pty. Ltd., an HOKLAS accredited laboratory.

7.4.1.27 The sediment sampling locations were conducted taken into consideration the site constraints (e.g. restricted access due to shallow water depth). All as-built sampling locations were still within the corresponding sampling grid and are shown in **Figure 7.3** and **Figure 7.4**.

7.4.1.28 The marine-based sediment sampling was carried out by means of grab sampling at the seabed level and vibrocoring method for the vertical sediment profiles below. Undisturbed samples using vibrocore were collected from seabed surface, 0.9 m down, 1.9 m down, 2.9 m down and thereafter every 3 m down to the proposed termination depth. The sediment sampling was terminated at least 1 m below the maximum sediment removal depth subject to site condition.

7.4.1.29 The land-based sediment sampling was carried out using borehole drilling method for the vertical sediment profiles. Undisturbed samples using U100 sampler were collected from the top level of marine deposit, 0.9 m down, 1.9 m down, 2.9 m down and thereafter every 3 m down to the bottom of the termination depth. The depth of sediment sampling was terminated at least 1 m below the base of marine deposit layer.

7.4.1.30 As biological screening is not required (refer to **Section 7.4.1.37** below), no reference grab sediment sample was collected from EPD's routine sediment monitoring station PS6 at Port Shelter (850234E, 820057N).

7.4.1.31 The sediment quality data from the sampling and testing works was reviewed, making reference to paragraph 4.2.1 of Chapter 4 of the *PAH*, to identify, characterise and estimate the quantities of the removed/excavated sediment, and to propose transportation routings and handling/disposal arrangements/methods to fulfil the requirements of the EIA Study Brief.

TKO 137

7.4.1.32 As discussed in **Section 7.4.1.23**, the sediment removal extent has largely reduced and submarine outfall for the EPP is no longer required. No sediment removal works are expected within the marine-based sampling grids of MEA2, MEA4 to MEA16, MEA18, MEA20 to MEA24 and land-based sampling grids of EA3 and EA4 (refer to **Figure 7.3**). As such, MEA2, MEA4 to MEA16, MEA18, MEA20 to MEA24, EA3 and EA4 would not be assessed under this assessment.

7.4.1.33 Based on the above, a total of 4 marine-based sampling locations (viz. MEA1, MEA3, MEA17 and MEA19) and 2 land-based sampling locations (viz. EA1 and EA2) were conducted. The as-built sampling locations are shown in **Figure 7.3**.

7.4.1.34 For marine-based sampling location MEA3, due to insufficient sample for testing, sediment samples were collected at an alternative sampling location (MEA3a), located approximately 20 m from MEA3 and within the corresponding sampling grid, for laboratory testing. For marine-based sampling location MEA17, no sediment was encountered and as such, no sediment samples were collected and tested from the location.

7.4.1.35 Following the above, 31 sediment samples were collected from the 3 marine-based sampling locations and 2 land-based sampling locations for laboratory testing. The relevant sampling locations are listed below**.**

Marine-Based Sampling Locations

- MEA1
- MEA3a
- MEA19

Land-Based Sampling Locations

- EA1
- EA2

7.4.1.36 The collected sediment samples were tested for chemical screening with parameters as stated in paragraph 4.2.1 of Chapter 4 of the *PAH*. The chemical screening results are summarised in **Table 7.11** with details provided in **Appendix 7.2**. Laboratory analytical reports for chemical screening are provided in **Appendix 7.3**.

7.4.1.37 Based on the chemical screening results, for the marine-based sampling, 2 Category M sediment samples and 2 Category H sediment samples were found in sampling locations MEA1 and MEA3a. The remaining samples were identified as Category L sediment. For the land-based sampling, all the samples were identified as Category L sediment.

Table 7.11 Summary of Chemical Screening Results for TKO 137

Sediment Category	No. of Samples	Percentage
Category L (equal to or below LCEL)	27 (marine-based: 9 land-based: 19)	87.10%
Category M (above LCEL but equal to or below UCEL)	2 (all marine-based)	6.45%
Category H (above UCEL but equal to or below 10x LCEL)	2 (all marine-based)	6.45%
Category H (above 10x LCEL)	0	0%
Total:	***31***	***100%***

7.4.1.38 Based on the chemical screening results and according to paragraph 4.2.1 of Chapter 4 of the *PAH*, no biological screening is required.

TKO 132

7.4.1.39 As discussed in **Section 7.4.1.24**, the engineering layout was formulated and the proposed sediment removal extent was updated. Based on the latest engineering layout, no sediment removal works are expected within the marine-based sampling grids of MEB23, MEB24, MEB25, MEB26, MEB27, MEB28, MEB29 and MEB30 (refer to **Figure 7.4**). As such, MEB23, MEB24, MEB25, MEB26, MEB27, MEB28, MEB29 and MEB30 would not be assessed under this assessment.

7.4.1.40 Based on the above, a total of 22 marine-based sampling locations (viz. MEB1 to MEB22) were conducted. The as-built sampling locations are shown in **Figure 7.4**.

7.4.1.41 Of the 22 marine-based sampling locations, 3 sampling locations (viz. MEB10, MEB17 and MEB21) did not encounter sediment and as such, no sediment samples were collected and tested from the location.

7.4.1.42 Following the above, 44 sediment samples were collected from the remaining 19 marine-based sampling locations for laboratory testing. The relevant sampling locations are listed below**.**

Marine-Based Sampling Locations

- MEB1
- MEB2
- MEB3
- MEB4

- MEB5
- MEB6
- MEB7
- MEB8
- MEB9
- MEB11
- MEB12
- MEB13
- MEB14
- MEB15
- MEB16
- MEB18
- MEB19
- MEB20
- MEB22

7.4.1.43 The collected sediment samples were tested for chemical screening with parameters as stated in paragraph 4.2.1 of Chapter 4 of the *PAH*. The chemical screening results are summarised in **Table 7.12** with details provided in **Appendix 7.2**. Laboratory analytical reports for chemical screening are provided in **Appendix 7.3**.

7.4.1.44 Based on the chemical screening results, for the marine-based sampling, Category M sediment was found in 14 samples at sampling locations MEB5, MEB6, MEB9, MEB11, MEB12, MEB15, MEB18, MEB19, MEB20 and MEB22. Category H sediment was found in 3 samples at sampling locations MEB5, MEB6 and MEB11. The remaining samples were identified as Category L sediment.

Table 7.12 Summary of Chemical Screening Results for TKO 132

Sediment Category	No. of Samples	Percentage
Category L (equal to or below LCEL)	27	61.4%
Category M (above LCEL but equal to or below UCEL)	14	31.8%
Category H (above UCEL but equal to or below 10x LCEL)	3	6.8%
Category H (above 10x LCEL)	0	0%
Total:	***44***	***100%***

7.4.1.45 Based on the chemical screening results and according to paragraph 4.2.1 of Chapter 4 of the *PAH*, no biological screening is required.

Sediment Disposal Options and Quantities

7.4.1.46 Based on the screening results and the above findings, the disposal options for each of the sediment samples were determined in accordance with paragraph 4.2.1 of Chapter 4 of the *PAH*. The sediment quantities to be generated under each disposal option were then estimated with consideration of (i) the potential sediment removal areas, (ii) the depths and thicknesses of the sediment based on the sediment sampling works and (iii) the determined disposal options of the sediment samples as based on the chemical screening results.

7.4.1.47 Refer to **Section 7.4.1.41**, although no sediment was encountered at MEB17 at TKO 132, given the uncertainty in ground conditions and for conservative purposes, sediment is assumed to be removed within the sampling grid of MEB17. The corresponding category and disposal type were determined based on the samples from the nearby sampling location (i.e. MEB18).

7.4.1.48 Based on current estimation, the quantities for each disposal type for TKO 137 and TKO 132 are presented in **Table 7.13** and **Table 7.14** respectively. Detailed calculations of removed sediment quantities and assumptions are presented in **Appendix 7.4**.

Table 7.13 Estimated Quantities of Sediment under each Disposal Option for TKO 137

Disposal Option	Corresponding Category	Estimated *In-situ* Quantities (m^3) (1)		
		Total	For Reuse (2)	Disposal at Designated Marine Disposal Area
Marine-Based Sediment				
Type 1 – Open Sea Disposal	Category L Sediment	8,237	8,237	0
Type 2 – Confined Marine Disposal at disposal site(s) allocated by MFC	Category M Sediment	4,828	0	4,828
	Category H Sediment (does not require biological screening)	5,123	0	5,123
Subtotal (Marine-Based Sediment) (A)		**18,188**	**8,237**	**9,951**
Land-Based Sediment				
Type 1 – Open Sea Disposal	Category L Sediment	1,858	1,858	0
Type 2 – Confined Marine Disposal at disposal site(s) allocated by MFC	Category M Sediment	0	0	0
	Category H Sediment (does not require biological screening)	0	0	0
Subtotal (Land-Based Sediment) (B)		**1,858**	**1,858**	**0**
Total (A + B)		**20,046**	**10,095**	**9,951**

Notes:
(1) The estimated quantities included marine deposit and excluded materials such as alluvium. The quantities shown in the table are estimates based on the finalized sediment removal area for the reclamation works.
(2) Possibility of reusing the excavated / removed sediment will be subject to further review during the detailed design and construction stages.

Table 7.14 Estimated Quantities of Sediment under each Disposal Option for TKO 132

Disposal Option	Corresponding Category	Estimated *In-situ* Quantities (m^3) (1)		
		Total	For Reuse (2)	Disposal at Designated Marine Disposal Area
Marine-Based Sediment				
Type 1 – Open Sea Disposal	Category L Sediment	90,517	0	90,517
Type 2 – Confined Marine Disposal at disposal site(s) allocated by MFC	Category M Sediment	92,246	0	92,246
	Category H Sediment (does not require biological screening)	1,838	0	1,838
	Total	**184,601**	**0**	**184,601**

Notes:
(1) The estimated quantities included marine deposit and excluded materials such as alluvium. The quantities shown in the table are estimates based on the finalized sediment removal area.
(2) Possibility of reusing the removed sediment will be subject to further review during the detailed design and construction stages.

7.4.1.49 Category L sediment excavated / removed from TKO 137 will to be treated using cement stabilization / solidification (S/S) technique and reused as backfilling materials within the reclamation area or by other concurrent projects before considering the marine disposal option. Possibility of reusing the excavated / removed sediment will be subject to further review during the detailed design and construction stages.

7.4.1.50 Surplus sediment that are not reused would be disposed of at the designated marine disposal areas according to paragraph 4.2.1 of Chapter 4 of the *PAH*. The disposal options for the removed sediment should follow the procedures in paragraph 4.2.1 of Chapter 4 of the *PAH*. Based on the current estimation, approximately 9,951 m^3 of sediment from TKO 137 and 184,601 m^3 of sediment from TKO 132 will be disposed of at the marine disposal areas. Subject to agreement with Marine Fill Committee (MFC) of CEDD, the marine disposal sites for Type 1 – Open Sea Disposal are typically South Cheung Chau and East of Ninepin. For Type 2 – Confined Marine Disposal, the marine disposal sites are typically East Sha Chau. The actual transportation routing and frequency for marine disposal to designated disposal outlets shall be agreed with EPD/CEDD during the construction phase prior to marine disposal. The recommended mitigation measures for marine disposal are discussed in **Section 7.5.2.12 to 7.5.2.21**. No adverse waste management implications are anticipated if the recommended mitigation measures are implemented.

Chemical Waste

7.4.1.51 The maintenance and servicing of plant, equipment and vehicles will also generate a small amount of chemical waste during the construction phase of the Project. The possible chemical waste includes:

- Scrap batteries from vehicle maintenance;
- Spent hydraulic fluids and waste fuel from plant operation;
- Spent lubrication oils and cleaning fluids from plant maintenance; and
- Spent paint and solvents from equipment maintenance.

7.4.1.52 Chemical waste arising during the construction phase of the Project may pose environmental, health and safety hazards if not stored and disposed of. The potential environmental, health and safety hazards include:

- Toxic effects to workers;
- Adverse impacts on water quality and aquatic biota from spills; and
- Fire hazard.

7.4.1.53 It is difficult to quantify the amount of chemical waste that will arise during the construction phase of the Project since it will be highly dependent on the Contractor's on-site maintenance practice and the quantities of plant and vehicles utilized. Nevertheless, it is anticipated that the quantity of chemical waste, such as lubrication oil and solvent produced from plant and equipment maintenance, would be in the order of few hundred litres per month.

7.4.1.54 Storage, handling, transport and disposal of chemical waste should be arranged in accordance with the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* published by the EPD. Measures should be taken to reuse and recycle materials before disposal. Mitigation and control requirements for chemical waste are detailed in **Section 7.5.2.8 to 7.5.2.9**. Provided that the handling, storage and disposal of chemical waste are in accordance with these requirements, adverse waste management implications, including potential hazards, air and odour emissions, noise, wastewater discharge, ecology and public transport, associated with handling, storage and disposal of chemical waste during the construction phase of the Project are not expected.

General Refuse

7.4.1.55 During the construction phase of the Project, the workforce will generate general refuse comprising food waste, waste paper, empty containers, etc. Storage of general refuse may give rise to adverse environmental impacts, such as windblown litter, odour, water and visual impacts, if not properly managed. The site may also attract vermin and pests if the waste containers are not cleaned or maintained properly and frequently. In addition, disposal of waste at sites other than the approved waste disposal facilities may lead to similar adverse environmental impacts to those sites.

7.4.1.56 The maximum number of construction workers present at any one time during each year of the construction phase of the Project is approximately 3,900 staff at TKO 137 and 900 staff at TKO 132. Based on a generation rate of 0.65 kg per worker per day, around 2,535 kg and 585 kg of general refuse would be generated daily from TKO 137 and TKO 132 respectively during the construction phase of the Project. Therefore, it is estimated that around 37,470 m^3 and 5,400 m^3 general refuse[1] would be generated from TKO 137 and TKO 132 respectively during the construction phase of the Project.

7.4.1.57 In order to minimise the final disposal quantities of general refuse, provision of sufficient number of recycling bins for the collection of different types of recyclables (including paper, aluminium cans, plastic bottles and glass bottles) and sufficient number of general refuse bins for the collection of non-recyclable waste is recommended. The Contractor should implement an education programme for workers relating to avoiding, reducing, reusing and recycling of general refuse. A reputable licensed collector should be employed to collect the general refuse on a daily basis for disposal at the NENT or WENT Landfill.

7.4.1.58 Mitigation and control requirements for general refuse are detailed in **Section 7.5.2.10 to 7.5.2.11**. Provided that the handling, storage and disposal of general refuse are in accordance with these requirements, adverse waste management implications, including potential hazards, air and odour emissions, noise and wastewater discharge, ecology and public transport,

[1] Assuming bulk density of 311.73kg/m^3 and works are 48 weeks a year and 6 days a week.

associated with handling, storage and disposal of general refuse during the construction phase of the Project are not expected.

Floating Refuse

7.4.1.59 Floating refuse in the Project area might be generated from construction workforce (e.g. waste paper and empty containers) while working on/near the sea. Additionally, accidental losses of construction materials and wastes when transporting to and from the designated sites might occur. The quantity is expected to be insignificant.

7.4.1.60 On the other hand, floating refuse not generated from the Project may wash up onto the Project area through the effect of wind and currents, and may be trapped and accumulated along the shoreline and breakwaters, especially in summer months following heavy rains and typhoons. As advised by Marine Department (MD), there was no available record of floating refuse collected within the Junk Bay and based on the current condition of the existing breakwaters and shoreline within the Project area, the floating refuse to be trapped is expected to be limited. With reference to the approved *EIA Report for Tung Chung New Town Extension* (AEIAR-196/2016), it is estimated that 11.5 m^3 of floating refuse would be collected from the 3.4 km long artificial seawall during each year of construction. Considering the total length of the newly constructed seawalls at TKO 137 and TKO 132 are approximately 2 km and 1.3 km respectively, it is anticipated that about 6.8 m^3 and 4.4 m^3 of floating refuse could be collected at TKO 137 and TKO 132 respectively during each year of construction as a conservative estimate.

7.4.1.61 Proper waste management and training to workers, such as avoiding placing waste collection bins close to the sea and ensuring construction materials are well covered to prevent occurrence of wind-blown light materials should be considered. Mitigation and control requirements for floating refuse are detailed in **Section 7.5.2.22**. Adverse waste management implications, including potential hazards, air and odour emissions, noise, wastewater discharge, ecology and public transport, associated with handling of floating refuse during the construction phase of the Project are not expected.

7.4.2 Transportation Arrangement for Waste Disposal during Construction Phase

7.4.2.1 Land and marine transports would be used to deliver and dispose of the waste generated from the Project sites to the designated disposal outlets. The tentative transportation routings and estimated frequency of vehicles / barges involved for the disposal of various types of wastes generated during the construction phase of the Project are shown in **Table 7.15**. Barging points will be established in the Project sites and the locations are shown in **Figure 7.1** and **Figure 7.2**. The transportation routings may change subject to the actual road / marine traffic conditions. Nevertheless, with the implementation of appropriate mitigation measures (e.g. using water-tight containers and covered trucks), no adverse environmental impacts are expected due to the transportation of waste.

Table 7.15 Tentative Transportation Routings for Waste Disposal During Construction Phase

Disposal Outlet	Type of Waste	Estimated Quantity	Tentative Transportation Routing	Frequency of Vehicles/ Barges Involved[1][2]
Potential concurrent projects and PFRFs subject to the designation from the PFC (e.g. Tuen Mun Area 38 Fill Bank)	Inert C&D Materials	***TKO 137***		
		Around 322,400m^3 at peak generation in year 2027	• Land route to potential concurrent projects • Land route to PFRFs (e.g. Tuen Mun Area 38 Fill Bank) via Wan Po Road, Cross Bay Link, Tuen Mun Road, Wong Chu Road, Lung Mun Road	199 vehicle trips per day (including the inert C&D materials from TKO 132)
		TKO 132		
		• Around 106,000m^3 at peak generation in year 2027	• Marine route via Tathong Channel to TKO 137 followed by land route to potential concurrent projects	• Less than 2 barge trips per week
		• Around 3,400m^3 at peak generation in year 2027	• Marine route to PFRFs (e.g. Tuen Mun Area 38 Fill Bank) via Tathong Channel, Eastern Fairway, Hung Hom Fairway, Central Fairway, Northern Fairway, Ma Wan Fairway, Ha Pang Fairway, Castle Peak Fairway and Urmston Road Fairway	• Less than 1 barge trip per month
SENTX	Non-inert C&D Materials	***TKO 137***		
		Around 150 m^3 per day at peak generation in year 2027	• Land route via Wan Po Road	34 vehicle trips per day (including the non-inert C&D materials from TKO 132)
		TKO 132		
		Around 100 m^3 per day at peak generation in year 2027	• Marine route via Tathong Channel to TKO 137 followed by land route via Wan Po Road	Less than 2 barge trips per month

Disposal Outlet	Type of Waste	Estimated Quantity	Tentative Transportation Routing	Frequency of Vehicles/ Barges Involved[1][2]
NENT / WENT Landfill	***TKO 137***			
	Non-inert C&D Materials	Less than 10 m^3 per day from year 2028	• NENT Landfill: Land route via Wan Po Road, Cross Bay Link, Tseung Kwan O – Lam Tin Tunnel (TKO-LTT), New Territories Circular Road, Heung Yuen Wai Highway and Wo Keng Shan Road • WENT Landfill: Land route via Wan Po Road, Cross Bay Link, Tuen Mun Road, Wong Chu Road, Lung Mun Road, Lung Kwu Tan Road and Nim Wan Road	17 vehicle trips per day (including the non-inert C&D materials, general refuse, floating refuse from TKO 132)
	General Refuse	Around 8.1 m^3 per day		
	Floating Refuse (if any)	Around 6.8 m^3 per year		
	TKO 132			
	Non-inert C&D Materials	Around 90 m^3 per day at the peak generation in year 2028	• NENT Landfill: Marine route via Tathong Channel to TKO 137 followed by land route via Wan Po Road, Cross Bay Link, TKO-LTT, New Territories Circular Road, Heung Yuen Wai Highway, Wo Keng Shan Road • WENT Landfill: Marine route via Tathong Channel to TKO 137 followed by land route via Wan Po Road, Cross Bay Link, Tuen Mun Road, Wong Chu Road, Lung Mun Road, Lung Kwu Tan Road and Nim Wan Road	Less than 2 barge trips per month
	General Refuse	Around 1.9 m^3 per day		
	Floating Refuse (if any)	Around 4.4 m^3 per year		
Type 1 - Open Sea Disposal at marine disposal site(s) allocated by MFC (Typically South Cheung Chau and East of Ninepin)	Category L Sediment	***TKO 132***		
		250 m^3 per day at peak generation in year 2026 and 2028	South Cheung Chau: Marine route via Tathong Channel, South of Hong Kong Island, East Lamma Channel, West Lamma Fairway and South Shek Kwu Chau Fairway East of Ninepin: Marine route via Tathong Channel	Less than 1 barge trip per week

Disposal Outlet	Type of Waste	Estimated Quantity	Tentative Transportation Routing	Frequency of Vehicles/ Barges Involved[1][2]
Type 2 - Confined Marine Disposal at marine disposal site(s) allocated by MFC (Typically East Sha Chau)	Category M and Category H Sediment (does not require biological screening)	***TKO 137*** 46 m^3 per day at peak generation in year 2029 ***TKO 132*** 260 m^3 per day at peak generation in year 2026 and 2028	East Sha Chau: Marine route via Tathong Channel, South of Hong Kong Island, East Lamma Channel, Western Fairway, Kap Shui Mun Fairway, Ha Pang Fairway and Castle Peak Fairway	Less than 1 barge trip per week
CWTC	Chemical Waste	Few hundred litres per month	***TKO 137***	
			Land route via Wan Po Road, Cross Bay Link, Kwai Tsing Road and Tsing Yi Road	Less than 1 vehicle trip per month (including the chemical waste from TKO 132)
			TKO 132	
			Marine route via Tathong Channel to TKO 137 followed by land route via Wan Po Road, Cross Bay Link, Kwai Tsing Road and Tsing Yi Road	Less than 1 barge trip per month

Notes:
1. It is assumed that each vehicle has a capacity of 7.5m^3 and operates 6 days a week and 48 weeks a year.
2. It is assumed that each barge has a capacity of 2,000m^3 and operates 6 days a week and 48 weeks a year.

7.4.3 Construction Phase Waste Summary

7.4.3.1 **Table 7.16** provides a summary of the waste types likely to be generated during the construction phase of the Project, together with the recommended handling and disposal methods.

Table 7.16 Summary of Waste Arising, Waste Handling Procedures and Disposal Routes during the Construction Phase of the Project

Waste Type	Generated from	Materials to be Generated	Total Amount to be Generated	Handling Procedures	Handling/Disposal Routes
Construction and Demolition (C&D) Materials	• Materials generated from reclamation, site clearance and site formation works including natural terrain hazard mitigation measures at TKO 137 and TKO 132, and construction of viaducts at TKO 132	• Non-inert C&D materials ➢ Top soil, vegetation and woodwaste, etc. ➢ Bamboo, timber, paper and plastic, etc.	• 117,000 m^3	• Reusable materials should be separated and recycled	• Reused on-site. Materials that cannot be reused nor recycled will be disposed of at the SENTX, NENT / WENT Landfill, or their extensions
		• Inert C&D materials ➢ Soft materials including fill ➢ Artificial hard materials including brick, broken concrete and asphalt ➢ Rock including granite/tuff	• 1,158,770 m^3	• Reusable materials should be separated and recycled	• Sorted materials will be stored at the temporary stockpiling areas and reused on-site before being used for construction by other concurrent projects or delivered to PFRFs subject to the designation from the PFC for beneficial use
	• Materials generated from construction of buildings and infrastructure at TKO 137 and TKO 132	• Non-inert C&D materials ➢ Top soil, vegetation and woodwaste, etc. ➢ Bamboo, timber, paper and plastic, etc.	• 6,500 m^3	• Reusable materials should be separated and recycled	• Reused on-site. Materials that cannot be reused nor recycled will be disposed of at the SENTX, NENT / WENT Landfill, or their extensions
		• Inert C&D materials ➢ Soft materials including fill ➢ Artificial hard materials including brick and concrete ➢ All grade granite	• 4,006,200 m^3	• Reusable materials should be separated and recycled	• Sorted materials will be reused on-site. The remainder to be delivered to concurrent projects if suitable project proponents are identified, or to PFRFs subject to the designation from the

Waste Type	Generated from	Materials to be Generated	Total Amount to be Generated	Handling Procedures	Handling/Disposal Routes
					PFC for beneficial use
Sediment	• Marine-based sediment removed from the reclamation works at TKO 137 and TKO 132 • Land-based sediment excavated from piling works and substructures for the construction of EPP at TKO 137 • Marine-based sediment removed from obstruction for berthing for CBP at TKO 132.	• Category L Sediment	• 8,237 m^3 (marine-based) and 1,858 m^3 (land-based) at TKO 137 • 90,517 m^3 at TKO 132	• Reuse as backfilling materials within reclamation area or by other concurrent projects after treatment (TKO 137 only) • Type 1 – Open sea disposal at marine disposal site(s) allocated by MFC (TKO 132 only)	• Final disposal site (typically South Cheung Chau / East of Ninepin) shall be determined by MFC; and disposal arrangement on a need basis
		• Category M and Category H Sediment (does not require biological screening)	• 9,951 m^3 (marine-based) at TKO 137 • 94,084 m^3 at TKO 132	• Type 2 – Confined marine disposal at marine disposal site(s) allocated by MFC	• Final disposal site (typically East Sha Chau) shall be determined by MFC; and disposal arrangement on a need basis
Chemical Waste	• Plant operation and maintenance • Maintenance of mechanical equipment	• Oil and grease, scrap batteries,used paint, fuel, etc. • Cleansing fluids and solvents from construction plant and equipment	• Few hundred litres per month	• Stored in compatible containers in designated area on-site • Collected by licensed collectors	• Recycled by licensed facility and/or disposal of at the CWTC

Waste Type	Generated from	Materials to be Generated	Total Amount to be Generated	Handling Procedures	Handling/Disposal Routes
General Refuse	• Refuse generated from construction works and site-based staff and workers.	• Food waste, containers, cans and waste paper, etc.	• Around 2,535 kg per day at TKO 137 • Around 585 kg per day at TKO 132	• Provide on-site collection points together with recycling bins • Collected by a licensed collector	• Recycled at recycling facilities and/or disposed of at the NENT or WENT Landfill
Floating Refuse	• Construction activities at / near the sea • Accumulation along seawall	• Litter and debris	• Around 6.8 m^3 per year at TKO 137 • Around 4.4 m^3 per year at TKO 132	• Dispose together with general refuse, after separating the recyclables for recycling • Collected by a licensed collector	• Recycled at recycling facilities and/or disposed of at the NENT or WENT Landfill

7.4.4 Operation Phase

7.4.4.1 The operation phase activities to be carried out for the Project will generate a variety of waste types. Typical waste types arising from the operation phase are identified in this section, together with an evaluation of the potential waste management impacts associated with the handling and disposal of waste. **Table 7.17** lists out the sources and examples of the identified waste types.

Table 7.17 Identification of Waste Types during the Operation Phase of the Project

Waste Type	Source of Waste	Example of Waste
Municipal Solid Waste (MSW)	• Domestic waste generated from future residences of public and private housing, schools and G/IC facilities e.g. public markets at TKO 137 • Industrial waste generated from operation of Public Facilities in TKO 132	• Food waste, containers, cans and waste paper, etc. • Scrap materials, e.g. metals, etc.
Chemical Waste	• Chemical waste generated from ➢ Maintenance and service activities (e.g. air conditioning system, E&M plant and equipment, vehicles and vessel, infrastructure etc.) ➢ Laboratories in education institutions at TKO 137	• Paint, lubricants and used batteries, etc.
Screenings, Grits and Sewage Sludge	• Screenings and grits generated from sewage treatment process • Dewatered sludge generated from sewage treatment process	• Screenings and grits • Dewatered sludge
Concrete Waste	• Concrete waste generated from operation of the concrete batching plant and construction waste handling facility at TKO 132	• Concrete waste • Sludge
Floating Refuse	• Accumulation along the newly constructed seawalls	• Litter and debris

Municipal Solid Waste

7.4.4.2 The Municipal Solid Waste (MSW) comprises of solid waste from households, commercial and industrial sources. With reference to the latest data from "*Monitoring of Solid Waste in Hong Kong – Waste Statistics for 2022*" by EPD, the MSW disposal rate was 1.51 kg/person/day in Year 2022, and the recovery rate for recycling was 32% of the MSW generation. By calculation, the MSW generation rate, disposal rate and recycled rate were 2.22 kg/person/day, 1.51 kg/person/day and 0.71 kg/person/day in 2022 respectively. According to the "*Waste Blueprint for Hong Kong 2035*" by Environment Bureau, a series of action agenda including waste reduction and pressure relief on landfills has been built upon enhanced social mobilization and implementation of policies and legislation. Necessary waste infrastructures to handle different types of waste will also be provided. The Blueprint has also set up ambitious waste reduction targets which aim to gradually reduce Hong Kong's MSW disposal rate on a per capita basis by 40-45% and increase the recovery rate to about 55% in the medium term, and to move away from the reliance on landfills in the long run by developing adequate waste-to-energy facilities (e.g. O Park 2 and I Park). As such, the estimated quantities of MSW to be disposal of at the future development stage adopted for the purpose of EIA could serve as a conservative

approach and would be reduced upon the achievement of the waste reduction targets as the programme progresses.

7.4.4.3 The estimated MSW based on planned residential and/or employment populations at TKO 137 and TKO 132 are summarized in **Table 7.18** and **Table 7.19**.

Table 7.18 Estimated quantities of MSW from Planned Residential and Employment Population during Operation Phase at TKO 137

Population Intake Year	Estimated MSW from Residential Population (tpd) [1][3]				Estimated MSW from Employment Population (tpd) [1][3]			
	Residential Population	Generated [2]	Required Disposal [2]	Recycled [2]	Employment Population	Generated [2]	Required Disposal [2]	Recycled [2]
2030	33,700	74.81	50.89	23.93	3,550	7.88	5.36	2.52
2033	28,100	62.38	42.43	19.95	2,650	5.88	4.0	1.88
2034	11,900	26.42	17.97	8.45	1,900	4.22	2.87	1.35
2035	28,300	62.83	42.73	20.09	3,400	7.55	5.13	2.41
2038	6,750	14.99	10.19	4.79	1,350	3.00	2.04	0.96
2040	0	0	0	0	4,450	9.88	6.72	3.16
2041	26,400	58.61	39.86	18.74	5,000	11.10	7.55	3.55
Total[4]	**135,150**	**300.04**	**204.07**	**95.95**	**22,300**	**49.51**	**33.67**	**15.83**

Notes:
[1] tpd: tonne per day. Residential and employment population are based on the development schedule of Recommended Outline Development Plan (RODP) of the Project.
[2] MSW disposal rate was 1.51kg/person/day and 68% of the MSW generation according to "Monitoring of Solid Waste in Hong Kong – Waste Statistics 2022" by EPD (MONITORING OF SOLID WASTE IN HONG KONG (wastereduction.gov.hk). By calculation, the MSW generation rate was 2.22 kg/person/day. MSW recovery rate for recycling was 32% of the MSW generation according to "Monitoring of Solid Waste in Hong Kong – Waste Statistics 2022". By calculation, the MSW recycling rate was 0.71 kg/person/day.
[3] The MSW is estimated by population intake year with respect to commissioning year of the development and it is not accumulated.
[4] The total estimated MSW is the estimated total MSW when all developments are commissioned in 2041.

Table 7.19 Estimated quantities of MSW from Planned Employment Population during Operation Phase at TKO 132

Population Intake Year	Estimated MSW from Employment Population (tpd) [1][3]			
	Employment Population	Generated [2]	Required Disposal [2]	Recycled [2]
2030	100	0.22	0.15	0.07
2031	250	0.56	0.38	0.18
2035	100	0.22	0.15	0.07
Total[4]	**450**	**1.0**	**0.68**	**0.32**

Notes:
[1] tpd: tonne per day. Residential and employment population are based on the development schedule of Recommended Outline Development Plan (RODP) of the Project.
[2] MSW disposal rate was 1.51kg/person/day and 68% of the MSW generation according to "Monitoring of Solid Waste in Hong Kong – Waste Statistics 2022" by EPD (MONITORING OF SOLID WASTE IN HONG KONG (wastereduction.gov.hk). By calculation, the MSW generation rate was 2.22 kg/person/day. MSW recovery rate for recycling was 32% of the MSW generation according to "Monitoring of Solid Waste in Hong Kong – Waste Statistics 2022". By calculation, the MSW recycling rate was 0.71 kg/person/day.
[3] The MSW is estimated by population intake year with respect to commissioning year of the development and it is not accumulated.
[4] The total estimated MSW is the estimated total MSW when all developments are commissioned in the year of 2041.

7.4.4.4 As shown in **Table 7.18** and **Table 7.19**, the total MSW generated from TKO 137 and TKO 132 would be approximately 350.55 tonnes per day.

7.4.4.5 An effective and efficient waste handling system is essential in order to minimise potential adverse environmental impacts during waste storage, collection and transport. Such impacts may include odour if waste is not collected frequently; water quality if waste enters storm water drains; aesthetics and vermin problems if the waste storage area is not well maintained and cleaned regularly. The waste handling system may also facilitate materials recovery and recycling.

7.4.4.6 In accordance with Chapter 9 of the Hong Kong Planning Standards and Guidelines, a refuse collection point (RCP) is required to serve the needs of each population of 20,000 persons or areas within a distance of 500 metres, whereas a refuse transfer station (RTS) is required to provide a handling capacity between 100 and 1,000 tonnes in New Town Areas, which is equivalent to between 100,000 and 1,000,000 population. To cope with the new population waste generation, a RCP will be established in TKO 137 and a RTS will be built at TKO 132 with treatment capacity of approximately 4,000 tonnes per day, which is sufficient to handle the MSW generated during the operation phase as detailed in **Table 7.18** and **Table 7.19**.

7.4.4.7 MSW will be recycled before transporting to the new RTS at TKO 132 and then disposal to WENT or NENT landfill. The waste should be sorted to recover materials (such as paper, aluminium cans, plastic bottles and glass bottles, etc.) before disposal at the landfill. Different containers should be provided for the storage of different recyclable materials (e.g. fluorescent lamps, toner cartridges, rechargeable batteries, scrap electrical and electronic appliances, etc.). To avoid potential odour nuisance to the residents during transport of waste, enclosed waste collection trucks should be used and the collection route and time should be properly planned. The new RTS at TKO 132 should contain compactors and/or related equipment to provide adequate waste handling services within the Project area and odour treatment units to remove odourous gas in the air before discharging to the environment. At least daily collection should be arranged by the waste collectors.

7.4.4.8 Mitigation and control requirements for MSW are detailed in **Section 7.5.3.1 to 7.5.3.2**. Provided that the handling, storage and disposal of MSW are in accordance with these requirements, adverse waste management implications, including the potential hazards, air and odour emissions, noise, wastewater discharge, ecology and public transport, associated with handling, storage and disposal of MSW during the operation phase of the Project are not expected.

Chemical Waste

7.4.4.9 Chemical waste will be generated from various routine maintenance and service activities for air conditioning system, E&M plant and equipment, vehicles and vessel deployed on site and infrastructures. Chemical waste such as fuels, paints, lubricants, contaminated rags, used solvent and spent chemical and used batteries are expected from these activities. Moreover, educational institutions are planned within the proposed development and it is expected that chemical waste would also be produced from the laboratories of these educational institutions during the operation phase. Measures as stipulated in the *Waste Disposal (Chemical Waste) (General) Regulation* and the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* should be strictly followed for the handling and disposal of chemical waste. It is difficult to quantify the amount of chemical waste that will arise from those activities at this stage since it will be dependent on the equipment maintenance requirements and the amount of equipment utilised. Nevertheless, it is anticipated that the quantity of chemical waste, such as lubrication oil and solvent produced from plant and equipment maintenance, would be in the order of few cubic metres per month.

7.4.4.10 Should any chemical waste be generated, the operator should register with EPD as a chemical waste producer. The chemical waste would be readily accepted for disposal of at the CWTC in Tsing Yi. This chemical waste should be collected periodically in drum- type containers by licensed chemical waste collectors. Mitigation and control requirements for chemical waste are detailed in **Section 7.5.3.3**. Provided that the handling, storage and disposal of chemical waste are in accordance with these requirements, adverse waste management implications, including the potential hazards, air and odour emissions, noise, wastewater discharge, ecology and public transport, associated with handling, storage and disposal of chemical waste during the operation phase of the Project are not expected.

Concrete Waste

7.4.4.11 Concrete waste is expected from the daily operation of the concrete batching plant and construction waste handling facility at TKO 132. Concrete waste generated during the operation of these two public facilities may pose potential environmental impacts such as dust emissions and water quality impacts if not properly handled, stored and disposed of.

7.4.4.12 Subject to detailed design and operational phase of the concrete batching plant, it is anticipated that the dusty materials will be collected during production and removed periodically, and a concrete recycling machine should be installed on-site to recycle concrete waste in order to reduce the material consumption and waste generation. Concrete waste material will be broken down into slurry water and aggregates. The aggregates could be reusable. Sludge generated during the recycling process will require off-site disposal. It is difficult to quantify the amount of concrete waste and sludge that will arise from those activities at this stage since it will be dependent on the equipment maintenance requirements and the amount of equipment utilised. Nevertheless, it is anticipated that the estimated quantity of concrete waste and sludge will be about 40 tonnes per day.

7.4.4.13 In addition to on-site recycling, opportunities for off-site reuse and recycling of materials for future reuse will be sought, subject to the engineering design from the future operator. Any concrete waste materials after recycling will be disposed at WENT or NENT Landfill. With proper implementation of good site practice and mitigation measures (refer to **Section 7.5.3.4**), adverse environmental impacts such as potential hazards, air and odour emissions, noise,

wastewater discharge and public transport associated with handling, storage and disposal of concrete waste materials during the operation phase of the Project are not expected.

Screenings, Grits and Sewage Sludge

7.4.4.14 The proposed TKO 137 EPP is designed to handle the sewage arising from the Project. Secondary plus treatment is assumed for the proposed TKO 137 EPP subject to detailed design. The design capacity of TKO 137 EPP is 54,000 m^3 per day and the major solid waste types produced from the operation are screenings and grits collected from the inlet works and dewatered sludge associated with the sewage treatment process. It is estimated that around 26 m^3 per day of screenings and grits would be generated from the proposed new TKO 137 EPP during the operation phase of the Project. The screenings and grits would be compacted and properly stored in a covered container prior to disposal at NENT or WENT landfill on a daily basis. The transportation and disposal of the screenings and grits would be managed and controlled by a license waste collector. Screenings would also be generated during the operation of TKO 132 SPS. The design capacity of TKO 132 SPS is 400 m^3 per day and it is estimated that around 0.03 m^3 per day of screenings would be generated from the proposed new TKO 132 SPS during the operation phase. The screenings would be properly stored in a covered container prior to disposal at NENT or WENT landfill on a periodic basis. The transportation and disposal of the screenings would be managed and controlled by a license waste collector.

7.4.4.15 Sludge thickening tank is suggested to reduce the volume of primary sludge generated from primary sedimentation tank in the new TKO 137 EPP. Approximately 27 m^3/day dewatered sludge cake at 30% w/w dry solids content would be generated for disposal during operation phase of the project. Dewatered sludge should be properly stored in a covered container after the sludge dewatering process and disposed of daily to the Sludge Treatment Facility (STF) in Tuen Mun (T·Park) or landfill sites (NENT / WENT Landfill) subject to confirmation with relevant management parties. The dewatered sludge would be delivered by road transport in water tight containers or skips to avoid odour emission during transportation to the STF.

7.4.4.16 Mitigation and control requirements for screenings, grits and sewage sludge are detailed in **Section 7.5.3.5**. Provided that the handling, storage and disposal of screenings, grits and sewage sludge are in accordance with these requirements, adverse waste management implications, including potential hazards, air and odour emissions, noise, wastewater discharge, ecology and public transportation, associated with handling, storage and disposal of screenings, grits and sewage sludge during the operation phase of the Project are not expected.

Floating Refuse

7.4.4.17 With reference to the approved *EIA Report for Tung Chung New Town Extension* (AEIAR-196/2016), it is estimated that 11.5 m^3 of floating refuse would be collected from the 3.4 km long artificial seawall during each year of construction. Considering the total length of the newly constructed artificial seawall is approximately 3.3 km, it is anticipated that about 6.8 m^3 and 4.4 m^3 of floating refuse might be accumulated during operational phase at TKO 137 and TKO 132 respectively per year. Nevertheless, the floating refuse would be collected during the regular operation of MD's appointed contractor within the vicinity.

7.4.4.18 In addition, the artificial seawall has been properly designed to achieve a hydrodynamically cautious shoreline to minimise any trapped or accumulated refuse. Curved corner will be adopted in the seawall design to avoid refuse accumulation surrounding the seawall. With the proper seawall design and implementation of management control practices, no adverse environmental impact associated with floating refuse are anticipated.

7.4.4.19 Floating refuse trapped within the Project area during operational phase will be collected by MD's appointed contractor and disposed to landfill correspondingly. The collection frequency is suggested to be at least monthly interval in accordance with MD's agreement. In case there

are any recyclable components in the floating refuse collected, they should be separated from the collected floating refuse. The contractor shall conduct on-site sorting of the recyclable component and be responsible to arrange respective recycling companies to collect these components.

7.4.5 Transportation Arrangement for Waste Disposal During Operation Phase

7.4.5.1 During operation phase, land transport would be used to deliver and dispose of the waste generated from TKO 137 to the designated disposal outlets, while both land and marine transport would be used for the delivery and disposal of the waste generated from TKO 132 to the designated disposal outlets. The transportation routings and estimated frequency of vehicles / barges involved for the disposal of various types of waste generated during the operation phase of the Project are shown in **Table 7.20**. The transportation routings may change subject to the actual road / marine traffic conditions. Nevertheless, with the implementation of appropriate mitigation measures (e.g. using water-tight containers and covered trucks), no adverse environmental impacts are expected due to the transportation of waste

Table 7.20 Tentative Transportation Routings for Waste Disposal During Operation Phase

Disposal Outlet	Type of Waste	Estimated Quantity	Tentative Transportation Routing	Frequency of Vehicles / Barges Involved
NENT / WENT Landfill	MSW(1)	***TKO 137***		
		Around 349.55 tonnes per day	• NENT Landfill: Land route via Wan Po Road, Cross Bay Link, TKO-LTT, New Territories Circular Road, Heung Yuen Wai Highway and Wo Keng Shan Road • WENT Landfill: Land route via Wan Po Road and Cross Bay Link to TKO 132 followed by marine route via Tathong Channel, Eastern Fairway, Hung Hom Fairway, Central Fairway, Northern Fairway, Ma Wan Fairway, Ha Pang Fairway, Castle Peak Fairway and Urmston Road Fairway	47 vehicle trips per day after full population intake in year 2041
		TKO 132		
		Around 1 tonne per day	• NENT Landfill: Land route via the new marine viaduct connection to TKO-LTT, New Territories Circular Road, Heung Yuen Wai Highway and Wo Keng Shan Road • WENT Landfill: Marine route via Tathong Channel, Eastern Fairway, Hung Hom Fairway, Central Fairway, Northern Fairway, Ma Wan Fairway, Ha Pang Fairway, Castle Peak Fairway and Urmston Road Fairway	• Less than 1 vehicle trip per day after full operation of the public facilities • Less than 2 barge trips per day (including MSW from TKO 137)
	Screenings and Grits(2)	TKO 137 Around 26 m^3 per day TKO 132 Around 0.03 m^3 per day	TKO 137 • NENT Landfill: Land route via Wan Po Road, Cross Bay Link, TKO-LTT, New Territories Circular Road, Heung Yuen Wai Highway and Wo Keng Shan Road • WENT Landfill: Land route via Wan Po Road, Cross Bay Link, Tuen Mun Road, Wong Chu Road, Lung	TKO 137 3 vehicle trips per day TKO 132 3 vehicle trips per day

Disposal Outlet	Type of Waste	Estimated Quantity	Tentative Transportation Routing	Frequency of Vehicles / Barges Involved
	Floating Refuse(3)	TKO 137 Around 6.8 m^3 per year TKO 132 Around 4.4 m^3 per year	Mun Road, Lung Kwu Tan Road and Nim Wan Road TKO 132 • NENT Landfill: Land route via the new marine viaduct connection to TKO-LTT, New Territories Circular Road, Heung Yuen Wai Highway and Wo Keng Shan Road • WENT Landfill: Land route via the new marine viaduct connection to TKO-LTT, Tuen Mun Road, Wong Chu Road, Lung Mun Road, Lung Kwu Tan Road and Nim Wan Road	
	Concrete waste materials(4)	TKO 132 About 24 tonnes per day for disposal (assuming 40% of the concrete would recycle on-site)	TKO 132 • NENT Landfill: Land route via the new marine viaduct connection to TKO-LTT, New Territories Circular Road, Heung Yuen Wai Highway and Wo Keng Shan Road • WENT Landfill: Land route via the new marine viaduct connection to TKO-LTT, Tuen Mun Road, Wong Chu Road, Lung Mun Road, Lung Kwu Tan Road and Nim Wan Road	
CWTC	Chemical Waste(3)	A few cubic metres per month	TKO 137 Land route via Wan Po Road, Cross Bay Link, Kwai Tsing Road and Tsing Yi Road TKO 132 Land route via the new marine viaduct connection to TKO-LTT, Kwai Tsing Road and Tsing Yi Road	Less than 1 vehicle trip per month
STF (subject to detailed design)	Dewatered Sludge from TKO 137 EPP(2)	Around 27 m^3 per day	Land route via Wan Po Road, Cross Bay Link, Tuen Mun Road, Wong Chu Road, Lung Fu Road, Lung Mun Road, Lung Kwu Tan Road and Nim Wan Road	3 vehicle trips per day

Notes:

1. It is assumed that the bulk density of MSW is 311.73kg/m^3, each MSW collection vehicle has a loading capacity of 7.5 tonnes and each barge has a capacity of 800 m^3. Estimated quantity of MSW generation amount is considered as a conservative approach.

2. It is assumed that each screenings, grits and dewatered sludge collection vehicle has a capacity of 10 m^3.
3. It is assumed that each vehicle has a capacity of 7m^3.
4. It is assumed that each concrete waste collection vehicle has a capacity of 8 tonnes.

7.4.6 Operation Phase Waste Summary

7.4.6.1 **Table 7.21** provides a summary of the waste types likely to be generated during the operation phase of the Project, together with the recommended handling and disposal methods.

Table 7.21 Summary of Waste Arising, Waste Handling Procedures and Disposal Routes during the Operation Phase of the Project

Waste Type	Generated from	Materials to be Generated	Total Amount to be Generated	Handling Procedures	Handling/Disposal Routes
Municipal Solid Waste (MSW)	• Domestic waste generated from future residences of public and private housing, schools and G/IC facilities e.g. public markets at TKO 137 • Industrial waste generated from operation of Public Facilities in TKO 132	• Food waste, containers, cans and waste paper, etc. • Scrap materials, e.g. metals, etc.	• Around 350.55 tonnes per day at TKO 137 and TKO 132	• Provided on-site collection points together with recycling bins • Collected by a licensed collector	• Recycled at recycling facilities and/or disposed of at the new RTS and/or the NENT or WENT Landfill
Chemical Waste	• Chemical waste generated from ➢ Maintenance and service activities (e.g. air conditioning system, E&M plant and equipment, vehicles and vessel, infrastructure etc.) ➢ Laboratories in education institutions at TKO 137	• Paint, lubricants and used batteries, etc.	• A few cubic metres per month	• Stored in compatible containers in designated area on-site • Collected by licensed collectors	• Recycled by licensed facility or disposed of at the CWTC
Concrete Waste	• Concrete waste generated from operation of the concrete batching plant and construction waste handling facility at TKO 132	• Concrete waste • Sludge	• About 40 tonnes per day	• Reusable materials should be separated and recycled	• Recycle on-site before disposal of at NENT or WENT Landfill

Waste Type	Generated from	Materials to be Generated	Total Amount to be Generated	Handling Procedures	Handling/Disposal Routes
Screenings, Grits and Sewage Sludge	• Screenings, grits and dewatered sludge generated from TKO 137 EPP • Screenings generated from TKO 132 SPS	• Screenings and grits • Dewatered sludge	• Screening and grits: around 26 m^3 per day • Screenings from TKO 132 SPS: around 0.03 m^3 per day • Dewatered sludge: Around 27 m^3 per day	• Stored in bins or other containers in designated area on-site • Collected by licensed collectors	• Screenings and grits are disposed of at the NENT or WENT Landfill • Dewatered sludge are disposed of at the STF
Floating Refuse	• Accumulation along seawall	• Litter and debris	• Around 6.8 m^3 per year at TKO 137 • Around 4.4 m^3 per year at TKO 132	• Dispose together with general refuse, after separating the recyclables for recycling • Collected by a licensed collector	• Recycled at recycling facilities and/or disposed of at the NENT or WENT Landfill

7.5 Mitigation of Adverse Waste Management Implications

7.5.1 General

Waste Management Hierarchy

7.5.1.1 The waste management hierarchy has been applied in the assessment and development of mitigation measures for waste which aims at evaluating the desirability of waste management methods and includes the following in descending preference:

- Avoidance and minimisation of waste generation;
- Reuse of materials;
- Recovery and recycling of residual materials; and
- Treatment and disposal of waste according to relevant laws, guidelines and good practices.

7.5.1.2 Recommendations of good site practices and waste reduction measures should be stated in order to achieve avoidance and minimisation of waste generation in the waste management hierarchy. To minimize C&D materials generation and encourage proper management of such materials, a C&DMMP should be prepared. An EMP and trip-ticket system are recommended for monitoring management of waste. Specific measures targeting the mitigation of impacts in works areas and the transportation of waste off-site should be provided to minimise the potential impacts to the surrounding environment.

Good Site Practices

7.5.1.3 Good site practices should be included as part of the contract requirements to be addressed during the detailed design stage of the development by the Contractor. Adverse waste management implications are not expected provided that good site practices are strictly implemented. The following good site practices are recommended during the construction phase:

- Nomination of an approved personnel, such as a site manager, to be responsible for the implementation of good site practices;
- Training of site personnel in site cleanliness, proper waste management and chemical handling procedures;
- Provision of sufficient waste disposal points and regular collection of waste for disposal;
- Adoption of appropriate measures to minimise windblown litter and dust during handling, transportation and disposal of waste; and
- Preparation of a WMP in accordance with the *ETWB TCW No. 19/2005 Environmental Management on Construction Sites* and submitted it to the Engineer for approval.

Waste Reduction Measures

7.5.1.4 Amount of waste generation can be significantly reduced through good management and control. Waste reduction is best achieved by proper planning and design at the planning and design phases, as well as by ensuring the implementation of good site practices. Architects and engineers can optimize building layouts and specifications to minimize material use and waste. This includes adopting modular and standardized components that reduce cut-offs and offcuts during installation. It is beneficial to adopt innovative techniques, such as efficient material cutting and offsite prefabrication, to minimize waste generation on-site.

7.5.1.5 Careful planning of construction activities and sequence can also help minimize waste, such as ordering materials in the appropriate quantities and timing delivery to avoid on-site storage issues. Proactive procurement and inventory management are equally crucial. Establishing just-in-time delivery systems and materials tracking mechanism can help construction teams avoid over-purchasing and ensure efficient use of resources. Negotiating with supplies to take back unused or damaged goods is another way to reduce construction waste and dumping before it reaches the job site.

7.5.1.6 On the construction site itself, worker training and clear waste management protocols are essential. Equipping crews with the knowledge and tools to properly handle, store and segregate different waste streams facilitates subsequent recycling and reuse. Designating dedicated storage areas for waste helps maintain organization and maximize diversion opportunities.

7.5.1.7 By implementing the multifaceted measures – from design to demolition – construction, architect, engineer and contractors can significantly reduce waste, increase recycling and reuse rates and contribute to the sustainable development of the built environment. Continuous monitoring, reporting and sharing of best practices are key to driving widespread industry adoption of effective construction waste management strategies. The following recommendations are summarized as the measures to achieve waste reduction:

7.5.1.8 The following recommendations are proposed to achieve waste reduction:

- Segregate and store different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal;
- Adopt proper storage and site practices to minimise the potential for damage to, and contamination of, construction materials;
- Plan the delivery and stock of construction materials carefully to minimise the amount of waste generated;
- Sort out demolition debris and excavated materials from demolition works to recover reusable / recyclable portions (i.e. soil, rock, broken concrete, etc.);
- Maximise the use of reusable steel formwork to reduce the amount of C&D materials;
- Minimise over ordering of concrete, mortars and cement grout by doing careful check before ordering; and
- Adopt pre-cast construction method instead of cast-in-situ method for construction of concrete structures.

Storage, Collection and Transportation of Waste

7.5.1.9 Storage of materials on-site may induce adverse environmental impacts if not properly managed. The following recommendations should be implemented to minimise the impacts:

- Waste, such as soil, should be handled and stored well to ensure secure containment, thus minimising the potential of pollution;
- Maintain and clean storage areas routinely;
- Stockpiling area should be provided with covers and water spraying system to prevent materials from being wind-blown or washed away; and
- Different locations should be designated to stockpile each material to enhance reuse.

7.5.1.10 Waste hauler with appropriate permits should be employed by the Contractor for the collection and transportation of waste from works areas to respective disposal outlets. The following recommendation should be implemented to minimise the impacts:

- Remove waste in timely manner;
- Employ the trucks with cover or enclosed containers for waste transportation;
- Obtain relevant waste disposal permits from the appropriate authorities; and
- Dispose of waste at licensed waste disposal facilities.

7.5.2 Construction Phase

Construction and Demolition Materials

7.5.2.1 Careful design, planning together with good site management can reduce over-ordering and generation of C&D materials such as concrete, mortar and cement grouts. Formwork should be designed to minimise the use of standard wooden panels, so that high reuse levels can be achieved. Alternatives such as steel formwork or plastic facing should be considered to increase the potential for reuse.

7.5.2.2 The inert C&D materials with suitable characteristics / size should be reused on-site as fill or recycled as aggregate for other projects. When disposing C&D material at a public filling reception facility for beneficial reuse, the material should only consist of soil, rock, concrete, brick, cement plaster / mortar, inert building debris, aggregates and asphalt. The material should be free from household refuse, plastic, metals, industrial and chemical waste, animal and vegetable matter, and other material considered to be unsuitable by the Filling Supervisor. Prior to disposal of non-inert C&D materials, wood, steel and other metals should also be separated for reuse and / or recycling so as to minimise the quantity of waste to be disposed of at landfill.

7.5.2.3 Suitable areas should be designated within the site boundaries for sorting and providing temporary stockpiling of C&D materials. Within stockpile areas, the following measures should be taken to control potential environmental impacts or nuisance:

- Surface of stockpiled soil should be regularly wetted with water especially during dry season;
- Disturbance of stockpile soil should be minimised;
- Stockpiled soil should be properly covered with tarpaulin especially during heavy storms are predicted; and
- Stockpiling areas should be enclosed where space is available.

7.5.2.4 In order to monitor the delivery of C&D materials at the designated public fill reception facility and landfill and to control fly-tipping, a trip-ticket system should be included. A recording system for the amount of waste generated, recycled and disposed, including the disposal sites, should also be set up. Warning signs should be put up to remind the designated disposal sites. CCTV should also be installed at the vehicular entrance and exit of the site to monitor handling of C&D materials disposal. To prohibit illegal dumping and landfilling of C&D materials, as well as proper delivery to concurrent project sites for re-use, the dump trucks engaged on site should be equipped with GPS or equivalent automatic system for real time tracking and monitoring of their travel routings, parking locations and disposal activities.

7.5.2.5 For non-inert biomass waste arising from the construction activities, such as yard waste, they are required to be handled in accordance with the principles of reduce, reuse, and recycle (3Rs). Specifically, to minimize the generation of yard waste, the project proponent shall:

(i) Avoid unnecessary removal or excessive pruning of trees. Preserve trees in their original locations and implement tree transplanting when on-site preservation is not feasible.

(ii) Segregate various types of yard waste and shred wood into smaller pieces if necessary to facilitate reuse and recycling.

(iii) Reuse yard waste (e.g. stumps, pure twigs, leaves and grass clipping, etc.) on-site for a variety of purposes (e.g. decomposition and composting, recreational and decorative uses, and mulching in planting areas, etc.).

(iv) Identify recycling options (e.g. delivery to Y-park) for yard waste that cannot be directly reused on-site.

7.5.2.6 Where yard waste generation is unavoidable, sorting of yard waste for recycling and reuse on site should always be the priority. Yard waste shall be separated from C&D material to facilitate recycling, such as delivering them to Y-park so as to minimize the quantity of waste to be disposed at landfill site. Under the construction stage of the Project, woodchippers should be provided on-site for processing of the tree/yard waste for reuse and recycling, e.g. use as wood chip mulch for planting. With the experience under the Phase 1 development of the Kwu Tung North New Development Area, the contractors will be required to reuse the tree/yard waste and its derived products, e.g. upcycling of tree wastes and its derived products on-site in site office as construction materials, furniture, signage, etc. The remaining yard wastes that are 6m long or below tree trunks and its attached tree branches, twigs and leaves will be transported to Y.Park, a yard waste recycling centre. Where appropriate, the Contractor should be responsible to cut and shred the yard waste on-site in order to meet the collection requirement of the recycling outlet for processing / disposal. Disposal of yard waste directly at landfills should only be regarded as the last resort, when no alternatives are available.

7.5.2.7 In addition, the architect / engineer should prioritize materials with higher recycled content or those that are more easily recyclable, such as engineered wood products over solid lumber. Procuring materials in standardized sizes can also help reduce the need for on-site cutting and trimming, which often generates significant wood waste. Establishing take-back agreements with suppliers for unused or damaged goods is another effective way to prevent these materials from ending up in landfills. Dedicated bins or storage areas for different waste streams, including non-inert biomass, in construction sites enables efficient sorting and facilitates recycling and reuse. Ultimately, reducing non-inert biomass waste in construction requires a holistic approach that spans material selection, procurement, on-site management, and end-of-life processing.

Chemical Waste

7.5.2.8 For those processes which generated chemical waste, alternatives could be found to eliminate the use of chemicals, to reduce the generation quantities or to select a chemical type of less impact on environment, health and safety.

7.5.2.9 If chemical waste is produced at the construction site, the Contractor will be required to register with the EPD as a chemical waste producer and to follow the guidelines stated in the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. Chemical waste should be stored in appropriate containers and collected by a licensed chemical waste contractor. Chemical waste (e.g. spent lubricant oil) should be recycled at an appropriate facility, while chemical waste that cannot be recycledshould be disposed of at either the CWTC, or another licensed facility, in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*.

General Refuse

7.5.2.10 General refuse should be stored in enclosed bins or compaction units separate from C&D materials and chemical wastes. A reputable waste collector should be employed by the contractor to remove general from the site, separately from C&D materials and chemical

wastes, on a daily basis to minimise odour, pest and litter impacts. The collected general refuse would be disposed of at designated landfill. Clearly labelled recycling bins should be provided on site in order to encourage segregation and recycling of aluminium and plastic wastes, and wastepaper in order to reduce general refuse production.

7.5.2.11 The contractor should carry out an education programme for workers in avoiding, reducing, reusing and recycling of materials generation. Posters and leaflets advising on the use of the bins should also be provided onsite as reminders. The recyclable waste materials should then be collected by reliable waste recycling agents on a daily basis.

Sediment

7.5.2.12 The sediment should be excavated / removed, handled, transported and disposed of in a manner that would minimize adverse environmental impacts. For TKO 137, excavated / removed Category L sediment is proposed to be treated using cement stabilization / solidification (S/S) technique and reused as backfilling materials within reclamation area or by other concurrent projects before considering the marine disposal option. Possibility of reusing the excavated / removed sediment will be subject to further review during the detailed design and construction stages.

7.5.2.13 Requirements of the *Air Pollution Control (Construction Dust) Regulation*, where relevant, shall be adhered to during excavation / removal, transportation and disposal of the sediment.

7.5.2.14 In order to minimize the exposure to contaminated materials, workers shall, if necessary, wear appropriate personal protective equipment (PPE) when handling contaminated sediment. Adequate washing and cleaning facilities shall also be provided on site.

7.5.2.15 For off-site disposal, the basic requirements and procedures specified under paragraph 4.2.1 of Chapter 4 of the *PAH* shall be followed. Marine Fill Committee (MFC) of CEDD is managing the disposal facilities in Hong Kong for the excavated/dredged sediment, while EPD is the authority of issuing marine dumping permit under the *Dumping at Sea Ordinance* (DASO).

7.5.2.16 For the purpose of site allocation and application of marine dumping permit and if considered necessary by EPD (Marine Dumping Control Section / Territorial Control Office), separate SSTP(s) (including the possible additional sampling works for the EPP construction and within the sampling grid of MEB17) shall be submitted to EPD for agreement under DASO. Additional GI works, based on the SSTP(s), shall then be carried out in order to confirm the disposal arrangements of the excavated / removed sediment. Sediment Quality Report(s) (SQR), reporting the chemical and biological screening results and the estimated quantities of sediment under different disposal options, shall then be submitted to EPD for agreement under DASO.

7.5.2.17 To ensure disposal space is allocated for the Project, the Project Proponent should be responsible for obtaining agreement from MFC on the rationale for sediment excavation / removal and the allocation of the disposal site. The contractor(s), on the other hand, should be responsible for the application of the marine dumping permit under DASO from EPD for the sediment disposal.

7.5.2.18 The excavated / removed sediments are expected to be loaded onto the barge and transported to the designated disposal sites allocated by MFC. The excavated / removed sediment would be disposed of according to its determined disposal options and paragraph 4.2.1 of Chapter 4 of the *PAH*.

7.5.2.19 Stockpiling of contaminated sediments should be avoided. If temporary stockpiling of contaminated sediments is necessary, the excavated / removed sediment should 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 stockpiles should be completely paved or covered by linings in order 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).

7.5.2.20 In order to minimise the potential odour / dust emissions during excavation / removal and transportation of the sediment, the excavated / removed sediments shall be wetted during excavation / removal / material handling and shall be properly covered when placed on trucks or barges. Loading of the excavated / removed sediment to the barge shall be controlled to avoid splashing and overflowing of the sediment slurry to the surrounding water.'

7.5.2.21 The barge transporting the sediments to the designated disposal sites shall be equipped with tight fitting seals to prevent leakage and shall not be filled to a level that would cause overflow of materials or laden water during loading or transportation. In addition, monitoring of the barge loading shall be conducted to ensure that loss of material does not take place during transportation. To avoid illegal dumping, all dumping vessels have to be approved in a marine dumping permit issued under the DASO. Each of the vessels has to be installed with an automatic recording equipment, namely the Front End Mobile Unit (FEMU), which is a key component of the Real Time Tracking & Monitoring of Vessel (RTTMV) System of EPD. The FEMU transmits self-monitoring data direct from the barge at sea to the Control Centre at EPD through GPRS mobile communication network. The transportation route avoiding the ecological sensitive areas should be proposed when applying the dumping permit.

Floating Refuse

7.5.2.22 In case of floating refuse is identified, the floating materials should be removed and eventually stored and disposed of together with the general refuse, after separating the recyclables for recycling. Any floating refuse trapped within the Project area will be collected by the Contractor and disposed together with other general refuse. Apart from collecting and storing waste with good waste management practice on site to avoid having waste transported to river channels or water bodies under extreme weather conditions, the contractor should be responsible for the collection of refuse, if any, within the works area. Contractor shall collect and remove floating refuse at regular intervals on a daily basis to keep river channels or water bodies within the Project area and the neighbouring water free from rubbish during the construction phase.

7.5.3 Operation Phase

Municipal Solid Waste

7.5.3.1 Implementation of a waste prevention programme as well as materials recovery and recycling programme are recommended in order to minimise the production of waste. The programmes should consist of the following components:

- Recycling bins such as paper, aluminium cans, plastic bottles, glass bottles, etc. should be placed at prominent locations to encourage recycling;
- Banner should be erected at the recycling bins area;
- Operator should make arrangements with the recycler to collect and recycle used fluorescent lamps, toner cartridges as well as the scrap electronic equipment, such as computers to avoid disposal at landfills;
- Staff awareness training should be provided on waste management procedures, including waste reduction and recycling;
- Operator should set up waste reduction and recycled targets; and
- Operator should participate in the Wastewi$e Label scheme to facilitate waste reduction.

7.5.3.2 MSW generated from residential and industrial buildings should be collected with lidded bins, delivered to the refuse collection room and stored in enclosed containers installed in each building at the ground floor to prevent windblown, vermin, water pollution and visual impact. Enclosed waste collection trucks should be used and the collection route and time should be properly planned in order to avoid environmental impacts including potential odour nuisance, water pollution, ecology and public transport during transport of MSW. At least daily collection should be arranged by the waste collector to transport the waste to the RTS at TKO 132. Odour removal installations are recommended to be installed at the RTS to treat the exhaust air. In addition, food waste collection in public rental housing estates such as adoption of smart bins would be implemented in order to collect food waste following by delivery to EPD's food waste recycling facilities for turning into energy or resources. Such arrangements will avoid disposal at landfills and thus minimise potential environmental impacts, including air and odour emissions, wastewater discharge, ecology and public transport. The above recommendations are proposed as technical guidelines for the operator's consideration and will be subject to detailed design.

Chemical Waste

7.5.3.3 For those processes which generated chemical waste, alternatives could be found to eliminate the use of chemicals, to reduce the generation quantities or to select a chemical type of less impact on environment, health and safety. The proposed mitigation measures for operation phase are the same as that proposed for the construction phase. The operator should register with EPD as a chemical waste producer and follow the guidelines stated in the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. Chemical waste should be stored in appropriate containers and collected by a licensed chemical waste contractor. Chemical waste (e.g. spent lubricant oil) should be recycled at an appropriate facility, while chemical waste that cannot be recycled should be disposed of at either the CWTC, or another licensed facility, in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*.

Concrete Waste

7.5.3.4 The general mitigation measures to minimise waste management implications as detailed in **Section 7.5.1** should be implemented for concrete waste generated during the operation

phase of the Project. Subject to detailed design of the concrete batching plant, a concrete recycling machine should be installed on-site to recycle concrete waste in order to reduce the material consumption and waste generation.

Screenings, Grits and Sewage Sludge

7.5.3.5 The new TKO 137 EPP is designed to handle the sewage generated from the new development areas under this Project. The major solid waste types produced from the EPP would be the screenings and grits collected from the inlet works and the dewatered sludge collected from the sewage treatment process. Screenings and grits generated from the EPP is suggested to be disposed of at the WENT or NENT Landfill whereas the dewatered sludge generated from the EPP is suggested to be treated at the STF. The screenings, grits and dewatered sludge will be delivered by road transport in water tight containers or skips to avoid odour emission during transportation. Unloading process will be operated in the designated room inside STF which should be enclosed and served by negative pressure by extracting odorous gas to deodorising unit.

7.5.3.6 Reduction of screened sewage in EPP includes improving the efficiency of the screening process to reduce the amount of sewage that bypasses the effluent screening system. Upgrading to more advanced screening technologies, such as rotary drum screens or band screens, can significantly enhance the capture of solids compared to traditional bar screens. Besides, implementing effective pretreatment and equalization process can further improve the screening system's efficiency. Incorporating grit removal and primary sedimentation steps upstream of the screening system can capture a large faction of suspended solids before they reach the treatment plant. Equalization basins, on the other hand, help dampen flow variations and prevent surges that can overwhelm the screening system, leading to increased solids bypass. By stabilizing the influent characteristics and flow conditions, the screening process can operate more effectively and consistently.

Floating Refuse

7.5.3.7 Regular inspection and monitoring of floating refuse will be conducted by MD's appointed contractor. The operation frequency is suggested to be at least monthly interval in accordance with MD's agreement. For any floating refuse trapped within the Project Area, waste collection and disposal by the future contractor will be arranged as required subject to agreement with MD. In case there are any recyclable components in the floating refuse, they should be separated from the collected floating refuse. The contractor shall conduct on-site sorting of the recyclable component and be responsible for arranging respective recycling companies to collect these components.

7.6 Evaluation of Residual Environmental Impacts

7.6.1.1 With the implementation of recommended mitigation measures for the handling, transportation and disposal of the identified waste, no adverse residual impact related to waste management would be anticipated during both the construction and operation phases.

7.7 Environmental Acceptability of the Schedule 2 Designated Projects

7.7.1.1 Waste management implication assessment for the construction and operation phases of the Project was carried out taking into account the DPs under Schedule 2 and Schedule 3. It is noted that the DPs under Schedule 2 would mostly contributed to the generation of C&D materials during the construction phase of the Project. The majority of the non-inert C&D materials would be generated from reclamation, site clearance and site formation works, while the majority of the inert C&D materials would be generated from construction of buildings and infrastructures. Since most of the inert C&D materials generated from the

Project would be reused as backfilling materials, the DPs under Schedule 2 are not anticipated to result in any adverse environmental impacts.

7.8 Conclusion

7.8.1.1 The main waste types to be generated during the construction phase of the Project will include C&D materials, chemical waste, general refuse, sediment and floating refuse. Reduction measures have been recommended to minimise the amount of materials generated by the Project by reusing C&D materials before off-site disposal. Provided that the waste is handled, transported and disposed of according to the recommended mitigation measures, adverse waste management implications, including potential hazards, air and odour emissions, noise, wastewater discharge, ecology and public transport, associated with handling, storage and disposal of wastes during the construction phase of the Project are not expected.

7.8.1.2 The main waste types to be generated during the operation phase of the Project will include MSW, chemical waste, concrete waste, floating refuse, screenings, grits and sewage sludge. A new RTS will be included in preparation for the increased quantity of waste in the district. The proposed waste infrastructure will provide convenient collection of recyclables from the local community, and to provide synergy to achieve better operational efficiency and environmental sustainability. Provided that the waste is handled, transported and disposed of according to the recommended mitigation measures, adverse waste management implications, including potential hazards, air and odour emissions, noise, wastewater discharge, ecology and public transport, associated with handling, storage and disposal of wastes during the operation phase of the Project are not expected.