7 WASTE MANAGEMENT IMPLICATIONS

7.1 Introduction

This chapter presents the findings of the assessment of waste management implications arising from the CKR during the construction and operational phases. Opportunities for waste avoidance, minimisation, reuse, recycling and disposal were examined. With the construction material import / export balancing design approach and the appropriate mitigation measures implemented during the different phases of CKR, potential environmental impacts associated with waste management would be insignificant.

The waste management implication assessment has been conducted in accordance with the requirements of Annexes 7 and 15 of the TM-EIAO and Clause 3.4.9 of the EIA Study Brief for CKR.

7.2 Legislation and Standards

The relevant legislation and associated guidance notes relate to the study for the assessment of waste management implications include:

- Waste Disposal (Amendment) Ordinance (Cap 354) and subsidiary Regulations;
- Environmental Impact Assessment Ordinance (Cap 499) and subsidiary Regulations;
- Dumping at Sea Ordinance (Cap 466);
- Land (Miscellaneous Provisions) Ordinance (Cap 28); and
- Public Health and Municipal Service Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances By-laws.
- Under the Waste Disposal (Amendment) Ordinance, some of the regulations are relevant to this EIA, including:
- Waste Disposal (Chemical Waste) (General) Regulation (Cap 354); and
- Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap 354).

7.2.1 Waste Disposal (Amendment) Ordinance

The Waste Disposal Ordinance (WDO) prohibits unauthorised disposal of wastes. Construction and Demolition (C&D) waste is not directly defined in the WDO but is considered as “trade waste” which is defined as waste from any trade, manufacturer or business, or any wasted building, or civil engineering materials, but does not include animal waste.

Under the WDO, wastes can only be disposed of at sites licensed by EPD. Breach of these regulations can lead to a fine and/or imprisonment. The WDO also stipulates the requirements for issuing licenses for the collection and

transportation of wastes. Licenses are however not required for the collection and transportation of C&D waste or trade waste.

7.2.2 Waste Disposal (Charges for Disposal of Construction Waste) Regulation

Under the WDO and the Charging Regulation, wastes can only be disposed of at designated waste disposal facilities licensed by EPD. Schedule 5 of Regulation defines that inert construction waste includes rock, rubble, boulder, earth, soil, sand, concrete, brick, tile, masonry or used bentonite. According to Schedule 6 of the Regulation, construction waste delivered to a landfill for disposal must not contain more than 50% by weight of inert material. Construction waste delivered to a sorting facility for disposal must contain more than 50% by weight of inert material, and construction waste delivered to a public fill reception facility for disposal must consist entirely of inert material.

For construction work with a value of more than HK$1M, the main contractor is required to establish a billing account at EPD before transporting the construction waste to the designated waste disposal facilities (e.g. landfill, public fill etc). The vessels for delivering construction waste to public fill reception facility would need prior approval from EPD. Breach of these regulations can lead to a fine and/or imprisonment.

Depending on the percentage of inert materials in the construction waste, construction waste can be disposed at public fill, sorting facilities, landfills and outlying islands transfer facilities where different disposal cost would be applied. The scheme encourages reducing, reusing and sorting of construction waste such that the waste producer can minimise their disposal fee.

7.2.3 Waste Disposal (Chemical Waste) (General) Regulation

Chemical waste includes any scrap materials, or unwanted substances specified under Schedule 1 of this Regulation, if such a substance or chemical occurs in such a form, quantity or concentration that causes pollution or constitutes a danger to health or risk of pollution to the environment.

A person shall not produce, or cause to be produced, chemical wastes unless he is registered with EPD. Any person who contravenes this requirement commits an offence and is liable to a fine and/or imprisonment. Chemical wastes should be treated, utilising on-site plant licensed by EPD or have a licensed collector to transport the wastes to a licensed facility. For each consignment of wastes, the waste producer, collector and disposer of the wastes must sign all relevant parts of a computerised trip ticket. The system is designed to trace wastes from production to disposal.

This regulation also prescribes the storage facilities to be provided on site including labelling and warning sign. To minimise the risks of pollution and danger to human health or life, the waste producer is required to prepare and make available written emergency procedures for spillage, leakage or accidents arising from storage of chemical wastes. The waste producer must also provide employees with training for such procedures.

7.2.4 Dumping at Sea Ordinance

According to the Dumping at Sea Ordinance, a permit from EPD is required if any waste producer intend to dump materials from vessels to designated marine dumping areas. The Authority will consider a number of factors including sources and nature of materials to be dumped, dumping rates, need for inspection / testing, water pollution avoidance measures etc before determining whether such a permit would be granted and, where deemed necessary, any conditions to be complied with. Breach of the requirements in the permit would result in a fine and/or to imprisonment.

7.2.5 Land (Miscellaneous Provisions) Ordinance

The inert portion of C&D materials may be taken to public filling facilities including public filling area, public filling barging points and stockpiling areas. These facilities usually form part of land reclamation schemes and are operated by CEDD. This ordinance requires Dumping Licenses (to be issued by CEDD) to be obtained by individuals or companies, who deliver inert C&D materials to the public filling facilities.

Individual licenses and windscreen stickers are issued for each vehicle involved. Public filling areas will accept only inert building debris, soil, rock and broken concrete. The material should, however, be free from marine mud, household refuse, plastic, metal, individual and chemical wastes, animal and vegetable matters and any other materials considered unsuitable by the Filling Supervisor.

7.2.6 Public Cleansing and Prevention of Nuisances Regulation

This regulation provides further control on illegal dumping of litter or waste in street and public places (including water course, stream, channel etc). Offence of this regulation would result in a fine and / or to imprisonment.

7.2.7 Other Relevant Guidelines

The following documents and guidelines also relate to waste management and disposal:

Table 7.1: Other relevant documents and information

Bureau / Department	Documents / Guidelines / Technical Circulars
ex-Planning, Environmental and Lands Branch	• Waste Disposal Plan for Hong Kong (December 1989) • Waste Reduction Framework Plan, 1998 to 2007
ex- Environment, Transport and Works Bureau	• Works Branch Technical Circular (WBTC) No. 32/92, The Use of Tropical Hard Wood on Construction Site • WBTC No. 2/93, Public Dumps • Works Bureau TC No 2/93B, Public Filling Facilities • WBTC No. 16/96, Wet Soil in Public Dumps • Works Bureau TC Nos. 4/98 and 4/98A, Use of Public Fill in Reclamation and Earth Filling Project • Works Bureau TC No. 12/2000, Fill Management

Bureau / Department	Documents / Guidelines / Technical Circulars
	• Works Bureau TC No. 19/2001, Metallic Site Hoardings and Signboards • Works Bureau TC No. 06/2002, Enhanced Specification for Site Cleanliness and Tidiness • Works Bureau TC No. 12/2002, Specification Facilitating the Use of Recycled Aggregates • Chapter 4 of the General Guidelines for Management of the Project Administration Handbook (PAH) • ETWBTC (Works) No. 34/2002, Management of Dredged / Excavated Sediment • ETWBTC (Works) No. 19/2005, Environmental Management on Construction Site
DEVB	• DEVB TC (Works) No 6/2010, Trip-ticket System for Disposal of Construction and Demolition Materials
EPD / CEDD	• New Disposal Arrangements for Construction Waste (1992)
EPD	• A Policy Framework for Management of Municipal Solid Waste (2005 -2014), (December 2005) • Code of Practice on the Packaging, Labeling and Storage of Chemical Wastes (1992)
PlanD	• Hong Kong Planning Standards and Guidelines, Chapter 9 (Section 6 – Waste Management)

According to Chapter 4 of the General Guidelines for Management of the Project Administration Handbook (PAH), for Designated Projects, a Construction & Demolition Material Management Plan (C&DMMP) has to be submitted to the Public Fill Committee in case of C&D materials exceed 50,000m^3.

ETWBTC (Works) No. 19/2005, Environmental Management on Construction Site, sets out the policy, procedures and requirements for contractor to prepare and implement and enhanced Waste Management Plan, which becomes a part of the Environmental management Plan in accordance with the aforesaid ETWBTC (Works) No. 19/2005.

7.2.8 Disposal Criteria for Dredged / Excavated Sediment

ETWBTC (Works) No. 34/2002 stipulates the procedures for seeking approval to dredged/excavated sediment and the management framework for marine disposal of such sediment. Applications for approval of dredging proposal and allocation of marine disposal shall be made to the Secretary of Marine Fill Committee (MFC). Marine Dumping Permits as stipulated under the Dumping at Sea Ordinance are required from EPD for the disposal of dredged sediment. No dredging works is allowed to proceed until all issues on management of dredged sediments have been resolved and all relevant arrangements have been endorsed by the relevant authorities including MFC and EPD. Exact location of marine disposal will be assigned by MFC. Letter from MFC expressing no further comment on the dredging rationale is appended in **Appendix 7.1**.

7.3 General Methodology and Principles

The potential environmental impacts associated with the handling and disposal of waste during the construction and operational phase will be assessed in accordance with the following:

- Estimation of the types, timing and quantities of the wastes to be generated; and
- Assessment of the potential impact on the capacity of waste collection, transfer and disposal facilities.

7.4 Identification and Evaluation of Waste Management Implications

7.4.1 Construction Phase

During the construction phase, the main activities that will potentially generate waste include excavation, tunnelling (e.g. cut-and-cover, drill-and-blast, mining), demolition and construction of structures and dredging of sediments. Typical waste types associated with these activities include:

- C&D materials;
- C&D waste;
- Excavated contaminated materials and marine sediments;
- Chemical waste; and
- General refuse.

Bituminous materials generated will be separated from other inert material during the onsite sorting process as far as practicable.

C&D Materials

The proposed alignment will run through various layers of materials including rock at the bottom and marine sediments (as dredging and excavation for underwater tunnel and residual material from previous reclamation works in Kai Tak and Ma Tau Kok) at some of the locations, and fill material on the top. These materials will need to be excavated for cut-and-cover activities (e.g. tunnels and depressed roads etc). For drill-and-blast and drill-and-break tunnelling, only the spoil within the tunnel will be excavated.

The estimated quality of C&D materials to be generated from the construction works have been presented in the C&DMMP (refer **Appendix 7.2**). A summary of the estimated quantity of C&D materials and sediments to be excavated are given in the tables below.

Table 7.2a: Summary of quantities of C&D materials generated

C&D Material		Total (in-situ) (m^3)
Soft Material		2,217,284
Rock	Grade I / II	880,116
	Grade III or below	230,150

C&D Material		Total (in-situ) (m^3)
Artificial Hard Material	Bituminous / Concrete pavement	117,093
Sub-total		3,444,643
Material Re-used		0[2]
Disposal		3,444,643

Note:
[1] The quantities shown above are estimates only and will be subject to further review.
[2] $0Mm^3$ of material can be re-used which is based on no temporary stockpile area (TSA) is available, the maximum amount of re-used material will be $0.959Mm^3$, which is subjected to the availability of the TSA. Continue exploration of possible TSA is needed so as to re-use the public fill on site.

Table 7.2b: Summary of quantities of sediments generated

Material		Total (in-situ) (m^3)
Sediments	Land-based sediment	42,254
	Marine-based sediment	176,640
Sub-total		218,894

Note:
[1] The quantities shown above are estimates only and will be subject to further review.

The total volume of C&D materials and sediments generated is estimated to be $3,444,643m^3$ and 218,894 m^3 respectively. $500m^3$ of land-based sediment will be reused in the project, whilst $3,444,643m^3$ C&D material and $218,394m^3$ sediment (including land-based sediment and marine-based sediment) will be disposed.

The current design is to use cut-and-cover techniques for depressed roads and tunnels in west and east portions, pipepile seawall approach for underwater tunnelling as well as drill-and-blast for tunnelling in central portion.

Measures have been adopted to minimise the generation of C&D materials at the outset during the design stage. As excavation cannot be avoided for both cut-and-cover and drill-and-blast tunnelling, only limited measures can be taken to minimise the quantity of C&D materials. The adoption of the pipepile seawall approach would significantly reduce the amount of marine-based dredged / excavated sediment from 357,500 m^3 to 176,640 m^3. In adopting the pipepile seawall scheme, dredging for navigation channel in Kowloon Bay is required to maintain the necessary marine traffic during construction stage. Out of the 176,640 m^3 of sediments, 41,450 m^3 are dredged for the purpose of navigation channel only.

On-site sorting of C&D material

All C&D materials arising from the construction of CKR will be sorted on-site to recover the inert C&D materials and reusable and recyclable materials prior to disposal off-site. All inert C&D materials will be broken down according to the Dumping Licence conditions before disposal to public filling outlets by barges and dump trucks. However, all of the above will depend on the availability of temporary stockpile area and the possibility of allocation of temporary barging points.

The Contractor will be responsible for devising a system to work for on-site sorting of C&D materials and promptly remove all sorted and processed material

arising from the construction activities to minimise temporary stockpiling on-site. It is recommended that the system should include the identification of the source of generation, estimated quantity, arrangement for on-site sorting and/ or collection, temporary storage areas, and frequency of collection by recycling Contractors or frequency of removal off-site.

It has been assumed that inert C&D materials (e.g. soil, building debris, concrete) will be sorted out from C&D materials at source to avoid double handling. Silty/ clayey materials from marine sediments will be identified at source. Non-contaminated marine sediments will be transported by leak proof trucks to eliminate water leakage during transportation to the barging facility for open sea disposal, e.g. mud pits. The trucks should also be covered with impervious sheeting to prevent any dust emissions. The barges would also be water tight to avoid leakage during transportation to disposal site.

In order to identify materials which are not suitable to use as aggregate in structural concrete (e.g. volcanic rock, Aplite dyke rock, etc), geological assessment would be carried out by competent persons on site during excavation. Volcanic rock and Aplite dyke rock will be separated at the source sites as far as practicable and stored at designated stockpile areas preventing them from delivering to crushing facilities. The Contractor's geologist should ensure that all rock types not suitable for concrete mix are disposed of properly, and should not be transported to Quarry for concrete mix use. Details regarding control measures at source site and crushing facilities will be submitted by the Contractors for the Engineer to review and agree. In addition, site records will also be kept for the types of rock materials excavated and the traceability of delivery will be ensured with the implementation of Trip Ticket System and enforced by site supervisory staff as stipulated under DEVB TC(W) No. 6/2010 for tracking of the correct delivery to the rock crushing facilities for processing into aggregates. Alternative disposal option for the reuse of volcanic rock and Aplite Dyke rock, etc will also be explored.

Reuse of C&D Materials

With the limited space of project sites, it is not practicable to stockpile the excavated materials at individual worksites for subsequent backfilling. Some of the excavated materials have to be exported off-site. A summary of the reused materials is given in the tables below.

Table 7.3a: Summary of C&D material generated, reused and disposed

C&D Materials		Quantity of C&D Materials (in-situ), m^3		
		Generated	**Reused**	**Disposed**
Soil Material		2,217,284	0	2,217,284
Rock	Grade I / II	880,116	0	880,116
	Grade III or below	230,150	0	230,150
Artificial hard material (AHM)	bituminous / concrete pavement	117,093	0	117,093
Subtotal		3,444,643	0[2]	3,444,643

Note:
[1] The quantities shown above are estimates only and will be subject to further review.

[2] 0Mm^3 of material can be re-used which is based on no temporary stockpile area (TSA) is available, the maximum amount of re-used material will be 0.959Mm^3, which is subjected to the availability of the TSA. Continue exploration of possible TSA is needed so as to re-use the public fill on site.

Table 7.3b: Summary of sediments generated, reused and disposed

Materials		Quantity of C&D Materials (in-situ), m^3		
		Generated	Reused	Disposed
Sediments	Land-based	42,254	500	41,754
	Marine-based Sediment	176,640	0	176,640
Subtotal		218,894	500	218,394

Note:
[1] The quantities shown above are estimates only and will be subject to further review.

Among the total 218,894 m^3 of sediment, 500 m^3 of land-based sediment is proposed to be reused for backfilling of pile caps of viaduct piers with low headroom under the same project. The actual amount of reused C&D material will depend on the content and quality of the excavated materials.

Disposal Programme for C&D Material

The estimated disposal programme of surplus C&D material is shown below:

Table 7.4a: Summary of annual disposal quantities of C&D materials

Waste Type		Annual Disposal Quantities (in-situ), m^3						Total, m^3
		2015	2016	2017	2018	2019	2020	
Soft Material		387,609	610,291	515,563	460,722	243,099	0	2,217,284
Rock	Rock I/II	5,795	200,685	462,462	211,174	0	0	880,116
	Rock III or below	144,700	64,133	20,663	654	0	0	230,150
Artificial Hard Material (AHM)	Bituminous / Concrete fragment	15,544	49,091	48,133	2,433	1,892	0	117,093
Subtotal		553,648	924,200	1,046,821	674,983	244,991	0	3,444,643

Note:
[1] The quantities shown above are estimates only and will be subject to further review.

Table 7.4b: Summary of annual disposal quantities of sediments

Waste Type		Annual Disposal Quantities (in-situ), m^3						Total, m^3
		2015	2016	2017	2018	2019	2020	
Sediments	Land-based and Marine-based Sediment	87,224	76,707	7,742	38,097	8,624	0	218,394
Subtotal		87,224	76,707	7,742	38,097	8,624	0	218,394

Note:
[1] The quantities shown above are estimates only and will be subject to further review.

The Project Proponent shall notify CEDD of the estimated spoil volumes to be generated, and liaise and agree with the Public Fill Committee for the disposal of surplus inert C&D materials including good quality rock during the detailed design phase of the project.

The C&D materials include those from the construction of the road networks, cut-and-cover tunnels and drill-and-blast tunnel. The spoil from the mucking out points will be transported by dump trucks to the barging facilities and fill banks for final disposal. Based on the latest information from Planning Department, the Barging points at Kai Tak Runway and Nam Cheong cannot be allocated to CKR project. There is another potential barging point (being used by XRL project) at Kwai Chung underneath Cheung Tsing Bridge. HyD / Major Works Project Management Office is now liaising with DLO / TW&KT about the possibility of taking it over for CKR. Continue liaison with DLO and other relevant offices on any possible barging points will be needed.

It is estimated that about 880,116 m^3 of Grade I/II or better rock will be produced and Mines Division of GEO supported the proposal of imported good quality rock generated from CKR to their Quarries, it is subjected to the new quarry contract to contractor.

About 117,093 m^3 of artificial hard materials (AHM) will be generated. Broken asphalt will be recycled where practicable, whereas broken concrete will be disposed of at the public fill. The designated location of public fill facility for the disposal of these hard materials will be confirmed later.

C&D Waste

C&D waste will be generated throughout the construction works from general site clearance works, tree felling, piling works and earthworks for construction of various structures. It is estimated that about 0.014Mm^3 (in-situ) non-inert C&D waste will be generated. The designated location of the landfills for the disposal of these non-inert C&D materials will be confirmed later.

Imported Fill Material

It is estimated by the Engineer that an amount of 959,100 m^3 of fill materials will need to be imported. The imported fill materials are used for backfilling for temporary reclamation work and backfilling seabed for underwater tunnel. The project proponent shall review the programme during the detailed design stage. Further exploration of possible Temporary Stockpile Area will be carried out and maximize the quantity of on-site reused of surplus C&D material.

Excavated Contamination Materials and Marine Sediment

Contaminated Soil

A Contamination Assessment Plan (CAP) has been prepared which set out the requirements and methodologies for a land contamination assessment along the CKR alignment and was endorsed by EPD on 23 September 2008 (appended in **Appendix 8.1).** A total of 10 boreholes were proposed in the endorsed CAP to identify the potential land contamination issues along the CKR alignment.

A total of 74 sediment and 7 water samples were collected from these 10 boreholes. The analytical testing results of the soil and groundwater samples collected were presented in the Contamination Assessment Report (CAR) and Remediation Action Plan (RAP) which was submitted to EPD in November 2010. Since exceedances of the relevant Risk-Based Remediation Goal (RBRG) values have been identified in 3 of the boreholes, a confirmatory investigation involving 7 boreholes was proposed in the CAR/RAP to delineate the extent of the

contamination detected. The endorsed CAP and CAR/RAP are appended in **Appendix 8.1** and **8.2** respectively.

Subsequently, additional at-grade works areas have been proposed and a Supplementary CAP was prepared and submitted to EPD separately to address the latest changes and also to cover the confirmatory investigation works proposed in the CAR/RAP. A total of 8 boreholes including 7 boreholes for the confirmatory investigation and 1 borehole for the additional works area have been proposed. The Supplementary CAP was endorsed by EPD in February 2012 and was appended in **Appendix 8.3**.

Due to site constraints, only 5 out of the 8 boreholes proposed in the Supplementary CAP has been completed or partially completed. A Supplementary CAR/RAP presenting the findings of the SI works at these 5 boreholes was submitted to EPD for retention in January 2013 (appended in **Appendix 8.4**).

Based on the available testing results, the potentially contaminated soil to be excavated was estimated at 157m^3. Considering the small quantity of contaminated soil to be generated and that the level of contamination detected did not exceed RBRGs (Public Park) which is a more representative landuse for CKR, on-site reuse of the contaminated soil identified would be recommended as the remediation option for the contamination soil. A remediation action plan (RAP) presenting the remediation option recommended was prepared and submitted to EPD for retention in January 2013.

The remaining SI works at the remaining 3 boreholes will be conducted at a later stage e.g. after possession of site and utility diversion by the construction contractor. Nevertheless, the contamination issue is anticipated to be surmountable with the supportive view that the contamination identified are relatively localised, likely contaminants are generic and easily remediated as remediation methods available in the market are well established and nature of the possible contaminants can be dealt with by sufficient local remediation experience.

Sediment

A Marine Sediment Sampling Proposal (MSSP) documented the methodologies of the marine SI for the construction of the underwater tunnel at To Kwa Wan Typhoon Shelter has been submitted and endorsed by EPD in August 2008. The corresponding marine-based and land-based SI works were commenced in August 2008 and January 2009 respectively. The endorsed MSSP is attached in **Appendix 7.3**.

Subsequently, owing to changes in the dredging extent, additional marine SI work was proposed. Detail methodologies of the additional marine SI works were presented in the Supplementary Sediment Sampling and Testing Plan (Supplementary SSTP) which was submitted and endorsed by EPD on 10 February 2012. The endorsed Supplementary SSTP is appended in **Appendix 7.4**.

A comparison of the data obtained from the marine SI works conducted in accordance to the endorsed MSSP in 2008 and in accordance to the endorsed Supplementary SSTP in 2012 has been done and the proportion of the sediment categories identified is summarised in **Table 7.5** below.

Table 7.5: Comparison of sediment categories identified in the marine SI works conducted in 2008 and 2012

Sediment Classification (ETWB TC(W) No. 34/2002)	Marine SI works commenced in 2008		Marine SI works commenced in 2012	
	Vibrocore	Grab	Vibrocore	Grab
Cat Hf	34.7%	45.0%	29.2%	50.0%
Cat Hp	14.7%	45.0%	16.7%	50.0%
Cat H	5.3%	0.0%	4.2%	0.0%
Cat Mf	2.7%	0.0%	8.3%	0.0%
Cat Mp	5.3%	5.0%	0.0%	0.0%
Cat L	37.3%	5.0%	41.7%	0.0%

As shown in the table above, the vibrocore samples obtained in both SI works conducted in 2008 and 2012 shows similar proportion of each sediment category with Cat Hf as the dominant type (~35% in 2008 and ~30% in 2012), followed by Cat Hp (~15% in 2008 and ~17% in 2012). For the grab samples, both marine SI works showed more or less equal proportions of Cat Hf and Hp sediment (~50%).

Due to the similarity of the proportions of each sediment category identified in the two marine SI works, it is considered that the quality of the sediment in Kowloon Bay has remained more or less the same since 2008. Hence, the data obtained in 2008 is still considered valid.

Land-based Sediment

Sampling of the land-based sediment was carried out in Yau Ma Tei and To Kwa Wan in 2009 at 30 drillholes. A total of 111 samples had been collected and tested. Results indicated that 97 of the samples were classified as Category L (contaminants concentrations ≤ Lower Chemical Exceedance Level (LCEL)), 6 were classified as Category M (contaminants concentrations > LCEL & ≤ Upper Chemical Exceedance Level (UCEL)) and 9 samples were Category H (contaminants concentrations > UCEL).

Among the 9 samples classified as Category H, 1 sample exceeded 10 times the LCEL. This sample and the 6 Category M samples are required for biological screening tests. Summary of the chemical and biological screening tests results are summarised in the table below.

Table 7.6: Summary of chemical and biological screening results of the land-based sediment

Category	No. of Samples	Biological Screening	Remarks
Category L	97	N/A	Type 1 – Open Sea
Category M	6	2 samples – Pass	Type I – Open Sea (Dedicated Sites)
		4 samples – Fail	Type 2 – Confined Marine Disposal
Category H (> UCEL)	8	N/A	Type 2 – Confined Marine Disposal
Category H (> 10 x LCEL)	1	Fail	Sediment at this sampling depth would not be disturbed by the construction, no disposal arrangement is required.

The quantity of land-based sediment to be generated is estimated at 42,254m^3 and the breakdown is summarised in the table below.

Table 7.7: Estimated quantities of different types of land-based sediment to be generated

Category	**Disposal Options**	**Excavated Volume (in-situ) (m^3)**
Category L	Reuse on site	500
	Type 1 – Open Sea	37,913
Category M (Biological screening passed)	Type 1 – Open Sea (Dedicated Sites)	11
Category M (Biological screening failed); Category H; and Category H (Biological screening passed)	Type 2 – Confined Marine Disposal	3,830
Total		**42,254**

It should be noted that 26,500m^3 of the 37,913m^3 of Category L land-based sediment, which is suitable for Type 1 – Open Sea disposal, would be generated from the construction of the depressed road. This 26,500m^3 of sediment is assumed to be Category L based on the available data obtained from sampling work conducted in 2009.

Marine-based Sediment

Sampling of the marine-based sediment was carried out at Kowloon Bay in 2008 and 2012 at 21 vibrocore (including vibrocore and grab samples) and 15 grab sampling locations (grab samples only).

A total of 94 vibrocore sub-samples and 20 grab sediment samples had been collected and tested. Results indicated that 38 samples were classified as Category L (contaminants concentrations ≤ LCEL), 8 samples were Category M (contaminants concentrations > LCEL & ≤ UCEL) and 68 samples were classified as Category H (contaminants concentrations > UCEL).

Among the 68 Category H sediment samples, 63 of which contained contaminant concentrations that had exceeded 10 times the LCEL. These 63 samples together with the 8 Category M sediment samples were required for biological screening test. The chemical and biological testing results and the disposal classification proposed for the marine SI works conducted in 2008 are presented in **Appendix 7.5**. Findings, including the disposal classification, of the marine SI conducted in 2012 in accordance with the Supplementary SSTP are summarised in **Table 7.8** and presented in **Appendix 7.6**. The detailed laboratory reports of the 2012 marine SI works are also given in **Appendix 7.7**. An overall summary of the marine SI works conducted in 2008 and 2012 is presented in **Table 7.9**.

Table 7.8: Findings of the marine SI works conducted in accordance with the Supplementary SSTP

Sampling ID	Sediment Category[1]						Disposal Classification (according to ETWB TC(W) No. 34/2002)
	L	Mp	Mf	H	Hp	Hf	
VR1 GRAB					#		Type 2 (Confined Marine Disposal)
VR1 0.9-1.9M				#			Type 2 (Confined Marine Disposal)
VR1 1.9-2.9M	#						Type 1 (Open Sea Disposal)
VR1 2.9-3.9M	#						Type 1 (Open Sea Disposal)
VR1 6.0 -6.9M	#						Type 1 (Open Sea Disposal)
VR2 GRAB					#		Type 2 (Confined Marine Disposal)
VR2 0.9-1.9M	#						Type 1 (Open Sea Disposal)
VR2 1.9-2.9M	#						Type 1 (Open Sea Disposal)
VR2 2.9-3.9M	#						Type 1 (Open Sea Disposal)
VR3 GRAB					#		Type 2 (Confined Marine Disposal)
VR3 0.9-1.9M					#		Type 2 (Confined Marine Disposal)
VR3 1.9-2.9M			#				Type 2 (Confined Marine Disposal)
VR3 2.9-3.9M	#						Type 1 (Open Sea Disposal)
VR3 6.0-6.9M	#						Type 1 (Open Sea Disposal)
VR4 GRAB						#	Type 3 (Special Treatment/ Disposal)
VR4 0.9-1.9M						#	Type 3 (Special Treatment/ Disposal)
VR4 1.9-2.9M						#	Type 3 (Special Treatment/ Disposal)
VR4 3.0-4.0M						#	Type 3 (Special Treatment/ Disposal)
VR4 6.0-6.9M	#						Type 1 (Open Sea Disposal)
VR5 GRAB						#	Type 3 (Special Treatment/ Disposal)
VR5 0.9-1.9M						#	Type 3 (Special Treatment/ Disposal)
VR5 1.9-2.9M						#	Type 3 (Special Treatment/ Disposal)
VR5 2.9-3.9M			#				Type 2 (Confined Marine Disposal)
VR5 6.0-7.0M	#						Type 1 (Open Sea Disposal)
GB1						#	Type 3 (Special Treatment/ Disposal)
GB2					#		Type 2 (Confined Marine Disposal)

Sampling ID	Sediment Category[1]						Disposal Classification (according to ETWB TC(W) No. 34/2002)
	L	Mp	Mf	H	Hp	Hf	
GB3						#	Type 3 (Special Treatment/ Disposal)
GB4						#	Type 3 (Special Treatment/ Disposal)
GB5						#	Type 3 (Special Treatment/ Disposal)
GB6					#		Type 2 (Confined Marine Disposal)
GB7					#		Type 2 (Confined Marine Disposal)
GB8						#	Type 3 (Special Treatment/ Disposal)
GB9					#		Type 2 (Confined Marine Disposal)
GB10					#		Type 2 (Confined Marine Disposal)
GB11						#	Type 3 (Special Treatment/ Disposal)

Note:

[1] Classification of sediment according to ETWB TC(W) No. 34/ 2002:

Category L:

- Analytical results ≤ Lower Chemical Exceedance Level (LCEL)

Category M :

- Analytical results > Lower Chemical Exceedance Level (LCEL), but ≤ Upper Chemical Exceedance Level (UCEL). Category M sediments are subjected to Tier III biological screening test to identify the most appropriate disposal option. **Mp**: biological test passed; **Mf**: biological test failed.

Category H :

- Analytical results > Upper Chemical Exceedance Level (UCEL). Category H sediments with one or more contaminant levels >10x LCEL are subject to Tier III biological screening test in a diluted manner to identify the most appropriate disposal option. **Hp**: biological test passed; **Hf**: biological test failed.

Table 7.9: Summary of chemical and biological screening results and the proposed disposal classification of the marine-based sediment

Category	No. of Samples	Biological Screening	Disposal Classifications
Category L	38	N/A	Type 1 – Open Sea Disposal
Category M	8	3 individual samples passed	Type 1 – Open Sea Disposal (Dedicated Sites)
		1 composite sample and 2 individual samples failed	Type 2 – Confined Marine Disposal
Category H (> UCEL)	5	N/A	Type 2 – Confined Marine Disposal
Category H (> 10 x LCEL)	63	9 composite samples passed	Type 2 – Confined Marine Disposal
		11 composite samples and 2 individual samples failed	Type 3 – Special Treatment/ Disposal

The quantity of marine-based sediment to be generated is estimated at 176,640 m^3 and the breakdown is summarised in the table below.

Table 7.10: Estimated quantities of different types of marine-based sediment to be generated

Category	Disposal Options	Excavated Volume (in-situ) (m^3)
Category L	Type 1 – Open Sea Disposal	33,246
Category M (Biological screening passed)	Type 1 – Open Sea Disposal (Dedicated Sites)	4,059
Category M (Biological screening failed); Category H; and Category H (Biological screening passed)	Type 2 – Confined Marine Disposal	80,442
Category H (Biological screening failed)	Type 3 – Special Treatment/ Disposal	58,893
Total		**176,640**

The total quantity of sediment (including land-based and marine-based sediment) to be generated from the Assignment is estimated at 218,894m^3 and the breakdown is summarised in the table below.

Table 7.11: Estimated quantities of different types of sediment (including land-based and marine-based) to be generated

Category	Disposal Options	Excavated Volume (in-situ) (m^3)
Category L	Reuse on site	500
	Type 1 – Open Sea	71,159
Category M (Biological screening passed)	Type 1 – Open Sea (Dedicated Sites)	4,070

Category	Disposal Options	Excavated Volume (in-situ) (m^3)
Category M (Biological screening failed); Category H; and Category H (Biological screening passed)	Type 2 – Confined Marine Disposal	84,272
Category H (Biological screening failed)	Type 3 – Special Treatment/ Disposal	58,893
Total		**218,894**

As summarised in **Table 7.11**, among the 218,894 m^3 of sediment (including land-based and marine-based) to be generated during the construction stage of the Assignment, 500 m^3 of Category L land-based sediment will be reused on site, 71,159 m^3 of which requires Type 1 – Open Sea Disposal, 4,070 m^3 requires Type 1 – Open Sea (Dedicated Sites) Disposal, 84,272 m^3 requires Type 2 – Confined Marine Disposal, and 58,893 m^3 requires Type 3 – Special Treatment/ Disposal.

Chemical Waste

Chemical wastes likely to be generated from the construction activities for the CKR and associated facilities will include:

- Scrap batteries or spent acid/alkali from their maintenance;
- Used paint, engine oils, hydraulic fluids and waste fuel;
- Spent mineral oils/cleansing fluids from mechanical machinery; and
- Spent solvents/solutions, some of which may be halogenated, from equipment cleansing activities.

Chemical waste may pose serious environmental, health and safety hazards if not stored and disposed of in an appropriate manner as outlined in the Waste Disposal (Chemical Waste) (General) Regulation and the Code of Practice on the Packing, Labelling and Storage of Chemical Waste.

It is difficult to quantify the amount of chemical waste as it will be highly dependent on the Contractor's on-site maintenance practice and the quantities of plant and vehicles deployed. However, it is anticipated that the quantity of chemical waste, such as lubricating oil and solvent produced from plant maintenance will be small and in the order of few hundred litres per month.

Chemical waste, irrespective of the likely small amount, would pose serious environmental, health and safety hazards if not properly managed. Such hazards may include:

- Toxic effects to workers;
- Adverse effects on air, water and land from spills; and
- Fire hazards; and
- Disruption of sewage treatment works should the chemical waste enter the sewerage system.

The chemical waste would be collected by licensed collectors for subsequent disposal at licensed waste disposal facilities, such as the Chemical Waste Treatment Centre in Tsing Yi. With the implementation of proper preventive and mitigation measures for handling, transport and disposal, no insurmountable environmental impacts would be anticipated.

General Refuse

The presence of a construction site with workers and site office will result in the generation of a variety of general refuse requiring disposal. General refuse will mainly consist of food waste, aluminium cans and waste paper.

The storage of general refuse has the potential to give rise to adverse environmental impacts. These include odour if the waste is not collected frequently (for example, daily), windblown litter, water quality impacts if waste enters waster bodies, and visual impact. The sites may also attract pests, vermin, and other disease vectors if the waste storage areas are not well maintained and cleared regularly. In addition, disposal of wastes at sites other than approved landfills, can also lead to similar adverse impacts at those sites.

The number of work force (clerical and workers) to be employed for the Project is not available at this stage. The total refuse generated per day would be estimated once the number of work force becomes available. Provided that the mitigation measures are adopted, the potential environmental impacts caused by the storage, handling, transport and disposal of general refuse are expected to be minimal. It is recommended that general refuse should be collected on a daily basis for disposal. Given the small quantity of general refuse, adverse impacts to the operation of the landfills are not expected.

7.4.2 Operational Phase

During the operational phase, the tunnel ventilation buildings and administration building will generate the following wastes:

- General refuse; and
- Chemical waste.

General Refuse

General refuse will arise from the employees within mainly the administration building, and partly from the tunnel ventilation buildings. Waste would include food, paper, wood, plastic, office waste, metal containers etc. The storage and handling of these wastes may give rise to environmental impacts.

Maintenance activities and cleaning process of the tunnel will generate waste including used fluorescent tubes, cleansing materials and discarded electronic equipment. A reputable waste collector should be employed to remove general refuse from the associated facilities, separately from chemical wastes, on a daily basis to minimise odour, pest and litter impacts.

As discussed in **Section 3.2.9**, both the ESP and the NO_2 removal process of the APS would generate some waste. Any dust or particulates collected from the APS are general refuse to be disposed.

For the ESP, the amount of dust or particulates collected would largely depend on the particulate capture efficiency. Assuming a typical capture efficiency of 80-90% for the tunnel section of CKR, it is estimated that the amount of dust or particulates collected would in the order of few hundred kg per month. The dust or particulates would be washed away from the collecting plates of ESP. The wastewater would then be directly discharged to the public sewerage system, or collected by licensed contractor, or filtered to dried dust 'cake' depending on the specific technology adopted. If the filtering technology is adopted, the dust cakes collected, which are inert materials, would be collected by licensed waste collector and disposed at landfill site.

For the NO_2 removal process, the filter media would be recycled as much as practicable but still need to be replaced on regular basis, or as necessary. The amount of solid waste generated would depend on the proprietary design to be determined at a later stage. Initial estimation is that the amount of the filter media to be disposed would be in the order of a few hundred cubic metres per year. Given the nature and relatively small amount of waste generated, these used filtered media would be collected by licenced waste collector and disposed at landfill site.

Chemical Waste

Similar to industrial waste, lubricants, paints, used batteries, mineral oil, coolants, and solvents will be generated during the operational phase within the administration building and ventilation buildings as well as maintenance of the tunnel. These wastes may pose significant environmental, health and safety hazard if they are not properly managed.

The requirements given in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes should be followed in handling of these chemical wastes. A trip-ticket system should be operated in accordance with the Waste Disposal (Chemical Waste) (General) Regulation to monitor all movements of chemical wastes which will be collected by a licensed collector to a licensed facility for final treatment and disposal.

7.5 Mitigation Measures

7.5.1 Construction Phase

The requirements as recommended in ETWB(W) No. 19/2005 Environmental Management on Construction Sites and its latest version, and other relevant guidelines, should be included in the Particular Specification for the Contractor as appropriate.

The Contractor should incorporate waste management recommendations into a comprehensive on-site Environmental Management Plan (EMP) based on the Construction and Demolition Material Management Plan (C&DMMP). The EMP shall be submitted to the Engineer for approval after commencement of construction. This should include all factors dependent on individual work sites including designation of areas for the segregation and temporary storage of materials for future use or recycling. Such provision cannot be specified at this stage. Contractors should follow the recommendations of ETWBTC (Works) No. 19/2005 for on-site separation of waste, and DEVBTC (Works) No. 6/2010 for

trip-ticket system for disposal of construction and demolition material. The EMP shall also define clearly the hierarchy for waste management on and off-site as well as a complete list of mitigation measures for handling excavated materials.

Waste management options with less environmental impacts are preferred. The waste management hierarchy should be as follows:

- Avoidance and minimization;
- Reuse of materials;
- Recovery and recycling; and
- Treatment and disposal.

This hierarchy should be used to evaluate the waste management options to allow maximum waste reduction and often reducing costs. For example, by reducing or eliminating over-ordering of construction materials, waste is avoided and costs are reduced both in terms of purchasing raw materials and disposing of wastes. Records of quantities of wastes generated, recycled and disposal (locations) should be properly kept.

A trip-ticket system should be established and will comply with the Waste Disposal (Charges for Disposal of Construction Waste) Regulation to monitor the disposal of public fill and solid wastes at public filling facilities and landfills, and to control fly-tipping. A trip-ticket system will be included as one of the contractual requirements and implemented by the Contractor. The Engineer shall audit the result of the system.

A recording system for the amount of waste generated, recycled and disposed of (including the disposal sites) should be established during the construction phase. The Contractor should provide training to workers on the concepts of site cleanliness and on appropriate waste management procedures, including waste reduction, reuse and recycling at the beginning of the Contract.

C&D Materials

The Project Proponent shall notify CEDD of the estimated spoil volumes to be generated, and liaise and agree with the Public Fill Committee (PFC) for the disposal of any surplus inert C&D materials including good quality rock during detailed design of the project. No construction work is allowed to proceed until all issues on management of C&D materials have been resolved and all relevant arrangements have been endorsed by the relevant authorities including PFC and EPD. A C&DMMP has been submitted and endorsed by PFC. The Project Proponent will ensure all the mitigation measures mentioned in the C&DMMP will be complied with. Wherever practicable, C&D materials should be segregated from other wastes to avoid contamination and ensure acceptability at public filling areas or reclamation sites. The surplus C&D material would be reused within the site as much as possible.

The following mitigation measures should be implemented in handling the C&D materials:

- Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement;
- Carry out on-site sorting;

- Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate;
- Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible;
- Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified; and
- Implement an enhanced Waste Management Plan, which become a part of the Environmental Management Plan in accordance with "ETWBTC (Works) No. 19/2005 – Environmental Management on Construction Site", to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction.
- The Contractor shall propose the final disposal sites to the Project Proponent and PFC to get their approval before implementation.

C&D Waste

The following mitigation measures should be implemented in handling of C&D waste:

- Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Metal hoarding should be used where practicable to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage.
- The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.
- HKSAR has developed and implemented a charging policy for the disposal of waste to landfill. It will provide additional incentive to reduce the volume of waste generated and to ensure proper segregation to allow disposal of inert material to public filling areas.

Excavated Contamination Materials and Marine Sediment

Contaminated Soil

157m^3 of contaminated soil has been identified. Since the contamination identified is envisaged to be moderate, localised and hence surmountable. Re-use in-situ was therefore recommended to be the most practicable remediation option. Details of the remediation options and recommendations regarding the contaminated soil have been presented in **Section 8**.

Land-based and Marine-based Sediment

The total amount of land-based and marine-based sediments to be generated is estimated to be 218,894 m^3. 500 m^3 of Category L land-based sediment will be

reused on site, 71,159 m^3 of which requires Type 1 – Open Sea Disposal, 4,070 m^3 requires Type 1 – Open Sea (Dedicated Sites) Disposal, 84,272 m^3 requires Type 2 – Confined Marine Disposal, and 58,893 m^3 requires Type 3 – Special Treatment/ Disposal.

Normally, the contaminated sediment will require to be disposed of at confined contaminated mud pits such as East Sha Chau, while the uncontaminated marine sediment will require open sea disposal, e.g. in South Cheung Chau, Nine Pin, etc. However, no dredging work is allowed to proceed until all issues on management of dredged sediments have been resolved and all relevant arrangements have been endorsed by the relevant authorities including MFC and EPD.

Possible mitigation measures to handle the contaminated / uncontaminated sediment are summarised as follows:

- All construction plant and equipment shall be designed and maintained to minimise the risk of silt, sediments, contaminants or other pollutants being released into the water column or deposited in the locations other than designated location.
- All vessels shall be sized such that adequate draft is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.
- Before moving the vessels which are used for transporting dredged material, excess material shall be cleaned from the decks and exposed fittings of vessels and the excess materials shall never be dumped into the sea except at the approved locations.
- Adequate freeboard shall be maintained on barges to ensure that decks are not washed by wave action.
- The Contractors shall monitor all vessels transporting material to ensure that no dumping outside the approved location takes place. The Contractor shall keep and produce logs and other records to demonstrate compliance and that journeys are consistent with designated locations and copies of such records shall be submitted to the Engineers.
- The Contractors shall comply with the conditions in the dumping licence.
- All bottom dumping vessels (hopper barges) shall be fitted with tight fittings seals to their bottom openings to prevent leakage of material.
- The material shall be placed into the disposal pit by bottom dumping.
- Contaminated marine mud shall be transported by split barge of not less than 750m^3 capacity and capable of rapid opening and discharge at the disposal site.
- Discharge shall be undertaken rapidly and the hoppers shall be closed immediately. Material adhering to the sides of the hopper shall not be washed out of the hopper and the hopper shall remain closed until the barge returns to the disposal site.
- For Type 3 special disposal treatment (see **Table 7.10** for quantity), sealing of contaminant with geosynthetic containment before dropping into designated mud pit would be a possible arrangement. A geosynthetic containment method

is a method whereby the sediments are sealed in geosynthetic containers and, the containers would be dropped into the designated contaminated mud pit where they would be covered by further mud disposal and later by the mud pit capping at the disposal site, thereby fulfilling the requirements for fully confined mud disposal. The technology is readily available for the manufacture of the geosynthetic containers to the project-specific requirements. Similar disposal methods have been used for projects in Europe, the USA and Japan and the issues of fill retention by the geosynthetic fabrics, possible rupture of the containers and sediment loss due to impact of the container on the seabed have been addressed.

- Moreover, the geosynthetic containment has also been proposed for Type 3 disposal in the EIA Study for Sha Tin to Central Link (Tai Wai to Hung Hom Section) (EIA 200/2011) and also in the EIA Study for Wan Chai Development Phase II and Central-Wan Chai Bypass (WDII) (EIA 141/2007). Several field trials had been undertaken under WDII - Design and Construction to demonstrate the feasibility on the use of the geosynthetic containment. Report on the field trials concluded that disposal by sealing sediments in geosynthetic containers and dropping these containers into the contaminated mud pits at East Sha Chau has been shown to be a successful and viable disposal method. The use of a geosynthetic containment for special disposal was considered to be an effective system with negligible loss of contaminants to the marine environment during disposal.

Chemical Waste

Chemical waste producers should be registered with EPD. For those processes which generate chemical waste, the Contractor shall identify any alternatives that generate reduced quantities or even no chemical waste, or less dangerous types of chemical waste.

Chemical waste should be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes as follows. Containers used for storage of chemical wastes should:

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

The storage area for chemical wastes should:

- Be clearly labelled and used solely for the storage of chemical wastes;
- Be enclosed on at least 3 sides;
- Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in the area, whichever is greatest;
- Have adequate ventilation;

- Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste, if necessary); and
- Be arranged so that incompatible materials are adequately separated.

Disposal of chemical waste should:

- Be via a licensed waste collector; and
- Be to a facility licensed to receive chemical waste, such as the CWTC which also offers a chemical waste collection service and can supply the necessary storage containers; or
- Be to a re-user of the waste, under approval from EPD.

General Refuse

General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes. A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law.

Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible.

Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor. In addition, waste separation facilities for paper, aluminium cans, plastic bottles etc., should be provided.

7.5.2 Operational Phase

General Refuse

A reputable waste collector should be employed to remove general refuse and industrial wastes generated from administration building and ventilation buildings on a daily basis to minimise odour, pest and litter impacts.

Chemical Waste

The requirements given in the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* should be followed, where applicable, in handling of these chemical wastes. A trip-ticket system should be operated in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation* to monitor all movements of chemical wastes which would be collected by a licensed collector to a licensed facility for final treatment and disposal. The details of mitigation measures are as described in **Section 7.5.1**.

7.6 Residual Environmental Impacts

With the implementation of recommended mitigation measures, adverse residual impacts are not anticipated for both the construction and operational phases.

7.7 Conclusion

The quantity and timing for the generation of waste during the construction phase have been estimated. Measures, including the opportunity for on-site sorting, reusing excavated fill materials (stored in stockpiles) etc, are devised in the construction methodology where practicable to minimise the surplus materials to be disposed. The annual disposal quantities for C&D materials and their disposal methods have also been discussed making reference to the C&DMMP which has been endorsed by PFC. The Project Proponent will ensure all the mitigation measures mentioned in the C&DMMP will be complied with. Wherever practicable, C&D materials should be segregated from other wastes to avoid contamination and ensure acceptability at public filling areas or reclamation sites. The surplus C&D material would be reused within the site as much as possible. No construction work is allowed to proceed until all issues on management of C&D materials have been resolved and all relevant arrangements have been endorsed by the relevant authorities including PFC and EPD.

In addition, quantities of contaminated soil and dredged/ excavated sediment that would be generated during the construction phase have also been estimated. Measures for handling these materials have been discussed. The types and quantities of waste that would be generated during the operational phase have also been assessed. Recommendations have been made to ensure proper treatment and disposal of these wastes.

No dredging works is allowed to proceed until all issues on management of dredged sediments have been resolved and all relevant arrangements have been endorsed by the relevant authorities including MFC and EPD. Exact location of marine disposal of the sediment will be assigned by MFC.