4 Waste Management

4.1 Introduction

4.1.1 This section identifies the quantity, quality and timing of waste generated from the Project based on the sequence and duration of associated activities, and, evaluates the potential environmental impacts associated with the handling, collection, treatment, transportation and disposal of wastes. Mitigation measures and good site practice are recommended where appropriate to minimise the identified environmental impacts.

4.2 Environmental Legislation, Standards and Guidelines

4.2.1 The following legislation covers the handling, treatment and disposal of wastes in Hong Kong:

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

4.2.2 Relevant legislation for this Project is further described below.

Waste Disposal Ordinance (Cap 354)

4.2.3 The Waste Disposal Ordinance (WDO) prohibits the unauthorised disposal of wastes, with waste defined as any substance or article which is abandoned. Construction waste is not directly defined in the WDO but is considered to fall within the category of "Trade Waste". Trade Waste is defined as waste from any trade, manufacturer or business, or any waste building, or civil engineering materials.

4.2.4 Under the WDO, wastes can only be disposed of at a licensed site. A breach of these regulations can lead to the imposition of a fine and/or a prison sentence. Under the WDO, a licence for the collection and transport of wastes is required. Licences are not, however, currently issued for the collection and transport of construction and/or trade wastes.

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

4.2.5 Chemical wastes as defined under the Disposal (Chemical Waste) (General) Regulation include any substances being scrap materials, or unwanted substances specified under the Schedule 1 of the regulation, if

such substances or chemicals occur in such a form, a quantity or a concentration so as to cause pollution or constitute a danger to health or a risk of pollution to the environment. The definition is sufficiently general that clarification with EPD is sometimes required to confirm whether some wastes are deemed to be chemical wastes or not.

4.2.6 A person should not produce, or be caused to produce, chemical wastes unless he/she is registered with EPD. Any person who contravenes this requirement commits an offence and is liable upon conviction to a fine and to an imprisonment.

4.2.7 Producers of chemical wastes must treat their wastes utilising an on-site plant licensed by EPD or have a licensed collector take the wastes to a licensed facility. For each consignment of waste, the producer, collector and disposer of the wastes must sign all relevant parts of a computerised trip ticket. The system is designed to allow the transfer of wastes to be traced from a site to disposal – the cradle to grave approach.

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

Dumping at Sea Ordinance (Cap 466)

4.2.9 Marine disposal of dredged materials is controlled under the Dumping at Sea Ordinance (Cap 466) which stipulates requirements for permits for dumping at sea as well as designating areas within Hong Kong waters as a marine dumping areas. A person convicted of dumping without the required permits is liable to a fine of $200,000 and to imprisonment for 6 months. Current practice is that dredged materials may be dumped at designated marine dumping sites.

Land (Miscellaneous Provisions) Ordinance (Cap 28)

4.2.10 Construction wastes which are wholly inert may be taken to public fill reception facilities. Public filling areas usually form part of land reclamation schemes and are operated by the Civil Engineering and Development Department (CEDD). The Land (Miscellaneous Provisions) Ordinance requires that public filling licences are obtained by individuals or companies who deliver suitable construction wastes to public filling areas. The licences are issued by the CEDD as delegated from the Director of Lands.

4.2.11 Individual licences and windscreen stickers are issued for each vehicle involved. Under the licence conditions public filling areas will accept only inert building debris, soil, rock and broken concrete. There is no size limitation on the rock and broken concrete, and a small amount of timber mixed with other suitable material is permissible. The material should, however, be free from marine mud, household refuse, plastic, metal,

industrial and chemical waste, animal and vegetable matter or any other material considered unsuitable by the dump supervisor.

Public Health and Municipal Services Ordinance (Cap 132)

4.2.12 The Public Health and Municipal Service Ordinance - Public Cleansing and Prevention of Nuisances By-Laws and the Waste Disposal Ordinance provide controls on the illegal tipping of wastes on unauthorised (unlicensed) sites.

Other Relevant Documents and Guidelines

4.2.13 The following documents and guidelines also relate to waste management and disposal in Hong Kong:

- Environment, Transport and Works Bureau Technical Circular (Works) No. 19/2005 - Environmental Management on Construction Sites;
- Environment, Transport and Works Bureau Technical Circular (Works) No. 34/2002 - Management of Dredged/Excavated Sediment;
- Environment, Transport and Works Bureau Technical Circular (Works) No. 33/2002 – Management of Construction and Demolition Material Including Rock;
- Works Bureau Technical Circular No. 21/2002 – Trip-ticket System for Disposal of Construction and Demolition Material;
- Works Bureau Technical Circular No. 12/2002 – Specifications Facilitating the Use of Recycled Aggregates;
- Works Bureau Technical Circular No.12/2000 – Fill Management;
- Works Bureau Technical Circular No. 25/99 – Incorporation of Information on Construction and Demolition Material Management in Public Works Subcommittee Papers. (to be read in conjunction to WBTC25/99A and WBTC25/99C);
- Works Bureau Technical Circular No. 5/98 – On Site Sorting of Construction Waste on Demolition Sites;
- Works Bureau Technical Circular No. 4/98 – Use of Public Fill in Reclamation and Earth Filling Projects. (to be read in conjunction to WBTC4/98A);
- Works Branch Technical Circular No. 16/96 – Wet Soil in Public Dumps;
- Works Branch Technical Circular 2/93 – Public Dumps;
- Buildings Department Practice Note for Authorised Persons and Registered Structural Engineers–Construction and Demolition Waste;
- Buildings Department, Practice Note for Authorised Persons and Registered Structured Engineers 252, Management Framework for Disposal of Dredged/Excavated Sediment;

- New Disposal Arrangements for Construction Waste (1992), Environmental Protection Department and Civil Engineering
- Environmental Guidelines for Planning in Hong Kong (1990), Hong Kong Planning and Standards Guidelines, Hong Kong Government; and

4.3 Assessment Methodology

General

4.3.1 The assessment of waste management impacts arising from the Project includes the following tasks:

- Estimation of the quantity and types of waste generated;
- Assessment of potential impacts associated with waste handling, collection, treatment, transportation and disposal of wastes with respect to potential hazards, air and odour emission, wastewater discharge and transportation risks;
- Evaluation of the opportunities for reducing waste generated and on-site and off-reuse;
- Estimation of the quantity and types of waste to be disposed of; and
- Description of the disposal options for each type of waste.

Marine Sediment

4.3.2 The sediment sampling work at both the existing site and proposed new site was carried out between 22 June and 22 July 2005 to determine the contamination levels of the marine sediment. The sampling methodology and testing procedures were based on the requirements stipulated in the Environment Transport and Works Bureau Technical Circular (Works) No. 34/2002 Management Framework for Disposal of Dredged/Excavated Sediment and have been approved by EPD.

4.3.3 The sampling locations are shown in Figures 3-10 and 3-11. A reference sediment is collected at ST1 (Grid Ref. 805950E 827572N) as shown in Figure 3-12, which is one of the reference stations of the sediment toxicity control test for the Environmental Monitoring and Audit for Contaminated Mud Pit VI at East Sha Chau.

4.3.4 Sediment samples were sent to a laboratory accredited by the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for chemical analysis and biological screening test.

4.3.5 The marine sediment was analysed for 13 chemical parameters which are used for the classification of sediment under the ETWB TC (W) No. 34/2002, as shown in Table 3-6.

4.3.6 The marine sediment at the existing site was classified as Category M or certain Category H, and so biological screening test has been undertaken in accordance with the ETWB TC No. 34/2002. The purpose of the test was to investigate the treatment methods and disposal options for the marine sediment, which may have to be dredged and disposed of.

4.3.7 As this project does not involve the disposal of marine mud, however, no dumping permit is required.

4.4 Baseline Condition of Marine Sediment

Marine Sediment at the Yam O Wan Site (Existing Site)

4.4.1 The chemical analysis results (Table 4-1) showed that 16 layers out of 46 layers belong to Category H due to the contamination of copper, zinc, silver and mercury. These Category H sediments are found at vibrocores EV1, EV2, EV3, EV4, EV5, EV9, EV11, EV12, EV15 and EV16.

4.4.2 Category M sediments due to the exceedances of LCEL of lead, copper, zinc, silver and mercury are found in 20 layers which are at vibrocores EV1, EV2, EV5, EV6, EV8, EV10, EV13, EV14, EV15 and EV16.

4.4.3 There are a total of 10 layers at vibrocores EV1, EV5, EV7, EV9, EV10 and EV13 belonging to Category L sediment.

4.4.4 The results indicate that there is particular pattern in either horizontal or vertical profile.

4.4.5 The sediment results at EPD's seabed monitoring stations at NS2 (Pearl Island) and NS5 (Tuen Mun typhoon shelter) are in vicinity of the existing site and are included in Table 4-1 for comparison. The contaminant levels of the marine sediment at the existing site and are generally comparable to the coastal area of this region, except for mercury levels. However, the average mercury level of 0.68 mg/L is less than those in some of the typhoon shelters such as in Causeway Bay (VS12 Hg: 0.72 mg/L), To Kwa Wan (VS20, Hg: 1.09 mg/L) and Kwun Tong (VS14, Hg: 1.00 mg/L) in 2004.

Sample Location	Depth, m	Heavy Metals									Other Parameters				Sediment Category
		Cd	Cr	Cu	Ni	Pb	Zn	Hg	As	Ag	LMW PAH[1]	HMW PAH[2]	Total PCBs	TBT	
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/L	
EV1	0.0-0.9	<0.2	37	53	15	54	120	0.43	11	0.9	<55	<170	<3	<0.015	L
EV1	0.9-1.9	0.2	36	30	17	58	100	***0.60***	***15***	0.2	<55	<170	<3	<0.015	M
EV1	1.9-2.9	<0.2	33	24	16	62	91	**1.3**	12	0.9	<55	<170	<3	<0.015	H
EV1	4.9-5.9	<0.2	21	9	11	26	53	0.30	7.1	<0.1	<55	<170	<3	<0.015	L
EV2	0.0-0.9	0.2	36	36	16	56	110	***0.96***	***14***	1.0	<55	<170	<3	<0.015	M
EV2	0.9-1.9	<0.2	31	23	15	62	89	**2.0**	***15***	1.0	<55	<170	<3	<0.015	H
EV2	1.9-2.9	<0.2	31	21	16	58	84	**1.8**	11	***1.4***	<55	<170	<3	<0.015	H
EV2	4.9-5.9	<0.2	18	8.0	7.1	23	42	**1.3**	9.2	***1.3***	<55	<170	<3	<0.015	H
EV3	Grab	<0.2	17	29	11	29	87	**1.2**	6.5	0.6	<55	<170	<3	<0.015	H
EV4	Grab	0.4	35	**470**	25	***99***	**1300**	***0.61***	***13***	***1.5***	110	470	<3	<0.015	H
EV5	0.0-0.9	0.2	30	37	12	45	92	**1.1**	12	***1.2***	<55	<170	<3	<0.015	H
EV5	0.9-1.9	<0.2	33	53	14	47	95	0.45	11	0.3	<55	<170	<3	<0.015	L
EV5	1.9-2.9	0.2	32	62	14	53	100	0.49	10	0.4	<55	<170	<3	<0.015	L
EV5	4.9-5.9	<0.2	29	22	15	57	89	0.50	***13***	0.2	<55	<170	<3	<0.015	M
EV6	0.0-0.9	<0.2	33	25	17	69	95	0.50	***13***	<0.1	<55	<170	<3	<0.015	M
EV6	0.9-1.9	<0.2	34	24	17	<8	180	0.43	***14***	<0.1	<55	<170	<3	<0.015	M
EV6	1.9-2.9	<0.2	32	20	17	47	79	0.47	***13***	<0.1	<55	<170	<3	<0.015	M
EV6	4.9-5.9	0.3	23	14	9.2	43	68	0.25	***14***	<0.1	<55	<170	<3	<0.015	M
EV7	Grab	<0.2	20	38	13	42	110	0.24	6.3	0.2	<55	<170	<3	<0.015	L
EV8	Grab	<0.2	30	48	19	45	150	0.45	8	***1.8***	<55	<170	<3	<0.015	M
EV9	0.0-0.9	0.2	35	***69***	14	61	120	***0.85***	12	**2.2**	<55	<170	<3	<0.015	H
EV9	0.9-1.9	<0.2	29	31	12	40	79	0.21	11	0.3	<55	<170	<3	<0.015	L
EV9	1.9-2.9	0.2	33	***67***	13	41	95	**1.3**	10	0.5	<55	<170	<3	<0.015	H
EV9	4.9-5.9	<0.2	19	17	6.5	48	57	0.21	7.7	0.2	<55	<170	<3	<0.015	L
EV10	0.0-0.9	<0.2	37	29	19	70	100	0.40	***14***	0.2	<55	<170	<3	<0.015	M
EV10	0.9-1.9	<0.2	33	23	18	59	89	0.50	***13***	0.1	<55	<170	<3	<0.015	M
EV10	1.9-2.9	<0.2	33	21	17	58	88	***0.52***	12	<0.1	<55	<170	<3	<0.015	M
EV10	4.9-5.9	<0.2	23	12	10	31	58	0.13	11	<0.1	<55	<170	<3	<0.015	L
EV11	Grab	<0.2	17	***69***	11	47	**350**	0.22	5.8	0.2	85	<170	<3	<0.015	H

Sample Location	Depth, m	Heavy Metals									Other Parameters				Sediment Category
		Cd	Cr	Cu	Ni	Pb	Zn	Hg	As	Ag	LMW PAH[1]	HMW PAH[2]	Total PCBs	TBT	
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/L	
EV12	Grab	0.3	28	***67***	18	55	**340**	0.27	9	0.3	<55	<170	<3	<0.015	H
EV13	0.0-0.9	<0.2	34	40	16	46	98	0.11	11	0.3	<55	<170	<3	<0.015	L
EV13	0.9-1.9	0.2	41	63	19	***89***	110	0.23	12	0.6	<55	<170	<3	<0.015	M
EV13	1.9-2.9	0.3	42	***79***	20	59	120	0.23	11	0.5	<55	<170	<3	<0.015	M
EV13	4.9-5.9	<0.2	17	7.2	8.1	19	40	0.27	10	<0.1	<55	<170	<3	<0.015	L
EV14	0.0-0.9	<0.2	36	27	19	65	95	0.49	***14***	0.1	<55	<170	<3	<0.015	M
EV14	0.9-1.9	0.2	35	27	17	60	100	0.38	***18***	0.2	<55	<170	<3	<0.015	M
EV14	1.9-2.9	<0.2	34	26	18	59	95	0.48	***15***	0.2	<55	<170	<3	<0.015	M
EV14	4.9-5.9	<0.2	32	19	17	42	78	***0.51***	11	<0.1	<55	<170	<3	<0.015	M
EV15	0.0-0.9	0.2	41	45	19	59	110	0.36	***13***	0.3	<55	<170	<3	<0.015	M
EV15	0.9-1.9	<0.2	32	25	18	57	92	**1.1**	***14***	***1.6***	<55	<170	<3	<0.015	H
EV15	1.9-2.9	<0.2	31	23	16	62	86	**1.6**	***14***	**2.9**	<55	<170	<3	<0.015	H
EV15	4.9-5.9	<0.2	16	7.9	8.4	36	38	**1.1**	7.9	1.0	<55	<170	<3	<0.015	H
EV16	0.0-0.9	0.2	32	28	16	61	100	**2.0**	***14***	**2.2**	<55	<170	<3	<0.015	H
EV16	0.9-1.9	<0.2	30	22	16	62	84	***0.55***	***13***	0.1	<55	<170	<3	<0.015	M
EV16	1.9-2.9	<0.2	32	25	17	61	89	**1.3**	***14***	0.5	<55	<170	<3	<0.015	H
EV16	4.9-5.9	<0.2	20	9	9.6	29	49	***0.69***	***14***	0.9	<55	<170	<3	<0.015	M
Average		0.24	30	42	15	52	128	**0.68**	12	0.76	<55[a]	<170[a]	<3	<0.015	M
ST1	Grab	0.3	43	50	22	43	110	<0.05	10	0.6	<55	<170	<3	<0.015	L
NS2	-	<0.1	33	31	20	37	94	0.09	10	<0.1	90	44	18	-	L
NS5	-	0.24	34.3	45.2	19	45	135.9	0.08	8.88	0.5	90	135.9	18	-	L

Notes:

The Underlined, bold and italic value indicates exccedance above LCEL

The Bold value with shaded area indicates exceedance above UCEL

1 Low molecular weight PAHs include acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthene.

2 High molecular weight PAHs include benzo[a]anthracene,benzo[a]pyrene, chrysene, dibenzo[a,h]anthracene, fluorantene, pyrene, benxo[b]fluoranthene, benxo[k]fluoranthene, indeno[1,2,3-c,d]pyrene and benzo[g,h,i]perylene

a the grab sample at EV4 is excluded in calculating the average due to its anomaly.

Table 4-1 Chemical Analysis Results of Marine Sediment at Yam O Wan and Reference Sediment

4.4.6 Based on the chemical test results and the requirements set out in ETWB TC (W) No. 34/2002, a composite sample was made up by mixing of 5 sediment layers of the Category M sediment for the biological screening test. The reasons for selecting these sediment layers are detailed in Table 4-2.

Sediment Location	Depth	Reasons for Selecting for Biological Screening Test
EV6	0.90 - 1.90	The concentration of arsenic exceeds LCEL and is the highest among the other layers of the same location. In addition, the concentrations of zinc and copper which are the main pollutants of paint are higher than those in sediment layer between 4.9m and 5.9m.
EV10	1.90 – 2.90	The concentration of mercury exceeds LCEL.
EV13	0.90 – 1.90	The concentration of lead exceeds LCEL.
EV13	1.90 – 2.90	The concentration of copper exceeds LCEL.
EV14	0.90 – 1.90	The concentration of arsenic exceeds LCEL and is the highest among the other layers of the same location.

Table 4-2 The Mixture of Composite Sediment Sample for Biological Screening Test for Category M Sediment

4.4.7 Table 4-3 presents the biological screening results. The marine sediment failed in 2 of 3 biological screening tests, resulting a "fail" condition in the overall results. This implies that if a marine disposal is required, confined marine disposal should be adopted. However, this Project will not involve any disposal of marine sediment as all dredged mud will be reused for backfilling on site.

Type of Composite Sample	Biological Screening Test			Overall Result
	10-day Amphipod	20-day Polychaete	48-hour Bivalve	
Category M	Pass	Fail	Fail	**Fail**

Table 4-3 Biological Test Results Summary

Marine Sediment at the Tsing Yi Site (Proposed New Site)

4.4.8 As shown in Table 4-4, 7 layers out of a total of 24 layers belong to Category M sediment due to the LCEL exceedance of copper, lead, mercury and high molecular weight PAHs. The locations with LCEL exceedances are at PV3, PV4, PV5 and PV6. This reveals that the marine sediment at the northeast of the Site is not contaminated.

4.4.9 The sediment results at EPD's seabed monitoring stations of WS1 and VS21 (Government Dockyard typhoon shelter) are included in Table 4-4 for comparison. The average sediment quality of the proposed site is similar to those at the adjacent seabed and at the Government Dockyard and for some of the parameters, the contaminant levels are even less.

Sample Location	Depth, m	Heavy Metals									Other Parameters				Sediment Category
		Cd	Cr	Cu	Ni	Pb	Zn	Hg	As	Ag	LMW PAH[1]	HMW PAH[2]	Total PCBs	TBT	
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/L	
PV1	0.0-0.9	<0.2	33	17	19	38	77	0.15	8.0	<0.1	<55	<170	<3	<0.015	L
PV1	0.9-1.9	<0.2	29	13	16	33	72	0.25	5.8	<0.1	<55	<170	<3	<0.015	L
PV1	1.9-2.9	<0.2	30	10	19	28	72	0.31	5.0	<0.1	<55	<170	<3	<0.015	L
PV1	4.9-5.9	<0.2	31	11	17	30	74	0.30	5.1	<0.1	<55	<170	<3	<0.015	L
PV2	0.0-0.9	<0.2	32	18	17	57	84	0.46	10	<0.1	<55	<170	<3	<0.015	L
PV2	0.9-1.9	<0.2	33	15	18	42	77	0.28	7.4	<0.1	<55	<170	<3	<0.015	L
PV2	1.9-2.9	<0.2	33	12	21	39	81	0.47	4.7	<0.1	<55	<170	<3	<0.015	L
PV2	4.9-5.9	<0.2	31	12	17	30	73	0.21	5.3	<0.1	<55	<170	<3	<0.015	L
PV3	0.0-0.9	0.4	35	***83***	17	***110***	120	0.48	9.4	0.5	140	***2840***	<3	<0.015	M
PV3	0.9-1.9	0.3	38	32	18	65	110	0.47	10	0.5	<55	<170	<3	<0.015	L
PV3	1.9-2.9	<0.2	33	17	18	48	83	0.35	8.1	0.2	<55	<170	<3	<0.015	L
PV3	4.9-5.9	<0.2	33	11	18	28	80	0.21	3.6	<0.1	<55	<170	<3	<0.015	L
PV4	0.0-0.9	0.3	39	40	18	73	130	0.39	10	0.4	<55	<170	<3	<0.015	L
PV4	0.9-1.9	<0.2	33	25	16	62	86	***0.90***	9.2	0.2	<55	<170	<3	<0.015	M
PV4	1.9-2.9	<0.2	33	18	17	***78***	79	0.40	7.4	0.2	<55	<170	<3	<0.015	M
PV4	4.9-5.9	<0.2	33	15	17	43	80	0.27	6.5	0.1	<55	<170	<3	<0.015	L
PV5	0.0-0.9	<0.2	35	42	18	***79***	92	0.39	8.3	0.4	<55	<170	<3	<0.015	M
PV5	0.9-1.9	<0.2	33	20	16	***78***	78	0.50	7.6	0.2	<55	<170	<3	<0.015	M
PV5	1.9-2.9	<0.2	30	11	15	28	74	0.11	4.1	0.1	<55	<170	<3	<0.015	L
PV5	4.9-5.9	<0.2	33	16	16	51	77	0.18	7.9	0.1	<55	<170	<3	<0.015	L
PV6	0.0-0.9	<0.2	31	17	14	59	78	***0.65***	8.6	0.2	<55	<170	<3	<0.015	M
PV6	0.9-1.9	<0.2	31	16	16	40	75	0.41	7.7	0.2	<55	<170	<3	<0.015	L
PV6	1.9-2.9	<0.2	32	12	18	32	79	0.25	4.8	0.2	<55	<170	<3	<0.015	L
PV6	4.9-5.9	<0.2	33	18	16	53	81	***0.55***	7.7	0.2	<55	<170	<3	<0.015	M
Average	-	0.3	33	21	17	51	84	0.37	7.2	0.25	<55[a]	<170[a]	<3	<0.015	L
ST1	Grab	0.3	43	50	22	43	110	<0.05	10	0.6	<55	<170	<3	<0.015	L
WS1	-	0.1	38	46	22	38	102	0.16	9.4	0.9	90	95	18	-	L
VS21	-	0.31	53.2	**127.9**	31.7	51.6	***210***	0.15	8.8	1.6	95.83	194.65	20.67	-	H

Notes:

The Underlined, bold and italic value indicates exccedance above LCEL

The Bold value with shaded area indicates exceedance above UCEL

1 Low molecular weight PAHs include acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthene.

2 High molecular weight PAHs include benzo[a]anthracene,benzo[a]pyrene, chrysene, dibenzo[a,h]anthracene, fluorantene, pyrene, benxo[b]fluoranthene, benxo[k]fluoranthene, indeno[1,2,3-c,d]pyrene and benzo[g,h,i]perylene

a the surface layer concentration at PV3 is excluded in the calculation due to its anomaly.

Table 4-4 Chemical Analysis Results of Marine Sediment at Tsing Yi

4.5 Impact Evaluation

Decommissioning at Yam O Wan

4.5.1 According to the decommissioning works described in Section 2, no marine sediment will be disposed of.

4.5.2 Nine new anchor blocks, which have been precasted in China, will be used for the installation of the Dock at the Tsing Yi site during the pre-anchoring stage. As a result, there will be nine surplus old anchor blocks at the existing site. These anchor blocks will be retrieved and reused in Hong Kong or China, and are not considered as waste.

4.5.3 The general refuse generated from the working vessels will be stored in containers and disposed of in accordance with Yiu Lian's existing waste management system.

4.5.4 No waste impact is anticipated from the decommissioning works.

Post-Decommissioning at Yam O Wan

4.5.5 There will be no waste impact at Yam O Wan after the relocation of the Dock.

Commissioning at Tsing Yi

4.5.6 According to the proposed construction method, no construction waste will be generated or disposed of. No marine sediment will be disposed of.

Operation at Tsing Yi

4.5.7 As there will be no change to the daily operation of Dock after relocation, the waste to be generated at the Tsing Yi site will be the same as that at the existing site. The management procedures after relocation will follow the current practice. Wastes to be generated at the Tsing Yi Site and their management are described below:

Chemical Wastes

4.5.8 Yiu Lian is registered as a chemical waste producer and follows waste handling procedures in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes for the operation activities at the Yam O Wan site. Any chemical waste produced on the Dock will be transported in an enclosed container to the chemical waste storage area located inside Yiu Lian's workshop on the southwestern coast of Tsing Yi. A license collector is employed for the collection of all the chemical wastes. All movements of chemical waste are monitored by Yiu Lian through a trip ticket system.

4.5.9 The main stream of chemical wastes to be generated on the Dock is spent oil. No surplus paints or solvent will be disposed of because the quantity of paints and solvent to be used is calculated by the paint suppliers based on the areas of exterior ship hull required for painting. Yiu Lian will use all paints and solvent ordered for the ship hulls such that no paint or solvent will be left over.

4.5.10 According to Yiu Lian's record, there is, on average, 2 tonnes of chemical wastes generated from their operation activities per year.

General Refuse

4.5.11 The general refuse generated on the Dock during its operation comprises food and drink containers, empty packaging, waste paper, used blasting sand and paint flakes. Containers are provided at different areas on the Dock for the collection of general refuse. The general refuse is removed by a licensed collector and disposed of to landfill sites on a daily basis.

4.5.12 As a canteen is provided for workers on the Dock, the volume of disposable food containers generated on the Dock is relative small. The main stream of waste is the used blasting sand, which is actually ash produced from the ash of copper refineries. The chemical composition of the ash varies from time to time, depending on the origin of the refinery. However, according to the supplier's record, the chemical content of the sand will normally consist of copper and oxides of silicon, iron, calcium aluminium and magnesium (Cu and SiO_2, Fe_2O_3, CaO, Al_2O_3 and MgO). Based on Yiu Lian's operation practice, workers are required to clean up the floor of the Dock after each of sand blasting activities to prevent any sand or paint flakes being washed into the sea.

4.5.13 After the relocation, a small amount of sludge primarily comprising of blasting sand and paint flakes will be generated from the new settling tank. With the nature similar to those generated from the sand blasting process, the sludge will be disposed of as general refuse in accordance with the existing waste management procedures.

4.5.14 Yiu Lian estimated that an average of 170 tonnes general refuse is generated from the Dock annually.

Waste from the Received Ships

4.5.15 All waste from ships received for maintenance will be collected by HKSAR Government and arranged by the ship owner, in accordance with established maritime practice.

4.6 Mitigation Measures

Decommissioning at Yam O Wan and Commissioning at Tsing Yi

4.6.1 The Contractor should be fully briefed of relevant Hong Kong ordinances and regulations regarding waste disposal and dumping at sea. Any illegal dumping in Hong Kong will constitute an offence. Measures such as provision of enclosed skips should be provided on the working vessels to prevent waste materials from being blown into the sea.

Post-Decommissioning at Yam O Wan

4.6.2 No mitigation measure is required.

Operation Stage at Tsing Yi

4.6.3 The existing waste management system implemented for the Dock at the Yam O Wan site is considered appropriate and applicable to the operation at the Tsing Yi site. However, good site practice and waste reduction measures described below are recommended for further improvement:

- Provision of training for workers on proper waste management and chemical waste handling procedures;
- Provision of sufficient numbers of waste disposal points;
- Nomination of an experienced and a dedicated staff to be responsible for good site practice and implementation of the waste management procedures;
- Undertaking regular cleansing of the Dock to prevent any waste being washed or blown into the sea;
- Provision of enclosed skips to prevent odour nuisance; and general refuse being blown into the sea; and
- Proper storage and handling procedures for paints, solvents and chemicals to prevent leakage.

4.7 Residual Impacts

4.7.1 With the implementation of the existing waste management procedures for the operation of the Dock and the recommended mitigation measures, there will be no residual impacts during the relocation or subsequent operation of the Dock.

4.8 Environmental Monitoring and Audit Requirements

4.8.1 Provided that the recommended good site practices are fully implemented, the environmental performance of the Project with respect to waste management will be acceptable. No environmental monitoring and audit is necessary.

4.9 Conclusions

4.9.1 The proposed relocation method will not involve the disposal of any marine sediment. Furthermore, the nature of the construction works will not generate excessive construction wastes and the environmental impact due to the waste generation during relocation will be minimal.

4.9.2 The existing waste management procedures for the Dock are considered appropriate and adequate. However, it is recommended to implement good site practice to further improve the environmental performance of the Dock.