TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 Background

Strategic Context: Airport City

1.1.1.1 Airport Authority Hong Kong (AAHK) first put forward its vision to transform Hong Kong International Airport (HKIA) into an Airport City in the "*From City Airport to Airport City*" report published in 2019. The Airport City vision envisages growing HKIA's position as the preeminent international aviation hub in Asia Pacific, while transforming HKIA into a new landmark and one of the key economic growth engines for Hong Kong. To realise the Airport City vision, AAHK has adopted a strategy to fully capitalise on the unique geographical advantage of HKIA and capture opportunities arising from the new infrastructures connected to the airport, such as the Hong Kong-Zhuhai-Macao Bridge (HZMB).

1.1.1.2 The commissioning of the HZMB in 2018 has greatly improved the connectivity between Hong Kong and cities in the Greater Bay Area (GBA), and further expand the catchment area of HKIA as the region's leading international hub. To meet the growing demand and extend the airport's reach, AAHK will continue to strengthen HKIA's capacity for passenger and cargo service, through the expansion into a Three-runway System and other capacity enhancement plans. In addition, AAHK is introducing a growing cluster of functional enhancements with a view to transforming the airport into a new landmark and attracting more visitors to the Airport City from within Hong Kong, the GBA and other parts of Asia. Such functional enhancements include SKYCITY, a major integrated development that comprises retail complexes, dining areas, hotels and entertainment facilities, as well as AsiaWorld-Expo (AWE) future developments and other related plans, with complementary infrastructural support and technological innovations.

1.1.1.3 The infrastructural support to the airport's capacity and functional enhancements includes, among others, a series of AAHK's recommendations for land uses on the Hong Kong Port (HKP) (formerly known as Hong Kong Boundary Crossing Facilities) Island of HZMB. The key project items include the building of automated car parks for transfer air passengers and visitors to Hong Kong travelling via HZMB, and an autonomous transportation system for visitors to travel between the HKP Island, SKYCITY and Tung Chung Town Centre. In addition, land parcels on the HKP Island have been reserved for the development of air cargo logistics. As announced in the Chief Executive's 2020 Policy Address, the HKSAR Government has accepted these proposals. It is also noted in the 2020 Policy Address that optimising the use of the land adjacent to the airport will not only provide more job opportunities and a better living environment for the expanding Tung Chung community, but also inject new development elements and economic impetus into the whole North Lantau.

1.1.1.4 Under the strategic context as discussed above, the Airport City Link Project (hereafter referred to as "the Project" is put forward to enhance the connectivity of Airport Island:

Enhancement of Connectivity

Airport Tung Chung Link – Autonomous Transportation System connecting Tung Chung

1.1.1.5 AAHK is taking forward the Airportcity Link (ACL) project, a purpose-built bridge on which a vehicular road and a pedestrian walkway will be provided to connect the HKP Island and SKYCITY. As an environmental initiative, ACL will only be served exclusively by AAHK's electric vehicles, such that there is no air pollutant emission during its operation. Non-AAHK vehicles are restricted from accessing the ACL. In the longer term, ACL will be served by AAHK's autonomous transportation

system. As the next step, an extension of the ACL's autonomous transportation system is being planned, called Airport Tung Chung Link (ATCL). ATCL, operated by AAHK, will run along the road on the eastern coast of the Airport Island to connect to Tung Chung Town Centre. With the use of zero emission vehicles (i.e. electric vehicles), and ultimately an autonomous transportation system (supported by zero emission autonomous vehicles) for the ATCL, the Airport Island will be seamlessly connected with the HKP Island and Tung Chung Town Centre in an environmentally-friendly manner.

Marine Facilities – SKYCITY Pier and Berthing Facilities

1.1.1.6 To the east of the Airport Island along the coast of SKYCITY, marine facilities will be provided in the area including a pier and berthing facilities to put the sea area into good use. These marine facilities would provide services for users to travel to the Airport or HKP Island. In other international airports such as the Singapore Changi Airport, there are similar sea access facilities near the airport for leisure and tourism, and transport where necessary.

1.1.1.7 A Project Profile (No. PP-623/2021) was submitted to the Environmental Protection Department (EPD) for application of an Environmental Impact Assessment (EIA) Study Brief under section 5(1)(a) of the Environmental Impact Assessment Ordinance (EIAO) and an EIA Study Brief (No. ESB-342/2021) for the Project was issued on 26 July 2021 under section 5(7)(a) of the EIAO.

1.1.1.8 On 21 September 2021, the Airport Authority Hong Kong appointed Meinhardt (Hong Kong) Ltd, to provide consultancy services for the Airport Tung Chung Link Project under Contract C21C04.

1.2 Description of Site Location of the Project

1.2.1.1 The Project is to construct and operate (i) the Airport Tung Chung Link (ATCL) to connect Hong Kong Port (HKP) Island and Tung Chung Town Centre; and (ii) marine facilities in the waters between Airport Island and HKP Island. The location of the Project is shown in **Figure 1.1** and the scope of works consists of:

ATCL

(a) Construction of about 3.8km long road with approximately 2,750m at-grade section, 810m land viaduct and 220m marine viaduct and a provision spur line of an approximate 1.2 km long connecting the planned Aviation Academy for future extension;

(b) Construction of 2-3 at grade and 1 elevated ATCL stations;

(c) Construction of a depot; and

(d) Realignment of existing Kwo Lo Wan Road and airport trail and other affected facilities, reprovision and diversion of affected utilities and construction of ancillary facilities such as walkways, footbridges, and plant room(s);

Marine Facilities

(e) Construction of a pier and berthing facilities with about 73 berths; and

(f) Construction of ancillary facilities including floating platforms, gangs, floating wave attenuator, guide piles, etc.

1.3 Designated Projects

1.3.1.1 The Project consists of the following designated projects under the following items of Part I, Schedule 2 of the EIAO:

- Item A.6(c) – A transport depot located less than 200 m from the nearest boundary of an existing or planned educational institution;
- Item A.8 – A road or railway bridge more than 100 m in length between abutments;
- Item C.12(b) – A dredging operation exceeding 500,000 m^3 or a dredging operation which is less than 100 m from a seawater intake point;
- Item C.3(a) – Reclamation works resulting in 5% decrease in cross sectional area calculated on the basis of 0.0mPD in a sea channel; and
- Item O.2 – A marina designed to provide moorings or dry storage for not less than 30 vessels used primarily for pleasure or recreation.

1.4 Objective of this Plan

1.4.1.1 In accordance with the requirements of Item 3 of Appendix E of EIA Study Brief (No. ESB-342/2021), the Applicant shall identify and estimate dredging/excavation, dredged/excavated sediment/mud transportation and disposal activities and requirements. Potential dumping ground to be involved shall also be identified. Appropriate field investigation, sampling and chemical and biological laboratory tests to characterise the sediment/mud concerned shall be conducted for marine disposal option. 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 shall be agreed with the Director of Environmental Protection (DEP) prior to the commencement of the tests.

1.4.1.2 This Sediment Sampling and Testing Plan (SSTP) is to present the above sediment sampling and testing requirements according to the Item 3 of Appendix E of the EIA Study Brief for DEP agreement. This SSTP is prepared with reference to the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers ADV-21 (PNAP ADV-21) - Management Framework for Disposal of Dredged/Excavated Sediment presented in **Appendix A**. This SSTP and the test results only serve the purpose of fulfilling the EIA Study for this Project under EIAO, and the findings from the sediment sampling and testing exercise will be used to assess the waste management implications associated with the sediment dredging/excavation under the EIA study. Should marine disposal of sediment be unavoidable upon exhaustion of reuse options, separate submissions should be submitted to EPD's Marine Dumping Control Section/ Territorial Control Office (TCO) when applying for the dumping permit under DASO. The rationale for sediment removal/ disposal will also need to be submitted to the MFC/ CEDD for agreement in accordance with PNAP ADV-21.

1.5 Rationale for Sediment Removal

1.5.1.1 The construction of piling foundation of the Tung Chung Central Station, East Coast Support Area (ECSA) South and North Stations and proposed depot, land viaduct near the proposed marine

facilities and marine viaduct near Tung Chung will involve in-situ bored piles which excavation of soil will be carried out. According to the GI record, marine deposits (silt/ clay) of approximately thickness 18m to 22m are found at those areas. Excavation at the proposed marine facilities might be necessary due to the increase of berthing depth for provision of future marine facilities. In addition, maintenance dredging will be conducted at marine facilities. Management options have been exhausted to keep the sediment in place, however, sediment excavation is deemed necessary. Nevertheless, details of the sediment reuse options will be explored during the EIA study before marine disposal. The anticipated commencement of the construction would be in early 2024/2025. The locations of the excavation areas are shown in **Figure 1.2**.

1.5.1.2 According to the project description of the EIA report (Section 4.2.2) of Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road (Register No.: AEIAR-144/2009), the reclamation of the at-grade road was based on rockfilling. Hence, sediment excavation is not anticipated at the at-grade road during construction works.

2 PROPOSED EXCAVATION AREA

2.1.1.1 The proposed excavation areas are located near Tung Chung Central Station, the land viaduct and marine viaduct near Tung Chung, ECSA South and North Stations and the proposed depot and the marine facilities and its nearby land viaduct. The locations of the proposed excavation areas are shown in **Figure 1.2**.

2.1.1.2 According to the existing GI information, the average seabed levels at the proposed excavated area range from -4.65mPD to -18.25mPD at the marine viaduct and land viaduct near Tung Chung Central Station and -15.80 to -30mPD at the land viaduct and marine facilities. The depth of excavation at marine facilities is approximately 1m from seabed level. In terms of the land viaduct and marine viaduct, as the footing of in-situ bored piles will be founded on rock-head under the marine sediment, the depth of excavated sediment is varied by the level of the rock-head. The actual level and amount of sediment to be excavated on-site will be estimated in the Sediment Quality Report (SQR) upon the completion of sampling and testing.

2.1.1.3 Sediment elutriate test will also be undertaken, as appropriate, to determine the potential of the release of sediment-bounded pollutants into the water column due to marine excavation at marine facilities and marine viaduct near Tung Chung Central Station. The proposed sampling and testing procedures required for the elutriate test are also included in this document.

3 REVIEW OF EXISTING INFORMATION

EIA Report – Study on Intermodal Transfer Terminal – Bonded Vehicular Bridge and Associated Roads (Register no.: AEIAR-216/2018)

3.1.1.1 Existing information has been reviewed in order to gain an understanding of the sediment quality at the proposed dredging area. With reference of previous approved EIA report – Intermodal Transfer Terminal – Bonded Vehicular Bridge and Associated Roads (Register no.: AEIAR-216/2018), sediment sampling has been conducted in 2018. Based on the sampling results, it is expected that the sediment contamination level in the vicinity of the proposed marine viaduct are Category L and Cetology M. The sampling locations and testing results are presented in **Appendix B.**

EIA Report – Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road (Register no.: AEIAR-144/2009)

3.1.1.2 Sediment sampling and testing works were carried out under the approved EIA report - Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road (Register No.: AEIAR-144/2009). Sediment samples were collected from 16 sampling locations for the proposed reclamation site of Hong Kong Boundary Crossing Facilities (HKBCF) and Hong Kong Link Road (HKLR) at the time of the EIA study. The sampling works were carried out in 2008 and 2009. The as-built locations and sediment quality data are shown in **Appendix C**.

3.1.1.3 Of the 16 sampling locations, 2 locations (viz. BCF/VC-A03 and BCF/VC-C11) were in close proximity of the proposed marine viaduct. Fourteen sediment samples from the 2 locations were tested and reported in the EIA Study for HZMB HKLR. Based on the laboratory testing results, 9 samples were classified as Category L and 5 samples as Category M. Amongst the 5 Category M samples, 3 samples had passed the biological test whereas the remaining 2 samples had failed the biological test. The laboratory testing results and the determined contamination categories and disposal types are shown in **Appendix C**.

EPD's Monitoring Data (2015 – 2019)

3.1.1.4 EPD conducts routine monitoring of the bottom sediment quality at 60 stations across the territory of Hong Kong waters. Among these 60 stations, Pillar Point (NS3) is the closest to the proposed marine works areas. Location and monitoring data of NS3 are shown in **Appendix D**.

3.1.1.5 Based on the available data, 10 sediment samples have been collected from NS3 between 2015 and 2019 (i.e. 2 samples per year). As summarised in Table 3.1, metals and organic contaminants were below the Lower Chemical Exceedance Level (LCEL). For metalloid (Arsenic), 4 of the 10 samples were detected with concentrations above the LCEL but below the Upper Chemical Exceedance Level (UCEL) Hence, out of the total 10 samples, 6 were classified as Category L and 4 were classified as Category M due to exceedance in Arsenic. It should be noted that there was no measurement of Tributyltin (TBT) of the sediment and no biological screening test was conducted.

Table 3.1: Summary of EPD Monitoring Data (2015 – 2019)

Contaminants	Lower Chemical Exceedance Level (LCEL)	Upper Chemical Exceedance Level (UCEL)	EPD's Monitoring Data [1]
Metals (mg/kg dry wt.)			
Cadmium (Cd)	1.5	4	<0.1 – 0.2
Chromium (Cr)	80	160	22-45
Copper (Cu)	65	110	17-51
Mercury (Hg)	0.5	1	0.06-0.14
Nickel (Ni)*	40	40	12-27
Lead (Pb)	75	110	28-53
Silver (Ag)	1	2	<0.2-0.4
Zinc (Zn)	200	270	83-160
Metalloid (mg/kg dry wt.)			
Arsenic	12	42	7.7-**16.0**
Organic-Polycyclic Aromatic Hydrocarbons (PAHs) (μg/kg dry wt.)			
Low Molecular Weight PAHs	550	3160	90-220
High Molecular Weight PAHs	1700	9600	30-120
Organic-non- Polycyclic Aromatic Hydrocarbons (PAHs) (μg/kg dry wt.)			
Total PCBs	23	180	18-18
Organometallics (μg TBT/L in Interstitial water)			
Tributyltin[1]	0.15	0.15	N/A [3]

Remarks:
1. Bold value denotes the contaminant level exceeds the LCEL but below the UCEL.
2. The contaminant level is considered to have exceeded the UCEL if it is greater than the value shown.
3. Sediment data is not available.

4 PROPOSED SEDIMENT SAMPLING AND TESTING

4.1 Sediment Sampling Locations

4.1.1.1 As revealed from the sediment quality data from previous studies as detailed in Section 3, the contamination level of the majority of sediment samples is expected to be low and moderate (i.e. Category L and M). As Category M sediment are expected, a 200m x 200m sampling grid arrangement with reference to paragraph 4(a) of memo issued by Development Bureau on 6 October 2010, "Control Measures for Management of Dredged/Excavated Contaminated Sediment" (ref: 0 in DevB(W) 515/83/04) will be adopted. The memo is presented in **Appendix E**.

4.1.1.2 With a grid size of 200m x 200m, 23 marine-based and land based sediment sampling locations are proposed. The locations of the proposed sampling locations are shown in **Figure 4.1** and summarised in **Table 4.1**.

Table 4.1: Proposed Sediment Sampling Locations

Sampling ID	Sampling Method	Sampling Depth	Coordinates	
			Easting	Northing
BHD1#	Dry rotary drilling	Seabed Level, 0.9m, 1.9m, 2.9m, thereafter 3m to the bottom of marine sediment or the base of the excavation level whichever is shallower	811995.97	816826.64
BHD2#			811850.71	816926.45
BHD3#			811733.39	817046.62
BHD4	Grab and vibrocore		811592.58	817116.92
BHD5#	Dry rotary drilling		811584.62	817253.69
BHD6#			811572.81	817533.98
BHD7#			811643.28	817746.43
BHD8#			811942.86	818272.90
BHD9#			812258.99	819336.76
BHD10#			812422.68	819366.82
BHD11#			812608.93	819461.62
BHD12#			812692.41	819599.59
BHD13#			811722.34	817932.04
BHD14#			811882.73	818096.70
BHD15#			811917.59	818489.45
BHD16#			811830.36	818713.59
BHD17#			811826.41	818904.69
BHD18#			811893.98	819076.00
BHD19#			812027.70	819241.18
BHE1			812513.54	819654.62

Sampling ID	Sampling Method	Sampling Depth	Coordinates	
			Easting	Northing
BHE2	Grab and vibrocore		812415.85	819553.74
BHE3			812314.95	819709.59
BHE4			812220.08	819546.08
Reference	Grab Sample	Seabed Level	850234.0	820057.0

Notes:

- Based on the existing data, the thickness of the marine deposit in the area is approximately 18m to 22m. As such, it is estimated that there will be approximately 9 to 10 vibrocore sub-samples for each sampling location (i.e. 0.9m, 1.9m, 2.9m, 5.9m, 8.9m, 11.9m, 14.9m, 17.9m, 20.9m and/or 23.9m).
- # represents the land-based sediment sampling.

4.1.1.3 Grab and vibrocore sampling will be adopted for marine-based sediment samples to collect a vertical profile of sediment samples. For reference sample(s) will be collected at Port Shelter (E850234, N820057) by grab sampling.

4.1.1.4 For land-based sediment samples, they will be collected using dry rotatory drilling method. An inspection pit of 1.5m deep will be formed to ensure the sampling location is free of metal or utilities obstruction. The concrete slab or road pavement will be removed (if any) before the actual fill material samples can be taken from underneath. U-100 sampler will be deployed for sediment sampling at all boreholes. Where U-100 sampler is deemed not suitable, e.g. due to unfavourable soil conditions, U76 or continuous mazier sampler will be used instead. No organic (carbon or petroleum based lubricants) or any kind of metal containing lubricants will be allowed for use as drilling bit lubricant. When required, only a minimum amount of clean fresh water will be used as lubricating medium in order to avoid sample contamination.

4.1.1.5 Modified Van Veen Grab (or equivalent) of capacity ~2L will be used to collect sediment samples at the seabed level. Vibrocore samples will be collected at 0.9m, 1.9m, 2.9m, and thereafter every 3m down to the bottom of the marine sediment or the base of the excavation level whichever is shallower.

4.1.1.6 All collected samples will be subjected to Tier II chemical screening. Certain samples which show exceedance of the chemical screening criteria will also be subjected to Tier III biological screening as detailed in **Section 4.2** below. Adequate samples will be collected for the chemical and biological screening tests. The recommended sample size is given in **Table 4.2**.

Table 4.2: Recommended Sample Size for Chemical and Biological Screening

Parameters to be Tested	Sample Size*
Metals and Metalloid	0.5 litre
Organic	0.5 litre
Biological Response	6 litre

*Quantity may be subjected to change as required by the testing laboratory. The quantity of reference sediment to be collected may vary.

4.2 Chemical and Biological Screening Tests

4.2.1.1 All sediment samples will undergo chemical screening where the samples will be tested for all the parameters stated in Table 1 – Analytical Methodology in Appendix B of PNAP ADV-21. The chemical screening parameters are shown in **Table 4.3**.

Table 4.3: Chemical Screening Parameters

Parameters	Preparation Method US EPA Method	Determination Method US EPA Method	Reporting Limit
Metals (mg/kg dry wt.)			
Cadmium (Cd)	3050B	6020A or 7000A or 7131A	0.2
Chromium (Cr)	3050B	6010C or 7000A or 7190	8
Copper (Cu)	3050B	6010C or 7000A or 7210	7
Mercury (Hg)	7471A	7471A	0.05
Nickel (Ni)	3050B	6010C or 7000A or 7520	4
Lead (Pb)	3050B	6010C or 7000A or 7420	8
Silver (Ag)	3050B	6020A or 7000A or 7761	0.1
Zinc (Zn)	3050B	6010C or 7000A or 7950	20
Metalloids (mg/kg dry wt.)			
Arsenic (As)	3050B	6010A or 7000A or 7061A	1
Organic-PAHs (µg/kg dry wt.)			
Low Molecular Weight PAHs+	3550B or 3540C and 3630C	8260B or 8270C	55
High Molecular Weight PAHs++	3550B or 3540C and 3630C	8260B or 8270C	170
Organic-non-PAHs (µg/kg dry wt.)			
Total PCBs+++	3550B or 3540C and 3665A	8082	3
Organometallics (µg TBT/L as interstitial water)			
Tributyltin	Krone et al (1989)* - GC/MS UNEP/IOC/IAEA**	Krone et al (1989)* - GC/MS UNEP/IOC/IAEA**	0.015

Notes:

[1] The reporting limits shown in this table are the most stringent limits which will be specified by Direction of Environmental Protection (DEP).

[2] Any methodology for which the laboratory is accredited that will produce equivalent or better results/ reporting limits as required may be used subject to approval by DEP.

\+ Low molecular weight PAHs include acenaphthene, acenaphthylene, anthracene, fluorine, naphthalene, and phenanthrene

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

+++ The reporting limit is for individual PCB congeners. Total PCBs include 2,4' diCB, 2,2',5 triCB, 2,4,4' triCB, 2,2',3,5' tetraCB, 2,2',5,5' tetraCB, 2,3',4,4' tetraCB, 3,3',4,4' tetraCB, 2,2',4,5,5' pentaCB, 2,3,3',4,4' pentaCB, 2,3',4,4',5 pentaCB, 3,3',4,4',5 pentaCB, 2,2',3,3',4,4' hexaCB, 2,2',3,4,4',5' hexaCB, 2,2',4,4',5,5' hexaCB, 3,3',4,4',5,5' hexaCB, 2,2',3,3',4,4',5 heptaCB, 2,2',3,4,4',5,5' heptaCB, 2,2',3,4',5,5',6 heptaCB (ref: the "summation" column of Table 9.3 of Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual (The Inland Testing Manual) published by USEPA).

* Krone et al. (1989), A method for analysis of butyltin species and measurement of butyltins in sediment and English Sole livers from Puget Sound, Marine Environmental Research 27 (1989) 1-18. Interstitial water to be obtained by centrifuging the sediment and collecting the overlying water.

** UNEP/ICO/IAEA refers to IAEA's Marine Environment Laboratory reference methods. These methods are available free of charge from UNEP/Water or Marine Environmental Studies Laboratory at IAEA's Marine Environment Laboratory. Interstitial water to be obtained by centrifuging the sediment and collecting the overlying water.

4.2.1.2 Based on the chemical screening results, sediment samples will be classified into either Category L, M or H sediment. The Chemical Exceedance Levels (CEL) specified in Appendix A of the PNAP ADV-

21 serves as the criteria for the categorization of the sediment samples and also determine the disposal requirements of the sediment and if biological testing is required. Descriptions of the 3 sediment categories are given below:

Category L	Sediment with all contaminant levels not exceeding the Lower Chemical Exceedance Level (LCEL). The material must be dredged, transported and disposed of in a manner, which minimizes the loss of contaminants either into solution or by resuspension.
Category M	Sediment with any one or more contaminant levels exceeding the Lower Chemical Exceedance Level (LCEL) and none exceeding the Upper Chemical Exceedance Level (UCEL). The material must be dredged and transported with care, and must be effectively isolated from the environment upon final disposal unless appropriate biological tests demonstrate that the material will not adversely affect the marine environment.
Category H	Sediment with any one or more contaminant levels exceeding the Upper Chemical Exceedance Level (UCEL). The material must be dredged and transported with great care, and must be effectively isolated from the environment upon final disposal.

4.2.1.3 The sediment quality criteria for the classification of sediment are shown in **Table 4.4**.

Table 4.4: Sediment Quality Criteria for the Classification of Sediment

Contaminants	**Lower Chemical Exceedance Level (LCEL)**	**Upper Chemical Exceedance Level (UCEL)**
Metals (mg/kg dry weight)		
Cadmium (Cd)	1.5	4
Chromium (Cr)	80	160
Copper (Cu)	65	110
Mercury (Hg)	0.5	1
Nickel (Ni)*	40	40
Lead (Pb)	75	110
Silver (Ag)	1	2
Zinc (Zn)	200	270
Metalloid (mg/kg dry weight)		
Arsenic (As)	12	42
Organic-PAHs (µg/kg dry weight)		
Low Molecular Weight PAHs	550	3160
High Molecular Weight PAHs	1700	9600
Organic-non-PAHs (µg/kg dry weight)		
Total PCBs	23	180
Organometallics (µg TBT/L in interstitial water)		
Tributyltin*	0.15	0.15

Note:
*The contaminant level is considered to have exceeded the UCEL if it is greater than the value shown.

4.2.1.4 Sediment classified as Category M will be subjected to biological screening. Sediment classified as Category H and with one or more contaminants levels exceeding 10 times the LCEL as specified in PNAP ADV-21 will also be subjected to biological screening but in a diluted manner (dilution test). **Table 4.5** presents the biological screening tests required and the preparation method for the dilution test is given in **Table 4.6**.

Table 4.5: Biological Screening Parameters

Toxicity Test	Endpoints Measured	Failure Criteria
10-day amphipod	Survival	Mean survival in test sediment is significantly different ($p \leq 0.05$)[1] from mean survival in reference sediment and mean survival in test sediment <80% of mean survival in reference sediment.
20-day polychaete worm	Dry Weight[2]	Mean dry weight in test sediment is significantly different ($p \leq 0.05$)[1] from mean dry weight in reference sediment and mean dry weight in test sediment <90% of mean dry weight in reference sediment.
48-96 hour larvae (bivalve or echinoderm)	Normality Survival[3]	Mean normality survival in test sediment is significantly different ($p \leq 0.05$)[1] from mean normality survival in reference sediment and mean normality survival in test sediment <80% of mean normality survival in reference sediment.

Notes:

[1] Statistically significant differences should be determined using appropriate two-sample comparisons (e.g., t-tests) at a probability of $p \leq 0.05$.

[2] Dry weight means total dry weight after deducting dead and missing worms.

[3] Normality survival integrates the normality and survival end points, and measures survival of only the normal larvae relative to the starting number.

Table 4.6: Preparation Method for Dilution Test

Sediment Characteristics	Preparation Method
Category H sediment (> 10 x LCEL)	Sample to be mixed with 9 portions of reference sediment
Category M sediment or Category H sediment (> 10 x LCEL) suspected of ammonia contamination	Additional set of sample (after dilution for Cat. H sediment) to be purged# for ammonia removal (for amphipod test only).

Note:

If the ammonia concentration in the overlying water of the test system is ≥ 20 mg/L, purging of sediment is required. This is performed by replacing the overlying water at a rate of 6 volume replacements/24 h for 24 hours, and repeated once only if the ammonia level still exceeds 20 mg/L.

4.2.1.5 Only ecologically relevant species should be used for carrying out the biological screening tests. The species to be used for each type of test are summarized in **Table 4.7**.

Table 4.7: Species to be used for Biological Screening Test

Test Types	Species	Reference Test Conditions*
10-day burrowing amphipod toxicity test	*Ampelisca abdita*	U.S.EPA(1994)/PSEP(1995)
	Leptocheirus plumulosus	U.S.EPA(1994)
	Eohaustorius estuarius	U.S.EPA(1994)/PSEP(1995)
20-day burrowing polychaete toxicity test	*Neanthes arenaceodentata*	PSEP(1995)
48-96 hour larvae (bivalve or echinoderm) toxicity test	*Bivalve:*	
	Mytilus spp.	PSEP(1995)
	Crassostrea gigas	PSEP(1995)
	Echinoderm :	
	Dendraster excentricus	PSEP(1995)
	Strongylocentrotus spp	PSEP(1995)

Notes:

* U.S.EPA (U.S. Environmental Protection Agency) 1994. Methods for assessing the toxicity of sediment-associated contaminants with estuarine and marine amphipods. Office of Research and Development. U.S. Environmental Protection Agency, Cincinnati, OH. EPA/600/R94/025.

PSEP (Puget Sound Estuary Program) 1995. Recommended guidelines for conducting laboratory bioassays on Puget Sound sediments.

4.3 Sample Handling and Storage

4.3.1.1 The sediment sampling process will be supervised by an on-site environmental specialist to ensure the sampling is carried out according to the requirements stipulated in PNAP ADV-21 and at the locations specified in this plan. All samples will be labelled with information for identification including station number, sample length, diameter and depth, sampling date and time, together with a full description of sample.

4.3.1.2 The recommended types of sampling bottle and pretreatment methods are shown in **Table 4.8**.

Table 4.8: Recommended Types of Sampling Bottle and Pretreatment Procedure

Parameters to be tested	Sampling bottle	Pretreatment Procedure#
Metals and Metalloid	High density polyethylene bottles*	USEPA SW-846+ Chapter 3
Organic	Wide mouth Borosilicate glass bottles with Teflon lined lid	USEPA SW-846 Chapter 4
Biological Response	Wide mouth Borosilicate glass bottles with Teflon lined lid or high density polyethylene bottles*	USEPA SW-846 Chapter 3 or Chapter 4 as appropriate.

* Heavy duty plastic bags may be used for the storage of sediment sample for testing metals, metalloid and biological response.

\# Other equivalent methods may be used subject to the approval of DEP.

\+ Test methods for evaluating solid waste: physical/chemical methods, SW-846, 3rd edition, United States Environmental Protection Agency.

4.3.1.3 The samples will be kept at 4°C in the dark and will not be frozen. All samples shall be promptly analysed within 24 hours after sampling. If this is not practical, the recommended maximum samples holding time is 2 weeks and 8 weeks for the chemical and biological screening tests respectively.

4.4 Elutriate Test

4.4.1.1 Preparation of elutriate test will be conducted in accordance with the Evaluation of Dredged Material proposed for Discharge in Waters of the US – Testing Manual (Inland Testing Manual), USEPA and USACE, 1998. The reference sediment and marine water samples will also be tested for comparison.

4.4.1.2 Six litres (6L) of marine water sample will be required for each elutriate test and blank test. The water samples will be collected from 1 m below the surface, mid-depth and 1 m above the seabed at each grab sampling location. Sufficient quantities of marine water will be collected by a water sampler prior to collection of the sediment samples to avoid disturbance to the seabed. Marine water collected on the same day will be composited on-site as one sample.

4.4.1.3 Elutriate samples will be prepared by sub-sampling approximately 1 L of sediment sample combined with unfiltered marine water collected on-site in a sediment-to-water ratio of 1:4 by volume in a pre-cleaned container in the laboratory. The mixture will be stirred for 30 minutes on a platform shaker. After stirring for 30 minutes, the mixture will be allowed to settle for 1 hour and the supernatant will then be siphoned off without disturbing the settled material. The decanted solution will be centrifuged to remove particulates prior to chemical analysis (approximately 2000 rpm for 30 min, until visually clear). Analytical methods and reporting limits are given in Table 4.8.

Table 4.8 Analytical Methods for Parameters of Elutriate Tests

Parameters		Instrument	Analytical Method	Reporting Limit
Inorganic chemical test (mg/kg dry weight)	Cd	ICP-MS	USEP A6020	0.1 µg/L
	Cr	ICP-MS	USEP A6020	1 µg/L
	Cu	ICP-MS	USEP A6020	1 µg/L
	Ni	ICP-MS	USEP A6020	1 µg/L
	Pb	ICP-MS	USEP A6020	1 µg/L
	Zn	ICP-MS	USEP A6020	10 µg/L
	Hg	ICP-MS	USEP A6020	0.05 µg/L
	As	ICP-MS	USEP A6020	1 µg/L
	Ag	ICP-MS	USEP A6020	1 µg/L
Organic Chemical Test	Total PAHs	GC-MSD	USEPA 8270C	3 µg/L
	Total PCBs	GC-ECD/ GC-MSD	USEPA 680 & USEPA 8270/8082	0.03 µg/L
	TBT	GC-MSD	USEPA 8323	0.015 µg/L
Ammonia		FIA	APHA 4500-NH3H	0.1 mg/L

Parameters		Instrument	Analytical Method	Reporting Limit
Nitrite as N		FIA	APHA 4500-NO3 I	0.05 mg-N/L
Nitrate as N		FIA	APHA 4500-NO3 I	0.05 mg-N/L
TKN as N		Kjeldahl	APHA 4500-Norg + NH3C	0.1 mg/LN/L
Total Phosphorus as P		Colorimetric	APHA 4500-P B&E	0.1 mg-P/L
Reactive Phosphorus as P		FIA	APAH 4500-P F	10 µg-P/L
Chlorinated Pesticides	Alpha-BHC Beta-BHC Gamma-BHC Delta-BHC Heptachlor Aldrin Heptachlor epoxide Endosulfan p,p'-DDT p,p-DDD p,p-DDE Endoselfan sulfate	GC-MSD/ GC-ECD	USEPA 3510C, 3620B, 8270C, 8081A	0.1 µg/L (individually)

Notes:

(1) Low molecular weight PAHs include acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene High molecular weight PAHs include benzo[a]anthracene, benzo[a]pyrene, chrysene, dibenzo[a,h]anthracene, fluoranthene, pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, indeno[1,2,3-c,d]pyrene and benzo[g,h,i]perylene

(2) The reporting limit is for total PCB including all 209 congeners.

4.5 QA/QC Requirements

4.5.1.1 All sampling tools would be cleaned thoroughly before and after each sampling using phosphate-free detergent to minimize chance of cross contamination. Disposable latex gloves would be worn to prevent the transfer of contaminants from other sources when handling the samples. Disposable accessories, such as latex gloves, would be discarded properly after use.

4.5.1.2 The sediment samples collected, as mentioned in Section 4.3, will be labelled with information for identification and will be delivered to laboratory for testing within 24 hours of collection. All samples will be handled under the chain of custody protocol using the form “Record of Sediment Sampling & Collection under ETWB TC(W) No. 34/2002/ PNAP 252” which will detail all information

relevant to the samples including sample IDs, sample locations, date and time of sampling, method of collection, testing required, etc.

4.5.1.3 All tests will be conducted by laboratories accredited by Hong Kong Laboratory Accreditation Scheme (HOKLAS). Laboratory QA/QC requirements, including method blank, sample duplicates, method analyte spike, negative/ positive control for biological test, etc. will be strictly complied with.

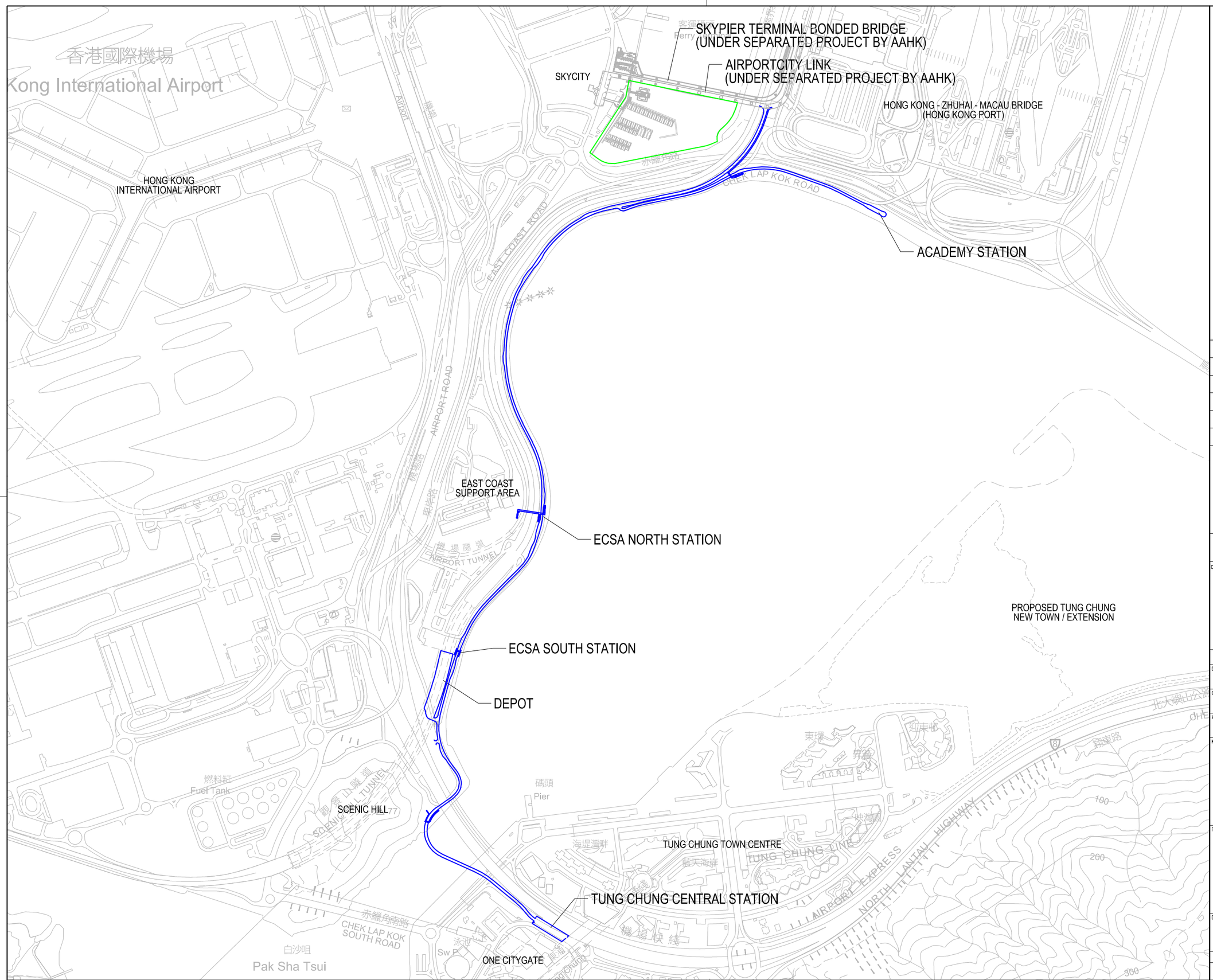
4.5.1.4 Field logs will be kept for all on-site sampling works with details including as-built sampling locations, sampling date, site activities and observations. Any deviation from the standard procedures and reasons will be recorded in the logs.

4.6 Tentative Programme of Sediment Sampling and Testing

4.6.1.1 The sediment sampling and testing exercise is anticipated to commence in late Q2 of 2022 for completion in Q3 2022. The tentative schedule is summarized below:

Tasks	Tentative Schedule
Sediment Sampling	late Q2 to Q3 2022
Chemical screening tests and Preliminary Sediment Quality Report (PSQR)	Q3 2022
Biological screening tests (if required)	Q3 2022
Submission of Sediment Quality Report (SQR)	Q3 2022

FIGURES



LEGEND

PROPOSED ALIGNMENT OF AIRPORT TUNG CHUNG LINK

PROPOSED MARINE FACILITIES

Rev	Date	Descriptions	Check

香港國際機場 HONG KONG INTERNATIONAL AIRPORT

HONG KONG INTERNATIONAL AIRPORT

Consultant

MEINHARDT in association with OTC ERM

Consultant's Signatures for Approval	Date
Design Supervisor	
Checkers	
Authorised Representative	

Key Plan

N

Title

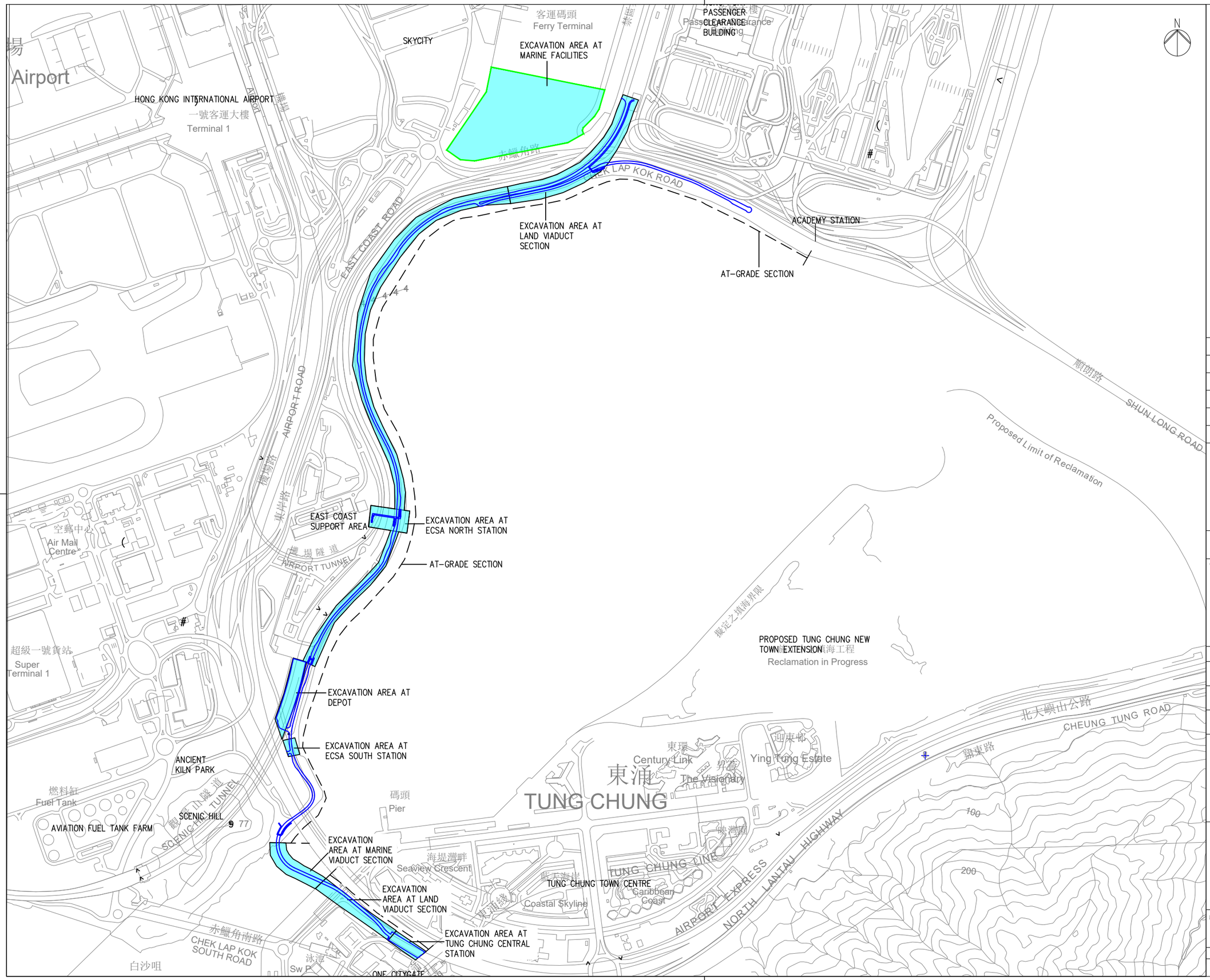
AIRPORT TUNG CHUNG LINK PROJECT

LOCATION OF PROJECT

Drawing No.

FIGURE 1.1

Originator	Location	Discipline	Typo	Dwg Sequence No.
Status Design		Scale 1 : 12000 (A3)		Rev Design



LEGEND

- PROPOSED MARINE FACILITIES
- PROPOSED ALIGNMENT OF AIRPORT TUNG CHUNG LINE
- SEDIMENT EXCAVATION AREA

Rev	Date	Descriptions	Check

香港國際機場 HONG KONG INTERNATIONAL AIRPORT

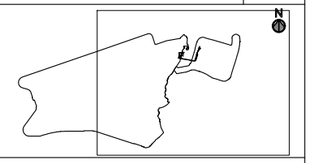
HONG KONG INTERNATIONAL AIRPORT

Consultant

MEINHARDT in association with OTC ERM

Consultant's Signatures for Approval	Date
Design Supervisor	
Checkers	
Authorised Representative	

Key Plan



Title

AIRPORT TUNG CHUNG LINK PROJECT
SEDIMENT EXCAVATION AREA

Drawing No.

FIGURE 1.2

Originator	Location	Discipline	Typo	Dwg Sequence No.
Status: Design		Scale: As shown		Rev

A:\Projects Current\ENVIRON\91788 C21C04 ATCL (AAHK)\Report\01 SSTP\EIA\Figure\source\Fig 1.2_27062022.dwg

香港國際機場
ng International Airport

HONG KONG INTERNATIONAL AIRPORT
一號客運大樓
Terminal 1

SKYCITY

客運碼頭
Ferry Terminal

BRIDGE HONG KONG PORT PASSENGER CLEARANCE BUILDING

禁區界線

BHE 1
BHE 2
BHE 3
BHE 4

BHD1 BHD2 BHD3 BHD4 BHD5 BHD6 BHD7 BHD8 BHD9 BHD10 BHD11 BHD12 BHD13 BHD14 BHD15 BHD16 BHD17 BHD18 BHD19

EAST COAST ROAD

CHEK LAP KOK ROAD

ACADEMY STATION

AIRPORT ROAD

機場路

東岸路

機場隧道
AIRPORT TUNNEL

空運中心
Air Mail Centre

超級一號貨站
Super Terminal 1

航空貨運站
Cargo Terminal

空運中心
Airport Freight Forwarding Centre

燃料缸
Fuel Tank

AVIATION FUEL TANK FARM

ANCIENT KILN PARK

SCENIC HILL

翔山小隧道
SCENIC HILL TUNNEL

碼頭
Pier

海堤灣畔
Seaview Crescent

TUNG CHUNG TOWN CENTRE

Coastal Skyline

Caribbean Coast

TUNG CHUNG LINE

AIRPORT EXPRESS

NORTH LANTAU HIGHWAY

機場快線

東涌
TUNG CHUNG

Century Link

The Visionary

Ying Tung Estate

映灣園

迎東邨

翔東路

北大嶼山公路
CHEUNG TUNG

赤鱲角南路
CHEK LAP KOK SOUTH ROAD

白沙咀
Pak Sha Tsui

泳灘
Sw P

Proposed Limit of Reclamation

擬定之填海界限

PROPOSED TUNG CHUNG NEW TOWN EXTENSION 填海工程
Reclamation in Progress

TYPE	Sampling ID	COORDINATE (m)	
		EASTING	NORTHING
SEDIMENT SAMPLING LOCATION	BHD1	811995.97	816826.64
	BHD2	811850.71	816926.45
	BHD3	811733.39	817046.62
	BHD4	811592.58	817116.92
	BHD5	811584.62	817253.69
	BHD6	811572.81	817533.98
	BHD7	811643.28	817746.43
	BHD8	811942.86	818272.90
	BHD9	812258.99	819336.76
	BHD10	812422.68	819366.82
	BHD11	812608.93	819461.62
	BHD12	812692.41	819599.59
	BHD13	811722.34	817932.04
	BHD14	811882.73	818096.70
	BHD15	811917.59	818489.45
	BHD16	811830.36	818713.59
	BHD17	811826.41	818904.69
	BHD18	811893.98	819076.00
	BHD19	812027.70	819241.18

TYPE	Sampling ID	COORDINATE (m)	
		EASTING	NORTHING
SEDIMENT SAMPLING LOCATION	BHE1	812513.54	819654.62
	BHE2	812415.85	819553.74
	BHE3	812314.95	819709.59
	BHE4	812220.08	819546.08

LEGEND

- PROPOSED MARINE FACILITIES
- PROPOSED ALIGNMENT OF AIRPORT TUNG CHUNG LINE
- BHD1 SEDIMENT SAMPLING LOCATION

Rev	Date	Description	Check

香港國際機場 HONG KONG INTERNATIONAL AIRPORT

HONG KONG INTERNATIONAL AIRPORT

Consultant

MEINHARDT in association with OTC ERM

Consultant's Signatures for Approval	Date
Design Supervisor	
Checkers	
Authorised Representative	

Key Plan

Title

AIRPORT TUNG CHUNG LINK PROJECT
PROPOSED SEDIMENT SAMPLING LOCATIONS

Drawing No.

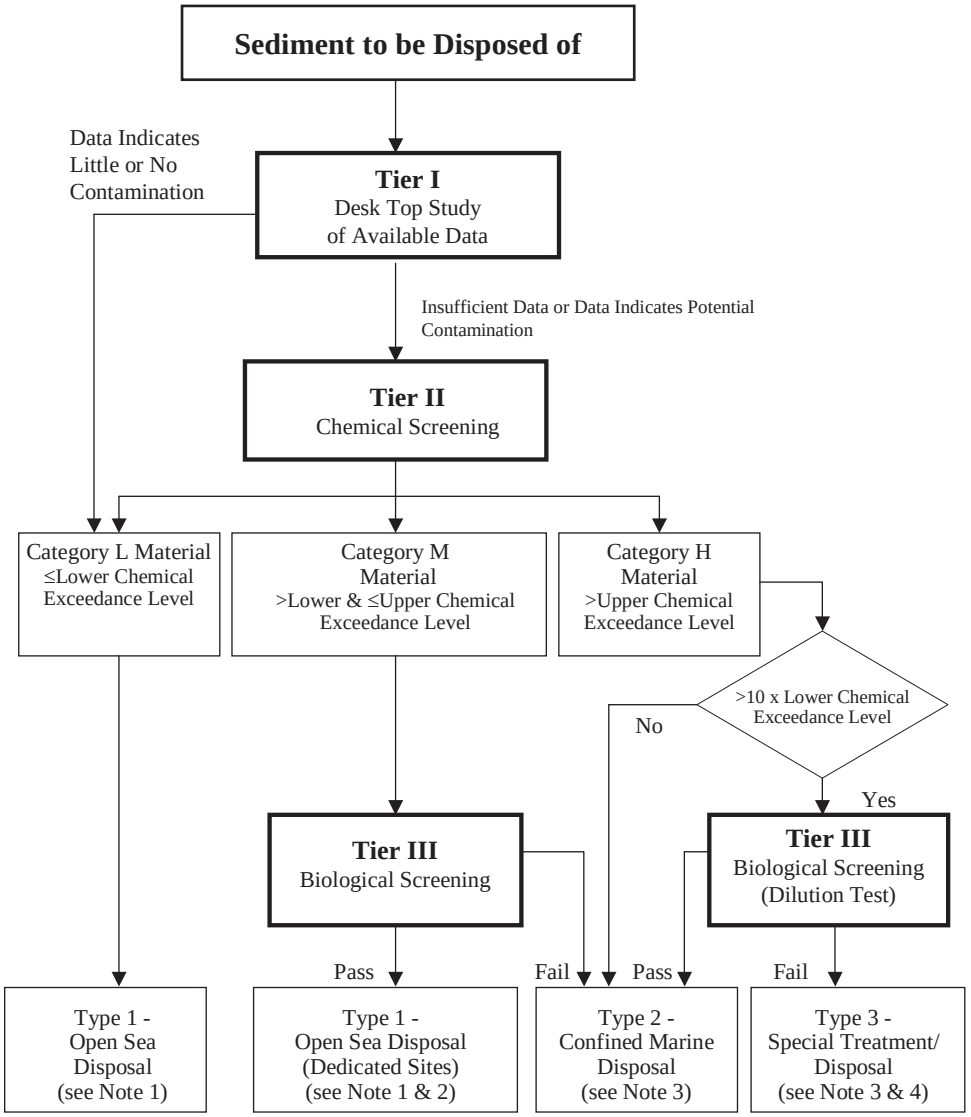
FIGURE 4.1

Originator	Location	Discipline	Typo	Dwg Sequence No.
Status Design		Scale As shown		Rev

APPENDIX A

Management Framework for Excavated Sediment

Management Framework for Dredged/Excavated Sediment



Notes

(1) Most open sea disposal sites are multi-user facilities and as a consequence their management involves a flexibility to accommodate varying and unpredictable circumstances. Contract documents should include provisions to allow the same degree of flexibility should it be necessary to divert from one disposal site to another during the construction period of a contract.

(2) Dedicated Sites will be monitored to confirm that there is no adverse impact.

(3) For sediment requiring Type 2 or Type 3 disposal, contract documents should state the allocation conditions of MFC and DEP. At present, East Sha Chau mud pits are designated for confined marine disposal.

(4) If any sediment suitable for Type 3 disposal (Category H sediment failing the biological dilution test) is identified, it is the responsibility of the AP/RSE, in consultation with DEP, to identify and agree with him/her, the most appropriate treatment and/or disposal arrangement. Such a proposal is likely to be very site and project specific and therefore cannot be prescribed. This will not preclude treatment of this sediment to render it suitable for confined marine disposal.

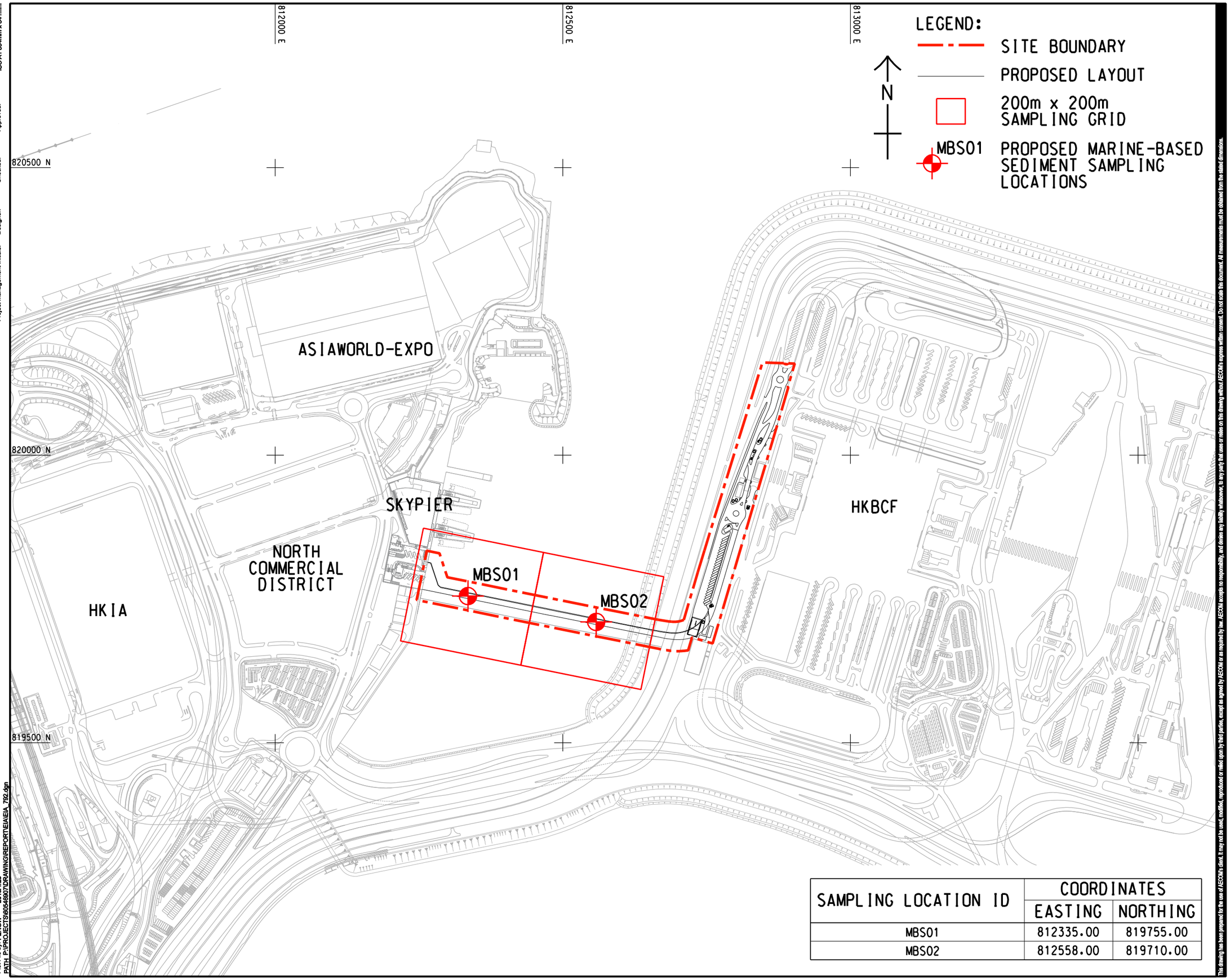
(5) The allocation of disposal space may carry a requirement for the project proponent to arrange for chemical analysis of the sediment sampled from 5% of the vessels en-route to the disposal site. For Category M and certain Category H sediment, the chemical tests will be augmented by biological tests. Vessel sampling will normally entail mixing five samples to form a composite sample from the vessel and undertaking laboratory tests on this composite sample. All marine disposal sites will be monitored under the general direction of the Civil Engineering and Development Department. However, exceptionally large allocations might require some additional disposal site monitoring. These will be stipulated at the time of allocation.

(6) Trailer suction hopper dredgers disposing of sediment at East Sha Chau must use a down-a-pipe disposal method, the design of which must be approved in advance by DCE. The dredging contractor must provide equipment for such disposal.

(Rev. 1/2003)

APPENDIX B

Marine Sediment Sampling Location and Testing Results (extracted from the EIA Report – Intermodal Transfer Terminal – Bonded Vehicular Bridge and Associated Roads)



SAMPLING LOCATION ID	COORDINATES	
	EASTING	NORTHING
MBS01	812335.00	819755.00
MBS02	812558.00	819710.00

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: PENGW 2018/1/23
PATH : P:\PROJECTS\60546907\DRAWING\REPORT\EIA\EIA_792.dgn

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AECOM

PROJECT
項目

INTERMODAL TRANSFER TERMINAL - BONDED VEHICULAR BRIDGE AND ASSOCIATED ROADS

CLIENT
業主

香港機場管理局 AIRPORT AUTHORITY HONG KONG

CONSULTANT
工程顧問公司

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

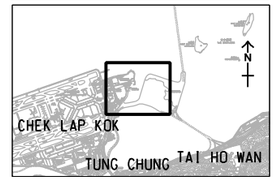
I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 核查

STATUS
狀況

SCALE 比例
A3 1 : 6000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN 索引圖 A3 1 : 200000



PROJECT NO. 項目編號
60546907

AGREEMENT NO. 協議編號
C17C03

SHEET TITLE
圖紙名稱

PROPOSED MARINE-BASED SEDIMENT SAMPLING LOCATIONS

SHEET NUMBER
圖紙編號

FIGURE 4.1

Appendix 6.1 - Summary of Chemical Screening Result and Disposal Options

		Sub-sample Depth (mPD)		Sub-sample Depth (m bgl)		LMW PAHs[1]	HMW PAHs[2]	Total PCB[3]	Cd	Cr	Cu	Ni	Pb	Zn	Hg	As	Ag	TBT				
Sampling ID	**Sampling Date**	**From**	**To**	**From**	**To**	µg/kg	µg/kg	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	Overall Classification	Sample require Biological Test?	Biological Test Pass?	Disposal Option[5]
LCEL						550	1700	23	1.5	80	65	40	75	200	0.5	12	1	0.15				
UCEL						3160	9600	180	4	160	110	40	110	270	1	42	2	0.15				
MBS02#1	3/12/2018	-3.94	-4.84	0.00	0.90	<55	<75	<23	<0.2	30	27	19	40	96	0.12	14	0.3	<0.015	Category M	Yes	Pass	Type 1*
MBS02#3	3/12/2018	-4.84	-5.84	0.90	1.90	<55	<75	<23	<0.2	31	26	20	39	92	0.10	13	0.3	<0.015	Category M	Yes	Pass	Type 1*
MBS02#5	3/12/2018	-5.84	-6.84	1.90	2.90	<55	<75	<23	<0.2	28	12	19	27	73	<0.05	7	<0.1	<0.015	Category L	No	NA	Type 1
MBS02#7	3/12/2018	-6.84	-7.84	2.90	3.90	<55	<75	<23	<0.2	30	13	20	28	75	<0.05	7	0.1	<0.015	Category L	No	NA	Type 1
MBS02#13	3/12/2018	-9.94	-10.84	6.00	6.90	<55	<75	<23	<0.2	27	11	18	29	69	<0.05	7	<0.1	<0.015	Category L	No	NA	Type 1
MBS02#19	3/12/2018	-12.84	-13.84	8.90	9.90	<55	<75	<23	<0.2	30	12	19	29	70	<0.05	7	<0.1	<0.015	Category L	No	NA	Type 1
MBS02#25	3/12/2018	-15.94	-16.84	12.00	12.90	<55	<75	<23	<0.2	27	14	16	34	63	<0.05	12	0.1	<0.015	Category L	No	NA	Type 1
MBS02#31	3/12/2018	-18.84	-19.84	14.90	15.90	<55	<75	<23	<0.2	26	13	14	38	65	<0.05	14	0.1	<0.015	Category M	Yes	Pass	Type 1*
MBS01#1	3/13/2018	-4.55	-5.45	0.00	0.90	<55	<75	<23	<0.2	35	34	22	47	107	0.14	14	0.5	<0.015	Category M	Yes	Pass	Type 1*
MBS01#3	3/13/2018	-5.45	-6.45	0.90	1.90	<55	<75	<23	<0.2	29	21	18	37	76	0.06	12	0.2	<0.015	Category L	No	NA	Type 1
MBS01#5	3/13/2018	-6.45	-7.45	1.90	2.90	<55	<75	<23	<0.2	30	13	19	28	73	<0.05	9	<0.1	<0.015	Category L	No	NA	Type 1
MBS01#7	3/13/2018	-7.45	-8.45	2.90	3.90	<55	<75	<23	<0.2	28	12	19	28	71	<0.05	8	<0.1	<0.015	Category L	No	NA	Type 1
MBS01#13	3/13/2018	-10.55	-11.45	6.00	6.90	<55	<75	<23	<0.2	29	12	19	29	71	<0.05	7	<0.1	<0.015	Category L	No	NA	Type 1
MBS01#19	3/13/2018	-13.45	-14.45	8.90	9.90	<55	<75	<23	<0.2	29	12	19	29	70	<0.05	8	<0.1	<0.015	Category L	No	NA	Type 1
MBS01#25	3/13/2018	-16.55	-17.45	12.00	12.90	<55	<75	<23	<0.2	15	7	8	31	36	<0.05	7	<0.1	<0.015	Category L	No	NA	Type 1
Reference Sample	3/19/2017	Surface		Surface		<55	<75	<23	<0.2	29	14	19	34	74	<0.05	7	0.7	<0.015	Category L	No	NA	Type 1

Notes:

1. LMW PAHs - Low molecular weight PAHs included acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene and phenanthrene.
2. HMW PAHs - High molecular weight PAHs included benzo[a]anthracene, benzo[a]pyrene, chrysene, dibenzo[a,h]anthracene, flouranthene, pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, indeno[1,2,3-c,d]pyrene and benzo[g,h,i]perylene.
3. Total PCBs includes 2,4' diCB, 2,2,'5 triCB, 2,4,4'triCB, 2,2'3,5' tetraCB, 2,2',5,5' tetraCB, 2,3',4,4' tetraCB, 3,3'4,4' tetraCB, 2,2',4,5,5' pentaCB, 2,3,3',4,4' pentaCB, 2,3'4,4',5 pentaCB, 3,3'4,4'5 pentaCB, 2,2',3,3',4,4' hexaCB, 2,2',3,4,4',5' hexaCB, 2,2',4,4',5,5' hexaCB, 3,3',4,4',5,5' hexaCB, 2,2',3,3',4,4',5 heptaCB, 2,2',3,4,4',5,5' heptaCB, 2,2',3,4',5,5',6 heptaCBpyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, indeno[1,2,3-c,d]pyrene and benzo[g,h,i]perylene.
4. Type 1: Open Sea Disposal
   Type 1*: Open Sea Disposal (Dedicated Site)
   Type 2: Confined Marine Disposal
   Type 3: Special Treatment / Disposal

^ Underlined value indicates exceedance of LCEL.
Bolded value indicates exceedance of UCEL.
Bolded and underlined value indicates that the value exceeds 10 times of LCEL.
NA: Not Applicable

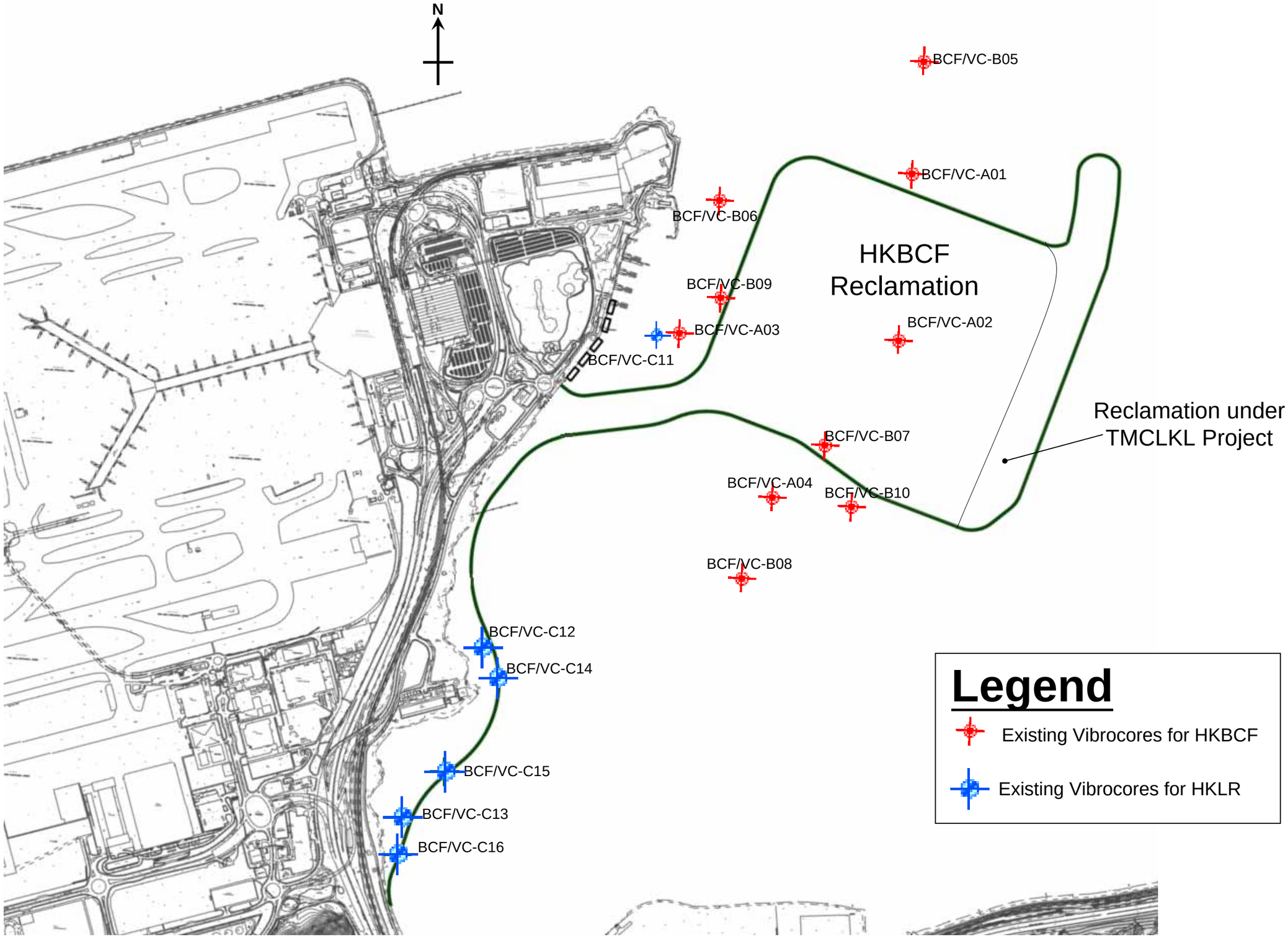
Appendix 6.2 - Summary of Biological Screening Results

Sampling Location ID	Sampling Depth (m bgl)	Category	Sampling Date	Test Result			
				10-Day Amphipod	20-Day Polychaete	48-60 hour Bivalve*	Overall
MBS01	0.00 to 0.90	M	13/03/2018	Pass	Pass	Pass	Pass
MBS02	0.00 to 0.90	M	12/03/2018	Pass	Pass	Pass	Pass
	0.90 to 1.90	M	12/03/2018	Pass	Pass	Pass	Pass
	14.90 to 15.90	M	12/03/2018	Pass	Pass	Pass	Pass

* The 48-60 hour bivalve toxicity test conducted for the samples complies with requirement for 48-96 hour larvae (bivalve or echinoderm) toxicity test as stated in ADV-21.

APPENDIX C

As-Built Sampling Locations and Relevant Sediment Quality Data (extracted from the EIA Report – HZMB HKLR)



路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處
Hong Kong - Zhuhai - Macao Bridge
Hong Kong Project Management Office

ARUP
奧雅納工程顧問
Ove Arup & Partners
Hong Kong Limited

Drawing Title

Locations of Existing Vibrocores for the Reclamation of HKBCF and HKLR

Drawing No.

Figure 7.2

Table 7-10 Sediment Chemical Quality Data and Proposed Biological Composite Schedule

Sample	Sampling Location	Sampling Depth below Seabed (m)	Metals (mg/kg)								Metalloid (mg/kg)	Organic-PAHs (µg/kg)		Organic-non-PAHs (µg/kg)	Organo-metallics (µg/L in pore water)	Classification under ETWBTC (Works) No. 34/2002	Biological Screening
			Cd	Cr	Cu	Hg	Ni	Pb	Ag	Zn	As	LMW PAH	HMW PAH	Total PCBs	TBT		
HKBCF																	
Sample in 2008	A01	0.05 - 0.9	<0.20	37	26	0.24	23	48	<0.10	84	15	<55	<170	<3.0	<0.015	Category M	√
	A01	0.9 – 1.9	<0.20	35	22	0.22	22	43	<0.10	78	14	<55	<170	<3.0	<0.015	Category M	√
	A01	1.9 – 2.9	<0.20	35	21	0.13	23	41	<0.10	80	13	<55	<170	<3.0	<0.015	Category M	√
	A01	4.9 – 5.9	<0.20	27	11	0.07	17	29	<0.10	68	7.8	<55	<170	<3.0	<0.015	Category L	N/A
	A01	7.9-8.9	0.21	29	14	0.09	16	44	<0.10	75	16	<55	<170	<3.0	<0.015	Category M	√
	A01	9.9-10.8	0.32	33	12	0.06	16	84	<0.10	70	12	<55	<170	<3.0	<0.015	Category M	√
	A02	0.2-0.9	<0.20	29	12	0.07	20	33	<0.10	74	8.0	<55	<170	<3.0	<0.015	Category L	NA
	A02	0.9-1.9	<0.20	34	13	0.07	23	34	<0.10	84	7.9	<55	<170	<3.0	<0.015	Category L	NA
	A02	1.9-2.9	<0.20	31	13	0.08	21	32	<0.10	80	7.1	<55	<170	<3.0	<0.015	Category L	NA
	A02	2.9-39	<0.20	30	12	0.07	20	32	<0.10	75	7.1	<55	<170	<3.0	<0.015	Category L	NA
	A02	4.9-5.9	<0.20	29	12	0.07	19	31	<0.10	72	7.7	<55	<170	<3.0	<0.015	Category L	NA
	A02	7.9-8.9	<0.20	29	13	0.08	19	32	<0.10	69	6.7	<55	<170	<3.0	<0.015	Category L	NA
	A02	12.0-12.9	<0.20	32	13	0.07	21	36	<0.10	78	7.2	<55	<170	<3.0	<0.015	Category L	NA
	A02	14.9-15.9	<0.20	30	14	0.07	16	45	<0.10	72	13	<55	<170	<3.0	<0.015	Category M	√
	A02	16.9-17.9	0.26	29	14	0.07	16	44	<0.10	74	15	<55	<170	<3.0	<0.015	Category M	√
	A03	0.2-0.9	<0.20	34	29	0.15	22	49	0.21	100	11.9	<55	<170	<3.0	<0.015	Category L	NA
	A03	0.9-1.9	<0.20	29	14	0.09	19	33	<0.10	75	8.0	<55	<170	<3.0	<0.015	Category L	NA
	A03	1.9-2.9	<0.20	30	12	0.07	20	32	<0.10	77	6.1	<55	<170	<3.0	<0.015	Category L	NA
	A03	4.9-5.9	<0.20	29	12	0.07	19	33	<0.10	72	6.3	<55	<170	<3.0	<0.015	Category L	NA
	A03	7.9-8.9	<0.20	34	14	0.08	23	36	<0.10	81	7.4	<55	<170	<3.0	<0.015	Category L	NA
	A03	12.0-12.9	<0.20	31	15	0.07	20	43	<0.10	78	14	<55	<170	<3.0	<0.015	Category M	√
	A03	14.9-15.9	0.27	29	14	0.08	16	42	<0.10	70	15	<55	<170	<3.0	<0.015	Category M	√
	A03	15.9-16.35	<0.20	30	13	0.05	9.3	39	<0.10	48	15	<55	<170	<3.0	<0.015	Category M	√

Sample	Sampling Location	Sampling Depth below Seabed (m)	Metals (mg/kg)								Metalloid (mg/kg)	Organic-PAHs (µg/kg)		Organic-non-PAHs (µg/kg)	Organo-metallics (µg/L in pore water)	Classification under ETWBTC (Works) No. 34/2002	Biological Screening
			Cd	Cr	Cu	Hg	Ni	Pb	Ag	Zn	As	LMW PAH	HMW PAH	Total PCBs	TBT		
	A04	0.0-0.9	<0.20	32	11	0.05	23	27	<0.10	72	8.0	<55	<170	<3.0	<0.015	Category L	NA
	A04	0.9-1.9	<0.20	34	13	0.06	24	32	<0.10	81	9.2	<55	<170	<3.0	<0.015	Category L	NA
	A04	1.9-2.9	<0.20	34	14	0.06	24	33	<0.10	80	6.7	<55	<170	<3.0	<0.015	Category L	NA
	A04	2.9-3.9	<0.20	33	13	0.05	23	31	<0.10	77	6.7	<55	<170	<3.0	<0.015	Category L	NA
	A04	4.9-5.9	<0.20	30	13	0.06	22	34	<0.10	77	5.9	<55	<170	<3.0	<0.015	Category L	NA
	A04	7.9-8.9	<0.20	34	14	0.09	22	36	<0.10	80	6.7	<55	<170	<3.0	<0.015	Category L	NA
	A04	12.15-12.9	<0.20	33	14	0.08	22	35	<0.10	77	6.6	<55	<170	<3.0	<0.015	Category L	NA
	A04	14.9-15.9	<0.20	31	14	0.08	20	37	<0.10	70	11	<55	<170	<3.0	<0.015	Category L	NA
	A04	18.05-18.9	0.20	33	16	0.08	20	44	0.11	82	14	<55	<170	<3.0	<0.015	Category M	√
	B05	0.25-0.9	0.20	39	31	0.28	26	50	0.12	90	17	<55	<170	<3.0	<0.015	Category M	√
	B05	0.9-1.9	0.20	41	32	0.25	28	48	0.11	91	17	<55	<170	<3.0	<0.015	Category M	√
	B05	1.9-2.9	<0.20	38	24	0.16	25	44	0.11	83	15	<55	<170	<3.0	<0.015	Category M	√
	B05	4.9-5.9	<0.20	35	15	0.07	25	40	<0.10	86	9.3	<55	<170	<3.0	<0.015	Category L	NA
	B05	7.9-8.9	0.27	32	15	0.08	20	42	0.10	78	14	<55	<170	<3.0	<0.015	Category M	√
	B05	12.0-12.9	0.41	26	15	0.08	14	47	0.11	74	8.4	<55	<170	<3.0	<0.015	Category L	NA
	B05	14.9-15.9	<0.20	<8.0	<7.0	<0.05	<4.0	16	<0.10	13	2.0	<55	<170	<3.0	<0.015	Category L	NA
	B05	15.9-16.1	<0.20	<8.0	<7.0	0.05	<4.0	21	<0.10	18	15	<55	<170	<3.0	<0.015	Category M	√
	B06	0.35-0.9	<0.20	35	14	0.08	25	34	<0.10	90	9.7	<55	<170	<3.0	<0.015	Category L	NA
	B06	0.9-1.9	<0.20	33	14	0.08	24	33	<0.10	85	8.5	<55	<170	<3.0	<0.015	Category L	NA
	B06	1.9-2.9	<0.20	31	14	0.07	22	30	<0.10	75	7.4	<55	<170	<3.0	<0.015	Category L	NA
	B06	4.9-5.9	<0.20	34	14	0.08	23	35	<0.10	85	8.3	<55	<170	<3.0	<0.015	Category L	NA
	B06	7.9-8.9	<0.20	33	14	0.07	22	34	<0.10	78	5.8	<55	<170	<3.0	<0.015	Category L	NA
	B06	9.9-10.9	<0.20	28	11	0.06	19	29	<0.10	61	7.6	<55	<170	<3.0	<0.015	Category L	NA
	B06	10.9-11.35	<0.20	25	21	<0.05	20	35	<0.10	88	5.4	<55	<170	<3.0	<0.015	Category L	NA
	B07	0.0-0.9	<0.20	33	14	0.06	24	35	<0.10	74	8.0	<55	<170	<3.0	<0.015	Category L	NA
	B07	0.9-1.9	<0.20	34	12	0.06	24	29	<0.10	77	8.6	<55	<170	<3.0	<0.015	Category L	NA

Sample	Sampling Location	Sampling Depth below Seabed (m)	Metals (mg/kg)								Metalloid (mg/kg)	Organic-PAHs (µg/kg)		Organic-non-PAHs (µg/kg)	Organo-metallics (µg/L in pore water)	Classification under ETWBTC (Works) No. 34/2002	Biological Screening
			Cd	Cr	Cu	Hg	Ni	Pb	Ag	Zn	As	LMW PAH	HMW PAH	Total PCBs	TBT		
	B07	1.9-2.9	<0.20	33	13	0.07	23	32	<0.10	77	7.4	<55	<170	<3.0	<0.015	Category L	NA
	B07	2.9-3.9	<0.20	33	13	0.05	23	32	<0.10	77	6.3	<55	<170	<3.0	<0.015	Category L	NA
	B07	4.9-5.9	<0.20	32	13	0.06	21	32	<0.10	72	6.2	<55	<170	<3.0	<0.015	Category L	NA
	B07	7.9-8.9	<0.20	35	14	0.07	23	36	<0.10	77	6.9	<55	<170	<3.0	<0.015	Category L	NA
	B07	12.0-12.9	<0.20	32	12	0.06	20	31	<0.10	61	9.5	<55	<170	<3.0	<0.015	Category L	NA
	B07	14.9-15.9	0.22	28	14	0.06	15	40	<0.10	64	14	<55	<170	<3.0	<0.015	Category M	√
	B08	0.0-0.9	<0.20	29	12	0.08	21	30	<0.10	76	8.1	<55	<170	<3.0	<0.015	Category L	NA
	B08	0.9-1.9	<0.20	30	12	0.08	22	30	<0.10	75	7.0	<55	<170	<3.0	<0.015	Category L	NA
	B08	1.9-2.9	<0.20	32	13	0.07	23	34	0.12	83	5.9	<55	<170	<3.0	<0.015	Category L	NA
	B08	2.9-3.9	<0.20	31	13	0.08	21	33	<0.10	79	6.9	<55	<170	<3.0	<0.015	Category L	NA
	B08	4.9-5.9	<0.20	31	14	0.07	21	38	<0.10	75	6.2	<55	<170	<3.0	<0.015	Category L	NA
	B08	7.9-8.9	<0.20	32	14	0.08	23	36	<0.10	81	7.2	<55	<170	<3.0	<0.015	Category L	NA
	B08	12.1-12.9	<0.20	33	14	0.07	22	35	<0.10	77	7.7	<55	<170	<3.0	<0.015	Category L	NA
	B08	14.9-15.9	<0.20	32	13	0.07	22	35	<0.10	71	9.3	<55	<170	<3.0	<0.015	Category L	NA
	B08	18.0-18.9	<0.20	35	17	0.08	21	47	<0.10	83	13	<55	<170	<3.0	<0.015	Category M	√
	B09	0.1-0.9	<0.20	39	34	0.15	25	52	0.37	110	12	<55	<170	<3.0	<0.015	Category M	√
	B09	0.9-1.9	0.24	37	26	0.12	22	47	0.19	97	14	<55	<170	<3.0	<0.015	Category M	√
	B09	1.9-2.9	<0.20	32	13	0.07	23	30	<0.10	75	8.0	<55	<170	<3.0	<0.015	Category L	NA
	B09	4.9-5.9	<0.20	32	14	0.07	22	33	<0.10	80	6.9	<55	<170	<3.0	<0.015	Category L	NA
	B09	7.9-8.9	<0.20	34	14	0.07	23	36	<0.10	82	6.4	<55	<170	<3.0	<0.015	Category L	NA
	B09	12.1-12.9	<0.20	32	15	0.07	20	40	<0.10	74	11	<55	<170	<3.0	<0.015	Category L	NA
	B09	14.9-15.9	0.27	31	15	0.07	18	46	0.14	80	14	<55	<170	<3.0	<0.015	Category M	√
	B09	18.0-18.9	0.28	29	16	0.08	16	45	0.10	73	13	<55	<170	<3.0	<0.015	Category M	√
	B10	0.05-0.9	0.22	41	29	0.19	26	51	0.17	92	19	<55	<170	<3.0	<0.015	Category M	√
	B10	0.9-1.9	<0.20	35	14	0.06	24	32	<0.10	79	8.7	<55	<170	<3.0	<0.015	Category L	NA
	B10	1.9-2.9	<0.20	34	14	0.07	23	31	<0.10	78	7.1	<55	<170	<3.0	<0.015	Category L	NA

Sample	Sampling Location	Sampling Depth below Seabed (m)	Metals (mg/kg)								Metalloid (mg/kg)	Organic-PAHs (µg/kg)		Organic-non-PAHs (µg/kg)	Organo-metallics (µg/L in pore water)	Classification under ETWBTC (Works) No. 34/2002	Biological Screening
			Cd	Cr	Cu	Hg	Ni	Pb	Ag	Zn	As	LMW PAH	HMW PAH	Total PCBs	TBT		
	B10	2.9-3.9	<0.20	34	13	0.06	23	32	<0.10	78	7.7	<55	<170	<3.0	<0.015	Category L	NA
	B10	4.9-5.9	<0.20	36	14	0.07	23	36	<0.10	78	6.1	<55	<170	<3.0	<0.015	Category L	NA
	B10	7.9-8.9	<0.20	34	14	0.07	23	33	<0.10	73	7.4	<55	<170	<3.0	<0.015	Category L	NA
	B10	12.0-12.9	<0.20	34	13	0.06	21	34	<0.10	65	8.0	<55	<170	<3.0	<0.015	Category L	NA
	B10	13.9-14.7	<0.20	34	15	0.06	20	42	<0.10	70	23	<55	<170	<3.0	<0.015	Category M	√
Hong Kong Link Road																	
Sample in 2004	A1	0.55-1.00	<0.2	33	24	0.1	21	29	0.2	83	15	<55	<170	<3.0	<0.015	Category M	√
	A1	1.0-2.0	<0.2	37	21	0.16	22	31	0.1	74	17	<55	<170	<3.0	<0.015	Category M	√
	A1	2.0-3.0	<0.2	37	20	0.13	23	29	0.1	71	15	<55	<170	<3.0	<0.015	Category M	√
	A1	5.0-6.0	<0.2	32	15	0.08	20	28	<0.1	64	12	<55	<170	<3.0	<0.015	Category L	NA
	A1	8.0-9.0	<0.2	36	13	0.09	22	25	0.1	73	11	<55	<170	<3.0	<0.015	Category L	NA
	A1	14.0-15.0	<0.2	18	6	<0.05	9	13	<0.1	28	8	<55	<170	<3.0	<0.015	Category L	NA
	A2	0.47-1.00	<0.2	40	28	0.13	26	28	0.2	96	19	<55	<170	<3.0	<0.015	Category M	√
	A2	2.0-3.0	<0.2	36	16	0.1	22	24	<0.1	72	13	<55	<170	<3.0	<0.015	Category M	√
	A2	5.0-6.0	<0.2	31	10	0.06	23	19	<0.1	71	7	<55	<170	<3.0	<0.015	Category L	NA
	A2	8.0-9.0	<0.2	38	14	0.07	25	22	0.1	79	13	<55	<170	<3.0	<0.015	Category M	√
	A3	0.41-1.0	<0.2	29	16	0.11	19	20	0.1	70	12	<55	<170	<3.0	<0.015	Category L	NA
	A3	2.0-3.0	<0.2	34	11	0.05	24	17	<0.1	75	7	<55	<170	<3.0	<0.015	Category L	NA
	A3	5.0-6.0	<0.2	36	14	0.07	25	21	<0.1	81	15	<55	<170	<3.0	<0.015	Category M	√
	A3	8.0-9.0	<0.2	37	14	0.08	24	22	0.1	79	11	<55	<170	<3.0	<0.015	Category L	NA
	A3	14.0-15.0	<0.2	35	14	0.07	24	21	<0.1	80	11	<55	<170	<3.0	<0.015	Category L	NA
	A4	0.14-1.00	<0.2	39	31	0.12	35	24	0.1	79	15	<55	<170	<3.0	<0.015	Category M	√
	A4	1.0-2.0	<0.2	35	11	0.17	24	17	<0.1	74	7	<55	<170	<3.0	<0.015	Category L	NA
	A4	2.0-3.0	<0.2	36	11	<0.05	25	17	<0.1	76	9	<55	<170	<3.0	<0.015	Category L	NA
	A4	5.0-6.0	<0.2	38	15	0.06	26	22	<0.1	84	12	<55	<170	<3.0	<0.015	Category L	NA
	A4	8.0-9.0	<0.2	40	15	0.07	26	23	0.1	83	13	<55	<170	<3.0	<0.015	Category M	√
	A4	14.0-15.0	<0.2	40	15	0.07	26	25	0.1	84	13	<55	<170	<3.0	<0.015	Category M	√

Sample	Sampling Location	Sampling Depth below Seabed (m)	Metals (mg/kg)								Metalloid (mg/kg)	Organic-PAHs (µg/kg)		Organic-non-PAHs (µg/kg)	Organo-metallics (µg/L in pore water)	Classification under ETWBTC (Works) No. 34/2002	Biological Screening
			Cd	Cr	Cu	Hg	Ni	Pb	Ag	Zn	As	LMW PAH	HMW PAH	Total PCBs	TBT		
	A5	0.17-1.00	<0.2	39	11	<0.05	23	20	0.2	70	8	<55	<170	<3.0	<0.015	Category L	NA
	A5	2.0-3.0	<0.2	43	12	<0.05	25	22	0.2	77	8	<55	<170	<3.0	<0.015	Category L	NA
	A5	5.0-6.0	<0.2	45	15	0.06	26	27	0.2	84	11	<55	<170	<3.0	<0.015	Category L	NA
	A5	8.0-9.0	<0.2	49	21	0.06	27	29	0.2	79	13	<55	<170	<3.0	<0.015	Category M	√
	A5	14.0-15.0	<0.2	50	20	0.08	27	28	0.2	78	14	<55	<170	<3.0	<0.015	Category M	√
	B8	0.25-1.00	<0.2	45	32	0.17	28	40	0.2	108	19	<55	<170	<3.0	<0.015	Category M	√
	B8	1.0-2.0	<0.2	34	13	0.06	22	24	<0.1	71	10	<55	<170	<3.0	<0.015	Category L	NA
	B8	2.0-3.0	<0.2	37	13	0.06	24	25	0.1	78	12	<55	<170	<3.0	<0.015	Category L	NA
	B8	5.0-6.0	<0.2	28	9	<0.05	15	20	<0.1	52	11	<55	<170	<3.0	<0.015	Category L	NA
	B8	8.0-9.0	<0.2	25	8	<0.05	14	20	<0.1	45	11	<55	<170	<3.0	<0.015	Category L	NA
	B8	14.0-15.0	<0.2	42	16	0.07	26	29	0.1	74	12	<55	<170	<3.0	<0.015	Category L	NA
	B9	0.90-1.00	<0.2	60	21	0.08	39	39	0.2	125	18	<55	<170	<3.0	<0.015	Category M	√
	B9	1.0-2.0	<0.2	30	11	0.06	19	21	<0.1	64	10	<55	<170	<3.0	<0.015	Category L	NA
	B9	2.0-3.0	<0.2	29	11	0.07	18	21	<0.1	63	11	<55	<170	<3.0	<0.015	Category L	NA
	B9	5.0-6.0	<0.2	35	9	<0.05	15	32	<0.1	47	23	<55	<170	<3.0	<0.015	Category M	√
	B9	7.0-8.0	<0.2	56	18	0.06	28	32	0.1	82	14	<55	<170	<3.0	<0.015	Category M	√
	B14	0.25-1.00	<0.2	46	27	0.14	29	30	0.2	101	18	<55	<170	<3.0	<0.015	Category M	√
	B14	2.0-3.0	<0.2	43	15	0.07	28	22	0.1	89	11	<55	<170	<3.0	<0.015	Category L	NA
	B14	5.0-6.0	<0.2	43	16	0.08	28	26	0.1	89	13	<55	<170	<3.0	<0.015	Category M	√
	B14	7.0-8.0	<0.2	31	11	0.06	13	22	<0.1	47	11	<55	<170	<3.0	<0.015	Category L	NA
	B15	0.45-1.00	<0.2	47	32	0.19	28	41	0.2	109	20	<55	<170	<3.0	<0.015	Category M	√
	B15	1.0-2.0	<0.2	39	20	0.1	24	31	0.1	82	15	<55	<170	<3.0	<0.015	Category M	√
	B15	2.0-3.0	<0.2	37	12	<0.05	24	24	<0.1	78	10	<55	<170	<3.0	<0.015	Category L	NA
	B15	5.0-6.0	<0.2	36	13	0.06	23	24	<0.1	73	11	<55	<170	<3.0	<0.015	Category L	NA
	B15	8.0-9.0	<0.2	42	15	0.05	24	36	0.1	68	18	<55	<170	<3.0	<0.015	Category M	√
	B16	0.0-1.0	<0.2	46	13	<0.05	23	24	<0.1	76	11	<55	<170	<3.0	<0.015	Category L	NA
	B16	1.0-2.0	<0.2	28	8	<0.05	12	16	<0.1	42	9	<55	<170	<3.0	<0.015	Category L	NA

Sample	Sampling Location	Sampling Depth below Seabed (m)	Metals (mg/kg)								Metalloid (mg/kg)	Organic-PAHs (µg/kg)		Organic-non-PAHs (µg/kg)	Organo-metallics (µg/L in pore water)	Classification under ETWBTC (Works) No. 34/2002	Biological Screening
			Cd	Cr	Cu	Hg	Ni	Pb	Ag	Zn	As	LMW PAH	HMW PAH	Total PCBs	TBT		
	B16	2.0-3.0	<0.2	16	4	<0.05	5	10	<0.1	19	6	<55	<170	<3.0	<0.015	Category L	NA
	B17	0.0-1.0	<0.2	28	10	<0.05	13	20	<0.1	49	9	<55	<170	<3.0	<0.015	Category L	NA
	G13	Surface	<0.2	41	28	0.18	26	33	0.2	101	18	<55	<170	<3.0	<0.015	Category M	√
	G14	surface	<0.2	44	31	0.18	28	38	0.2	113	18	<55	<170	<3.0	<0.015	Category M	√
Sample in 2009	C11	0.3-0.9	<0.2	39	16	0.05	27	34	<0.1	99	8	<550	<1700	<3.0	N/A*	Category L	NA
	C11	0.9-1.9	<0.2	39	15	0.07	26	38	<0.1	96	9	<550	<1700	<3.0	N/A*	Category L	NA
	C11	1.9-2.9	<0.2	39	14	0.06	26	32	<0.1	97	10	<550	<1700	<3.0	N/A*	Category L	NA
	C11	4.9-5.9	<0.2	39	15	0.06	28	37	<0.1	93	8	<550	<1700	<3.0	N/A*	Category L	NA
	C11	7.9-8.9	<0.2	41	14	<0.05	26	35	<0.1	81	14	<550	<1700	<3.0	N/A*	Category M	√
	C11	9.9-10.8	<0.2	19	6	<0.05	6	22	<0.1	28	13	<550	<1700	<3.0	N/A*	Category M	√
	C12	0.2-0.9	<0.2	38	10	<0.05	25	20	<0.1	81	7	<550	<1700	<3.0	N/A*	Category L	NA
	C12	0.9-1.9	<0.2	48	15	<0.05	29	29	0.1	109	10	<550	<1700	<3.0	N/A*	Category L	NA
	C12	1.9-2.9	<0.2	52	17	<0.05	31	33	0.1	112	11	<550	<1700	<3.0	N/A*	Category L	NA
	C12	4.9-5.9	<0.2	53	17	0.06	31	37	0.1	113	8	<550	<1700	<3.0	N/A*	Category L	NA
	C12	7.9-8.9	<0.2	48	16	0.05	30	34	0.1	98	9	<550	<1700	<3.0	N/A*	Category L	NA
	C12	8.9-9.9	<0.2	48	15	<0.05	28	35	0.1	93	10	<550	<1700	<3.0	N/A*	Category L	NA
	C12	9.9-10.4	<0.2	11	4	<0.05	6	12	<0.1	26	4	<550	<1700	<3.0	N/A*	Category L	NA
	C13	0.2-0.9	<0.2	29	12	<0.05	25	25	<0.1	71	7	<550	<1700	<3.0	N/A*	Category L	NA
	C13	0.9-1.9	<0.2	35	14	<0.05	27	28	0.1	86	9	<550	<1700	<3.0	N/A*	Category L	NA
	C13	1.9-2.9	<0.2	37	15	<0.05	27	31	0.1	91	8	<550	<1700	<3.0	N/A*	Category L	NA
	C13	4.9-5.9	<0.2	41	16	0.06	28	33	0.1	91	6	<550	<1700	<3.0	N/A*	Category L	NA
	C13	7.9-8.9	<0.2	40	16	0.05	29	34	0.1	88	8	<550	<1700	<3.0	N/A*	Category L	NA
	C13	9.9-10.9	<0.2	7	2	<0.05	4	29	<0.1	14	4	<550	<1700	<3.0	N/A*	Category L	NA
	C14	0.3-0.9	<0.2	37	10	<0.05	24	21	<0.1	88	7	<550	<1700	<3.0	N/A*	Category L	NA
	C14	0.9-1.9	<0.2	49	17	0.07	31	34	0.1	115	11	<550	<1700	<3.0	N/A*	Category L	NA
	C14	1.9-2.9	<0.2	48	16	0.05	30	31	0.1	112	8	<550	<1700	<3.0	N/A*	Category L	NA

Sample	Sampling Location	Sampling Depth below Seabed (m)	Metals (mg/kg)								Metalloid (mg/kg)	Organic-PAHs (µg/kg)		Organic-non-PAHs (µg/kg)	Organo-metallics (µg/L in pore water)	Classification under ETWBTC (Works) No. 34/2002	Biological Screening
			Cd	Cr	Cu	Hg	Ni	Pb	Ag	Zn	As	LMW PAH	HMW PAH	Total PCBs	TBT		
	C14	4.9-5.9	<0.2	55	17	0.05	32	36	0.1	118	9	<550	<1700	<3.0	N/A*	Category L	NA
	C14	7.9-8.9	<0.2	55	18	<0.05	32	35	0.2	116	14	<550	<1700	<3.0	N/A*	Category M	√
	C14	10.9-11.9	<0.2	19	6	<0.05	10	20	0.1	36	5	<550	<1700	<3.0	N/A*	Category L	NA
	C14	12.0-12.6	<0.2	10	3	<0.05	4	19	<0.1	22	2	<550	<1700	<3.0	N/A*	Category L	NA
	C15	0.1-0.9	<0.2	36	10	<0.05	24	20	<0.1	83	6	<550	<1700	<3.0	N/A*	Category L	NA
	C15	0.9-1.9	<0.2	45	15	<0.05	28	31	0.1	107	8	<550	<1700	<3.0	N/A*	Category L	NA
	C15	1.9-2.9	<0.2	48	15	<0.05	28	30	0.1	108	8	<550	<1700	<3.0	N/A*	Category L	NA
	C15	4.9-5.9	<0.2	49	16	<0.05	29	35	0.1	111	8	<550	<1700	<3.0	N/A*	Category L	NA
	C15	7.9-8.9	<0.2	49	16	<0.05	28	36	0.1	101	9	<550	<1700	<3.0	N/A*	Category L	NA
	C15	10.9-11.8	<0.2	35	8	<0.05	9	48	<0.1	28	9	<550	<1700	<3.0	N/A*	Category L	NA
	C16	0.2-0.9	<0.2	26	12	<0.05	22	30	<0.1	65	8	<550	<1700	<3.0	N/A*	Category L	NA
	C16	0.9-1.9	<0.2	33	12	<0.05	27	25	<0.1	81	8	<550	<1700	<3.0	N/A*	Category L	NA
	C16	1.9-2.9	<0.2	36	15	<0.05	27	28	0.1	87	7	<550	<1700	<3.0	N/A*	Category L	NA
	C16	4.9-5.9	<0.2	35	14	<0.05	26	30	0.1	81	8	<550	<1700	<3.0	N/A*	Category L	NA
	C16	7.9-8.9	<0.2	36	14	<0.05	26	32	0.1	75	7	<550	<1700	<3.0	N/A*	Category L	N/A

(1) Bold value in shaded cell denote the contaminate level exceeds the Lower Chemical Exceedance Level (LCEL) but not exceeding the Upper Chemical Exceedance Level (UCEL);

(2) Bold value with # denoted the contaminate level exceeds both the LCEL and UCEL;

(3) Low molecular weight PAHs include naphthalene, acenaphthylene. acenaphthene, fluorene, phenanthrene and anthracene; high molecular weight PAHs include chrysene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenzo(a.h.)anthracene, fluoranthene, indeno(1.2.3-cd)pyrene, pyrene and benzo(g.h.i)perylene; and

(4) Total PCBs include 2,4' dichlorobiphenyl, 2,2',5 trichlorobiphenyl, 2,4',4 trichlorobiphenyl, 2,2',3,5 tetrachlrobiphenyl, 2,2',5,5' tetrachlrobiphenyl, 2,3',4,4' tetrachlrobiphenyl, 3,3',4,4' tetrachlrobiphenyl, 2,2',4,5,5' pentachlrobiphenyl, 2,3,3',4,4' pentachlrobiphenyl, 2,3',4,4',5' pentachlrobiphenyl, 3,3',4,4,5' pentachlrobiphenyl, 2,2',3,3',4,4' hexachlrobiphenyl, 2,2',3,4,4',5' hexachlrobiphenyl, 2,2',4,4',5,5' hexachlrobiphenyl, 3,3',4,4',5,5' hexachlrobiphenyl, 2,2',3,3',4,4',5 heptachlrobiphenyl, 2,2',3,4,4',5,5' heptachlrobiphenyl and 2,2'3,4',5,5',6 heptachlrobiphenyl;

(5) *N/A*-Insufficient interstitial water for analysis of TBT.*

7.6.2 Biological Screening

7.6.2.1 A total of 50 sediment samples (24 samples for HKBCF reclamation, 23 samples for the marine viaducts in HKLR and 3 samples for HKLR reclamation) are classified as Category M and biological screening of these samples is required. **Table 7-11** summarized the samples requiring biological screening test.

7.6.2.2 Not Used.

7.6.2.3 The results of 10-day burrowing amphipod toxicity test, 20-day burrowing polychaete toxicity test, and 48-96 hours larvae (bivalve or echinoderm) toxicity test are summarised in **Tables 7-12 – 7-14** respectively, whereas the results of ancillary parameters including grain size, moisture content, total organic carbon (TOC), ammonia, and salinity are summarised in **Table 7-15**.

7.6.2.4 The results showed that all the samples were passed the biological tests except the samples A01 (9.9 -10.8m), A5 (8.0-9.0m & 14.0-15.0m), B9 (0.9-1.0m, 5.0-6.0m & 7.0-8.0m), B15 (0.45-1.00m, 1.0-2.0m & 8.0-9.0m), G14, C11 (7.9-8.9m, 9.9-10.8m) and C14 (7.9-8.9m). The results of ancillary parameters showed that interstitial ammonia ranged from <0.03 - 36mgNH_3/L while TOC levels (% dry weight) ranged from 010 - 0.94%.

7.6.2.5 The highest levels of interstitial ammonia and TOC content were determined in sample B05 (1.9 - 2.9m) and A01 (9.9 - 10.8m) respectively. The grain size (<63μm) ranges from 71 - 101%. The highest moisture content (107%) and interstitial salinity (35ppt) were found at sample B09 (0.1 - 0.9m) and B05 (0.25 - 0.9m) respectively.

Table 7-11 Schedule of Sediment Sample for Biological Screening

Sample	Sample Location	Sampling Depth below seabed (m)	No. of Sample
HKBCF			
Sampling for HKBCF reclamation (2008)	A01	0.05 - 0.9	1
	A01	0.9 – 1.9	1
	A01	1.9 – 2.9	1
	A01	7.9-8.9	1
	A01	9.9-10.8	1
	A02	14.9-15.9	1
	A02	16.9-17.9	1
	A03	12.0-12.9	1
	A03	14.9-15.9	1
	A03	15.9-16.35	1
	A04	18.05-18.9	1
	B05	0.25-0.9	1
	B05	0.9-1.9	1
	B05	1.9-2.9	1
	B05	7.9-8.9	1
	B05	15.9-16.1	1
	B07	14.9-15.9	1
	B08	18.0-18.9	1
	B09	0.1-0.9	1
	B09	0.9-1.9	1
	B09	14.9-15.9	1
	B09	18.0-18.9	1
	B10	0.05-0.9	1
	B10	13.9-14.7	1
HKLR			
Sampling for HKLR viaduct (2004)	A1	0.55-1.00	1
	A1	1.0–2.0	1
	A1	2.0–3.0	1
	A2	0.47–1.00	1

Sample	Sample Location	Sampling Depth below seabed (m)	No. of Sample
	A2	2.0–3.0	1
	A2	8.0–9.0	1
	A3	5.0–6.0	1
	A4	0.14–1.00	1
	A4	8.0-9.0	1
	A4	14.0–15.0	1
	A5	8.0–9.0	1
	A5	14.0-15.0	1
	B8	0.25–1.00	1
	B9	0.9–1.0	1
	B9	5.0-6.0	1
	B9	7.0-8.0	1
	B14	0.25-1.00	1
	B14	5.0-6.0	1
	B15	0.45-1.00	1
	B15	1.0-2.0	1
	B15	8.0-9.0	1
	G13	Surface	1
	G14	Surface	1
Sampling for HKLR reclamation (2009)	C11	7.9-8.9	1
	C11	9.9–10.8	1
	C14	7.9-8.9	1

Table 7-12 Amphipod Survival in Relation to Reference Sediment

Sample	Sample Location	Sampling Depth below seabed (m)	Survival in Relation to Reference (%)	Statistical difference with Reference	Result
HKBCF					
Sampling for HKBCF reclamation (2008)	A01	0.05 - 0.9	96.8	Note 1	Pass
	A01	0.9 – 1.9	95.8	Note 1	Pass
	A01	1.9 – 2.9	96.8	Note 1	Pass
	A01	7.9-8.9	96.8	Note 1	Pass
	A01	9.9-10.8	91.6	Note 1	Pass
	A02	14.9-15.9	100.0	Note 1	Pass
	A02	16.9-17.9	N/A*	N/A*	N/A*
	A03	12.0-12.9	97.9	Note 1	Pass
	A03	14.9-15.9	100.0	Note 1	Pass
	A03	15.9-16.35	97.9	Note 1	Pass
	A04	18.05-18.9	93.7	Note 1	Pass
	B05	0.25-0.9	96.8	Note 1	Pass
	B05	0.9-1.9	96.8	Note 1	Pass
	B05	1.9-2.9	96.8	Note 1	Pass
	B05	7.9-8.9	95.8	Note 1	Pass
	B05	15.9-16.1	N/A*	N/A*	N/A*
	B07	14.9-15.9	95.8	Note 1	Pass
	B08	18.0-18.9	93.7	Note 1	Pass
	B09	0.1-0.9	93.7	Note 1	Pass
	B09	0.9-1.9	93.7	Note 1	Pass
	B09	14.9-15.9	100.0	Note 1	Pass

Sample	Sample Location	Sampling Depth below seabed (m)	Survival in Relation to Reference (%)	Statistical difference with Reference	Result
	B09	18.0-18.9	96.8	Note 1	Pass
	B10	0.05-0.9	96.8	Note 1	Pass
	B10	13.9-14.7	96.8	Note 1	Pass
HKLR					
Sampling for HKLR viaduct (2004)	A1	0.55-1.00	105.6	Note 1	Pass
	A1	1.0–2.0			
	A1	2.0–3.0			
	A2	0.47–1.00	93.7	Note 1	Pass
	A2	2.0–3.0			
	A2	8.0–9.0			
	A3	5.0–6.0	91.7	Note 1	Pass
	A4	0.14–1.00	81.9	Note 1	Pass
	A4	8.0-9.0			
	A4	14.0–15.0			
	A5	8.0–9.0	81.9	Note 1	Pass
	A5	14.0-15.0			
	B8	0.25–1.00	93.1	Note 1	Pass
	B9	0.9–1.0	79.2	P=0.0008	Fail
	B9	5.0-6.0			
	B9	7.0-8.0			
	B14	0.25-1.00	81.9	Note 1	Pass
	B14	5.0-6.0			
	B15	0.45-1.00	76.4	P=0.0005	Fail
	B15	1.0-2.0			
	B15	8.0-9.0			
	G13	Surface	88	Note 1	Pass
	G14	Surface	82.6	Note 1	Pass
Sampling for HKLR reclamation (2009)	C11	7.9-8.9	51.0	P<0.05	Fail
	C11	9.9–10.8	48.0	P<0.05	Fail
	C14	7.9-8.9	48.0	P<0.05	Fail

Note: 1) As the average survival rate of amphipods for test sediment was greater than 80% of that of the reference sediment, statistical analysis was not required

2) N/A – Insufficient sample for biological test.

Table 7-13 Total Dry Weight of Polychaete in Relation to Reference Sediment

Sample	Sample Location	Sampling Depth below seabed (m)	Total Dry Weight in Relation to Reference Site (%)	Statistical difference with Reference	Result
HKBCF					
Sampling for HKBCF reclamation (2008)	A01	0.05 - 0.9	101.9	Note 1	Pass
	A01	0.9 – 1.9	87.2	P=0.082	Pass
	A01	1.9 – 2.9	87.6	P=0.156	Pass
	A01	7.9-8.9	92.6	Note 1	Pass
	A01	9.9-10.8	71.9	P<0.05	Fail
	A02	14.9-15.9	98.8	Note 1	Pass
	A02	16.9-17.9	N/A*	N/A*	N/A*
	A03	12.0-12.9	96.9	Note 1	Pass

Sample	Sample Location	Sampling Depth below seabed (m)	Total Dry Weight in Relation to Reference Site (%)	Statistical difference with Reference	Result
	A03	14.9-15.9	73.3	P=0.116	Pass
	A03	15.9-16.35	74.4	P=0.126	Pass
	A04	18.05-18.9	93.1	Note 1	Pass
	B05	0.25-0.9	71.3	P=0.1	Pass
	B05	0.9-1.9	71.3	P=0.102	Pass
	B05	1.9-2.9	76.9	P=0.147	Pass
	B05	7.9-8.9	68.8	P=0.089	Pass
	B05	15.9-16.1	N/A*	N/A*	N/A*
	B07	14.9-15.9	108.1	Note 1	Pass
	B08	18.0-18.9	83.4	P=0.074	Pass
	B09	0.1-0.9	71.2	P=0.101	Pass
	B09	0.9-1.9	83.2	P=0.237	Pass
	B09	14.9-15.9	73.4	P=0.118	Pass
	B09	18.0-18.9	74.7	P=0.123	Pass
	B10	0.05-0.9	98.6	Note 1	Pass
	B10	13.9-14.7	103.9	Note 1	Pass
HKLR					
Sampling for HKLR viaduct (2004)	A1	0.55-1.00	140.3	Note 1	Pass
	A1	1.0–2.0			
	A1	2.0–3.0			
	A2	0.47–1.00	109.8	Note 1	Pass
	A2	2.0–3.0			
	A2	8.0–9.0			
	A3	5.0–6.0	82.8	P=0.1146	Pass
	A4	0.14–1.00	74.9	P=0.0642	Pass
	A4	8.0-9.0			
	A4	14.0–15.0			
	A5	8.0–9.0	54.7	P=0.0028	Fail
	A5	14.0-15.0			
	B8	0.25–1.00	130.8	Note 1	Pass
	B9	0.9–1.0	70.5	P=0.0174	Fail
	B9	5.0-6.0			
	B9	7.0-8.0			
	B14	0.25-1.00	82.9	P=0.0822	Pass
	B14	5.0-6.0			
	B15	0.45-1.00	97.9	Note 1	Pass
	B15	1.0-2.0			
	B15	8.0-9.0			
	G13	Surface	113.2	Note 1	Pass
	G14	Surface	114.3	Note 1	Pass
Sampling for HKLR reclamation (2009)	C11	7.9-8.9	79.0	P=0.154	Pass
	C11	9.9–10.8	61.6	P=0.0030	Fail
	C14	7.9-8.9	98.0	Note 1	Pass

Note: 1) As the average total dry weight for the test sediment was greater than 90% of that of the reference sediment, statistical analysis was not required

2) N/A – Insufficient sample for biological test.

Table 7-14 Normality Survival of Bivalve Larvae in Relation to Reference Sediment

Sample	Sample Location	Sampling Depth below seabed (m)	Survival in Relation to Reference Site (%)	Statistical difference with Reference	Result
HKBCF					
Sampling for HKBCF reclamation (2008)	A01	0.05 - 0.9	99.3	Note 1	Pass
	A01	0.9 – 1.9	98.9	Note 1	Pass
	A01	1.9 – 2.9	100.1	Note 1	Pass
	A01	7.9-8.9	101.4	Note 1	Pass
	A01	9.9-10.8	100.7	Note 1	Pass
	A02	14.9-15.9	100.2	Note 1	Pass
	A02	16.9-17.9	N/A*	N/A*	N/A*
	A03	12.0-12.9	103.7	Note 1	Pass
	A03	14.9-15.9	98.4	Note 1	Pass
	A03	15.9-16.35	101.9	Note 1	Pass
	A04	18.05-18.9	99.6	Note 1	Pass
	B05	0.25-0.9	101.2	Note 1	Pass
	B05	0.9-1.9	99.8	Note 1	Pass
	B05	1.9-2.9	101.7	Note 1	Pass
	B05	7.9-8.9	98.6	Note 1	Pass
	B05	15.9-16.1	N/A*	N/A*	N/A*
	B07	14.9-15.9	99.4	Note 1	Pass
	B08	18.0-18.9	100.1	Note 1	Pass
	B09	0.1-0.9	100.9	Note 1	Pass
	B09	0.9-1.9	99.2	Note 1	Pass
	B09	14.9-15.9	99.2	Note 1	Pass
	B09	18.0-18.9	97.8	Note 1	Pass
	B10	0.05-0.9	99.6	Note 1	Pass
	B10	13.9-14.7	97.9	Note 1	Pass
HKLR					
Sampling for HKLR viaduct (2004)	A1	0.55-1.00	94.9	Note 1	Pass
	A1	1.0–2.0			
	A1	2.0–3.0			
	A2	0.47–1.00	88.7	Note 1	Pass
	A2	2.0–3.0			
	A2	8.0–9.0			
	A3	5.0–6.0	90.0	Note 1	Pass
	A4	0.14–1.00	97.6	Note 1	Pass
	A4	8.0-9.0			
	A4	14.0–15.0			
	A5	8.0–9.0	100.7	Note 1	Pass
	A5	14.0-15.0			
	B8	0.25–1.00	101.2	Note 1	Pass
	B9	0.9–1.0	96.3	Note 1	Pass
	B9	5.0-6.0			
	B9	7.0-8.0			
	B14	0.25-1.00	121.0	Note 1	Pass
	B14	5.0-6.0			
	B15	0.45-1.00	98.3	Note 1	Pass

Sample	Sample Location	Sampling Depth below seabed (m)	Survival in Relation to Reference Site (%)	Statistical difference with Reference	Result
	B15	1.0-2.0			
	B15	8.0-9.0			
	G13	Surface	88.7	Note 1	Pass
	G14	Surface	63.9	P=0.0001	Fail
Sampling for HKLR reclamation (2009)	C11	7.9-8.9	43.7	P <0.05	Fail
	C11	9.9–10.8	42.8	P <0.05	Fail
	C14	7.9-8.9	110.4	Note 1	Pass

Note: 1) As the average survival rate of bivalve larve for test sediment was greater than 80% of that of the reference sediment, statistical analysis was not required
2) N/A – Insufficient sample for biological test.

Table 7-15 Ancillary Test Results

Sample	Sample Location	Sampling Depth (m)	Interstitial Ammonia ($mgNH_3/L$)	Interstitial Salinity (ppt)	Grain Size <63m (%)	Moisture Content* (%)	TOC (% Wet Weight)	TOC (% Dry Weight)
HKBCF								
HKBCF reclamation (2008)	A01	0.05 - 0.9	1.4	31	99	92	0.39	0.75
	A01	0.9 – 1.9	0.62	25	98	88	0.41	0.77
	A01	1.9 – 2.9	11	30	98	89	0.41	0.77
	A01	7.9-8.9	4.9	20	99	78	0.48	0.85
	A01	9.9–10.8	6.6	23	94	56	0.60	0.94
	A02	14.9-15.9	<0.03	25	99	89	0.39	0.75
	A02	16.9-17.9	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
	A03	12.0-12.9	4.2	25	100	77	0.45	0.80
	A03	14.9-15.9	3.8	25	99	71	0.53	0.91
	A03	15.9-16.35	N/A**	N/A**	71	29	0.08	0.10
	A04	18.05-18.9	1.8	20	99	79	0.47	0.84
	B05	0.25-0.9	1.3	35	99	86	0.42	0.78
	B05	0.9-1.9	3.2	27	99	86	0.42	0.78
	B05	1.9-2.9	24	30	99	83	0.40	0.73
	B05	7.9-8.9	<0.03	33	98	85	0.50	0.93
	B05	15.9-16.1	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
	B07	14.9-15.9	0.38	23	97	64	0.49	0.80
	B08	18.0-18.9	0.84	20	99	76	0.41	0.72
	B09	0.1-0.9	0.87	32	99	107	0.42	0.87
	B09	0.9-1.9	2.0	32	99	98	0.40	0.79
	B09	14.9-15.9	7.1	25	100	72	0.54	0.93
	B09	18.0-18.9	6.5	25	101	72	0.52	0.89
	B10	0.05-0.9	0.92	30	76	73	0.38	0.66
	B10	13.9-14.7	1.7	25	100	65	0.40	0.66
HKLR								
Sampling for HKLR viaduct (2004)	A1	0.55-1.00	6.1	27	82	58	0.50	0.79
	A1	1.0–2.0						
	A1	2.0–3.0						
	A2	0.47–1.00	6.5	25	85	72	0.40	0.69
	A2	2.0–3.0						
	A2	8.0–9.0						

Sample	Sample Location	Sampling Depth (m)	Interstitial Ammonia ($mgNH_3/L$)	Interstitial Salinity (ppt)	Grain Size <63m (%)	Moisture Content* (%)	TOC (% Wet Weight)	TOC (% Dry Weight)
	A3	5.0–6.0	21	25	93	78	0.45	0.80
	A4	0.14–1.00	7.5	26	90	79	0.45	0.81
	A4	8.0-9.0						
	A4	14.0–15.0						
	A5	6.0–9.0	N/A**	24	98	67	0.30	0.50
	A5	14.0-15.0						
	B8	0.25–1.00	4.3	26	96	83	0.45	0.82
	B9	0.9–1.0	12	24	42	46	0.25	0.36
	B9	5.0-6.0						
	B9	7.0-8.0						
	B14	0.25-1.00	6.7	25	92	83	0.40	0.73
	B14	5.0-6.0						
	B15	0.45-1.00	36	23	91	42	0.40	0.57
	B15	1.0-2.0						
	B15	8.0-9.0						
	G13	Surface	1.8	32	95	89	0.45	0.85
	G14	Surface	7.1	28	89	77	0.35	0.62

Note: N/A – Insufficient sample for biological test.*
*N/A**- Analysis was not performed due to insufficient amount of porewater obtained.*

7.6.3 Elutriate Samples

7.6.3.1 Elutriate tests were conducted for the purpose of water quality assessment (see **Section 9**) of the extent of contaminant release when dredging activities take place. The testing parameters included heavy metals (cadmium, chromium, copper, mercury, nickel, lead, zinc and silver), metalloid (arsenic) and organic micro-pollutants (PCB, PAH and TBT), chlorinated pesticides and nutrients including NH_3-N, PO_4-P, and total phosphorus.

7.6.3.2 The elutriate test results are summarised in **Tables 7-16 and 7-17**. In general, the levels of PAHs, PCBs and TBT, metals were all below the reporting limits.

Table 7.16 Elutriate Test Results (Metals, Metalloid and PAHs)

Sample location	Sampling Depth below seabed (m)	Metals (ug/L)								Metalloid (ug/L)	Organic-PAHs (µg/L)	
		Cd	Cr	Cu	Hg	Ni	Pb	Ag	Zn	As	LMW PAH	HMW PAH
A01	0.05 - 0.9	<0.2	<1	1	<0.1	2.1	<1	<1	<4	3.7	<0.20	<0.20
A01	0.9 – 1.9	<0.2	<1	<1	<0.1	<1	<1	<1	<4	4.4	<0.20	<0.20
A01	2.9 – 3.9	<0.2	<1	1.7	<0.1	2.5	<1	<1	<4	9.9	<0.20	<0.20
A01	7.9-8.9	<0.2	<1	<1	<0.1	1.1	<1	<1	<4	2.3	<0.20	<0.20
A01	9.9–10.8	0.37	<1	<1	<0.1	6.5	<1	<1	8.5	<2	<0.20	<0.20
A02	0.2-0.9	<0.2	<1	<1	<0.1	1.1	<1	<1	<4	23	<0.20	<0.20
A02	2.9-3.9	<0.2	<1	<1	<0.1	2.2	<1	<1	<4	57	<0.20	<0.20
A02	7.9-8.9	<0.2	<1	<1	<0.1	2.0	<1	<1	<4	13	<0.20	<0.20
A02	14.9-15.9	<0.2	<1	1.2	<0.1	1.7	<1	<1	5	7.5	<0.20	<0.20
A02	16.9-17.9	<0.2	<1	1.3	<0.1	1.9	<1	<1	5	4.3	<0.20	<0.20
A03	0.2-0.9	<0.2	<1	<1	<0.1	2	<1	<1	<4	2.9	<0.20	<0.20
A03	2.9-3.9	<0.2	<1	<1	<0.1	1.5	<1	<1	<4	28	<0.20	<0.20
A03	7.9-8.9	<0.2	<1	<1	<0.1	1.7	<1	<0.1	4.3	6.5	<0.20	<0.20
A03	14.9-15.9	<0.2	<1	<1	<0.1	3	<1	<1	<4	3.1	<0.20	<0.20
A03	15.9-16.35	0.2	<1	1.3	<0.1	9.1	<1	<1	9.6	2.3	<0.20	<0.20
A04	0.0-0.9	<0.2	<1	<1	<0.1	1.2	<1	<1	<4	11	<0.20	<0.20

7.7 Classification of Sediment

7.7.1 Based on the chemical and biological test results, the classification of sediment samples according to ETWBTC (Works) No. 34/2002 is summarised in **Table 7-20**. It is anticipated that the sediments generally belong to Category L (Type 1 open sea disposal), Category Mp (Type 1 open sea disposal at dedicated sites) and Category Mf (Type 2 confined marine disposal). No Category H sediment is found according to the findings of this study.

Table 7-20 Classification of Sediment

Sample	Sampling Location	Sampling Depth (m)	Category			Disposal Method according to ETWBTC (Works) No. 34/2002
			L	Mp	Mf	
HKBCF						
Sampling for HKBCF reclamation (2008)	A01	0.05 - 0.9		#		Open Sea Disposal (Dedicated Sites)
	A01	0.9 – 1.9		#		Open Sea Disposal (Dedicated Sites)
	A01	1.9 – 2.9		#		Open Sea Disposal (Dedicated Sites)
	A01	4.9 – 5.9	#			Open Sea Disposal
	A01	7.9-8.9		#		Open Sea Disposal (Dedicated Sites)
	A01	9.9–10.8			#	Confined Marine Disposal
	A02	0.2-0.9	#			Open Sea Disposal
	A02	0.9-1.9	#			Open Sea Disposal
	A02	1.9-2.9	#			Open Sea Disposal
	A02	2.9-39	#			Open Sea Disposal
	A02	4.9-5.9	#			Open Sea Disposal
	A02	7.9-8.9	#			Open Sea Disposal
	A02	12.0-12.9	#			Open Sea Disposal
	A02	14.9-15.9		#		Open Sea Disposal (Dedicated Sites)
	A02	16.9-17.9			# [Note 1]	Confined Marine Disposal
	A03	0.2-0.9	#			Open Sea Disposal
	A03	0.9-1.9	#			Open Sea Disposal
	A03	1.9-2.9	#			Open Sea Disposal
	A03	4.9-5.9	#			Open Sea Disposal
	A03	7.9-8.9	#			Open Sea Disposal
	A03	12.0-12.9		#		Open Sea Disposal (Dedicated Sites)
	A03	14.9-15.9		#		Open Sea Disposal (Dedicated Sites)
	A03	15.9-16.35		#		Open Sea Disposal (Dedicated Sites)
	A04	0.0-0.9	#			Open Sea Disposal
	A04	0.9-1.9	#			Open Sea Disposal
	A04	1.9-2.9	#			Open Sea Disposal
	A04	2.9-3.9	#			Open Sea Disposal
	A04	4.9-5.9	#			Open Sea Disposal
	A04	7.9-8.9	#			Open Sea Disposal
	A04	12.15-12.9	#			Open Sea Disposal
	A04	14.9-15.9	#			Open Sea Disposal
	A04	18.05-18.9		#		Open Sea Disposal (Dedicated Sites)
	B05	0.25-0.9		#		Open Sea Disposal (Dedicated Sites)
	B05	0.9-1.9		#		Open Sea Disposal (Dedicated Sites)
	B05	1.9-2.9		#		Open Sea Disposal (Dedicated Sites)
	B05	4.9-5.9	#			Open Sea Disposal
	B05	7.9-8.9		#		Open Sea Disposal (Dedicated Sites)
	B05	12.0-12.9	#			Open Sea Disposal
	B05	14.9-15.9	#			Open Sea Disposal
	B05	15.9-16.1			# [Note 1]	Confined Marine Disposal
	B06	0.35-0.9	#			Open Sea Disposal
	B06	0.9-1.9	#			Open Sea Disposal

Sample	Sampling Location	Sampling Depth (m)	Category			Disposal Method according to ETWBTC (Works) No. 34/2002
			L	Mp	Mf	
	B06	1.9-2.9	#			Open Sea Disposal
	B06	4.9-5.9	#			Open Sea Disposal
	B06	7.9-8.9	#			Open Sea Disposal
	B06	9.9-10.9	#			Open Sea Disposal
	B06	10.9-11.35	#			Open Sea Disposal
	B07	0.0-0.9	#			Open Sea Disposal
	B07	0.9-1.9	#			Open Sea Disposal
	B07	1.9-2.9	#			Open Sea Disposal
	B07	2.9-3.9	#			Open Sea Disposal
	B07	4.9-5.9	#			Open Sea Disposal
	B07	7.9-8.9	#			Open Sea Disposal
	B07	12.0-12.9	#			Open Sea Disposal
	B07	14.9-15.9		#		Open Sea Disposal (Dedicated Sites)
	B08	0.0-0.9	#			Open Sea Disposal
	B08	0.9-1.9	#			Open Sea Disposal
	B08	1.9-2.9	#			Open Sea Disposal
	B08	2.9-3.9	#			Open Sea Disposal
	B08	4.9-5.9	#			Open Sea Disposal
	B08	7.9-8.9	#			Open Sea Disposal
	B08	12.1-12.9	#			Open Sea Disposal
	B08	14.9-15.9	#			Open Sea Disposal
	B08	18.0-18.9		#		Open Sea Disposal (Dedicated Sites)
	B09	0.1-0.9		#		Open Sea Disposal (Dedicated Sites)
	B09	0.9-1.9		#		Open Sea Disposal (Dedicated Sites)
	B09	1.9-2.9	#			Open Sea Disposal
	B09	4.9-5.9	#			Open Sea Disposal
	B09	7.9-8.9	#			Open Sea Disposal
	B09	12.1-12.9	#			Open Sea Disposal
	B09	14.9-15.9		#		Open Sea Disposal (Dedicated Sites)
	B09	18.0-18.9		#		Open Sea Disposal (Dedicated Sites)
	B10	0.05-0.9		#		Open Sea Disposal (Dedicated Sites)
	B10	0.9-1.9	#			Open Sea Disposal
	B10	1.9-2.9	#			Open Sea Disposal
	B10	2.9-3.9	#			Open Sea Disposal
	B10	4.9-5.9	#			Open Sea Disposal
	B10	7.9-8.9	#			Open Sea Disposal
	B10	12.0-12.9	#			Open Sea Disposal
	B10	13.9-14.7		#		Open Sea Disposal (Dedicated Sites)
HKLR						
Sampling for HKLR viaduct (2004)	A1	0.55-1.00		#		Open Sea Disposal (Dedicated Sites)
	A1	1.0-2.0		#		Open Sea Disposal (Dedicated Sites)
	A1	2.0-3.0		#		Open Sea Disposal (Dedicated Sites)
	A1	5.0-6.0	#			Open Sea Disposal
	A1	8.0-9.0	#			Open Sea Disposal
	A1	14.0-15.0	#			Open Sea Disposal
	A2	0.47-1.00		#		Open Sea Disposal (Dedicated Sites)
	A2	2.0-3.0		#		Open Sea Disposal (Dedicated Sites)
	A2	5.0-6.0	#			Open Sea Disposal
	A2	8.0-9.0		#		Open Sea Disposal (Dedicated Sites)
	A3	0.41-1.0	#			Open Sea Disposal
	A3	2.0-3.0	#			Open Sea Disposal
	A3	5.0-6.0		#		Open Sea Disposal (Dedicated Sites)

Sample	Sampling Location	Sampling Depth (m)	Category			Disposal Method according to ETWBTC (Works) No. 34/2002
			L	Mp	Mf	
	A3	8.0-9.0	#			Open Sea Disposal
	A3	14.0-15.0	#			Open Sea Disposal
	A4	0.14-1.00		#		Open Sea Disposal (Dedicated Sites)
	A4	1.0-2.0	#			Open Sea Disposal
	A4	2.0-3.0	#			Open Sea Disposal
	A4	5.0-6.0	#			Open Sea Disposal
	A4	8.0-9.0		#		Open Sea Disposal (Dedicated Sites)
	A4	14.0-15.0		#		Open Sea Disposal (Dedicated Sites)
	A5	0.17-1.00	#			Open Sea Disposal
	A5	2.0-3.0	#			Open Sea Disposal
	A5	5.0-6.0	#			Open Sea Disposal
	A5	8.0-9.0			#	Confined Marine Disposal
	A5	14.0-15.0			#	Confined Marine Disposal
	B8	0.25-1.00		#		Open Sea Disposal (Dedicated Sites)
	B8	1.0-2.0	#			Open Sea Disposal
	B8	2.0-3.0	#			Open Sea Disposal
	B8	5.0-6.0	#			Open Sea Disposal
	B8	8.0-9.0	#			Open Sea Disposal
	B8	14.0-15.0	#			Open Sea Disposal
	B9	0.90-1.00			#	Confined Marine Disposal
	B9	1.0-2.0	#			Open Sea Disposal
	B9	2.0-3.0	#			Open Sea Disposal
	B9	5.0-6.0			#	Confined Marine Disposal
	B9	7.0-8.0			#	Confined Marine Disposal
	B14	0.25-1.00		#		Open Sea Disposal (Dedicated Sites)
	B14	2.0-3.0	#			Open Sea Disposal
	B14	5.0-6.0		#		Open Sea Disposal (Dedicated Sites)
	B14	7.0-8.0	#			Open Sea Disposal
	B15	0.45-1.00			#	Confined Marine Disposal
	B15	1.0-2.0			#	Confined Marine Disposal
	B15	2.0-3.0	#			Open Sea Disposal
	B15	5.0-6.0	#			Open Sea Disposal
	B15	8.0-9.0			#	Confined Marine Disposal
	B16	0.0-1.0	#			Open Sea Disposal
	B16	1.0-2.0	#			Open Sea Disposal
	B16	2.0-3.0	#			Open Sea Disposal
	B17	0.0-1.0	#			Open Sea Disposal
	G13	Surface		#		Open Sea Disposal (Dedicated Sites)
	G14	surface			#	Confined Marine Disposal
Sampling for HKLR reclamation (2009)	C11	0.3-0.9	#			Open Sea Disposal
	C11	0.9-1.9	#			Open Sea Disposal
	C11	1.9-2.9	#			Open Sea Disposal
	C11	4.9-5.9	#			Open Sea Disposal
	C11	7.9-8.9			#	Confined Marine Disposal
	C11	9.9-10.8			#	Confined Marine Disposal
	C12	0.2-0.9	#			Open Sea Disposal
	C12	0.9-1.9	#			Open Sea Disposal
	C12	1.9-2.9	#			Open Sea Disposal
	C12	4.9-5.9	#			Open Sea Disposal
	C12	7.9-8.9	#			Open Sea Disposal
	C12	8.9-9.9	#			Open Sea Disposal
	C12	9.9-10.4	#			Open Sea Disposal

Sample	Sampling Location	Sampling Depth (m)	Category			Disposal Method according to ETWBTC (Works) No. 34/2002
			L	Mp	Mf	
	C13	0.2-0.9	#			Open Sea Disposal
	C13	0.9-1.9	#			Open Sea Disposal
	C13	1.9-2.9	#			Open Sea Disposal
	C13	4.9-5.9	#			Open Sea Disposal
	C13	7.9-8.9	#			Open Sea Disposal
	C13	9.9-10.9	#			Open Sea Disposal
	C14	0.3-0.9	#			Open Sea Disposal
	C14	0.9-1.9	#			Open Sea Disposal
	C14	1.9-2.9	#			Open Sea Disposal
	C14	4.9-5.9	#			Open Sea Disposal
	C14	7.9-8.9			#	Confined Marine Disposal
	C14	10.9-11.9	#			Open Sea Disposal
	C14	12.0-12.6	#			Open Sea Disposal
	C15	0.1-0.9	#			Open Sea Disposal
	C15	0.9-1.9	#			Open Sea Disposal
	C15	1.9-2.9	#			Open Sea Disposal
	C15	4.9-5.9	#			Open Sea Disposal
	C15	7.9-8.9	#			Open Sea Disposal
	C15	10.9-11.8	#			Open Sea Disposal
	C16	0.2-0.9	#			Open Sea Disposal
	C16	0.9-1.9	#			Open Sea Disposal
	C16	1.9-2.9	#			Open Sea Disposal
	C16	4.9-5.9	#			Open Sea Disposal
	C16	7.9-8.9	#			Open Sea Disposal

Note: *1) There were insufficient samples to carry out the biological test for sample A02 (16.9-17.9m) and B05 (15.9-16.1m). Therefore, no biological test results are available for these two samples. As a conservative assumption, it is assumed that these two samples failed the biological test and they are classified as Mf materials.*

2) The biological test for Samples C11 (7.9-8.9m & 9.9-10.8m) and C14 (7.9-8.9m) for HKLR are being carried out and it could be Mp or Mf depending on the biological test results. Review will be made when the test results are available.

7.7.2 For Samples A02 (16.9-17.9m) and B05 (15.9–16.1m), there were insufficient samples for the biological test and therefore no biological test results are available for these two samples. To be conservative, it is assumed that these two samples failed the biological test and they are classified as Mf sediment. This will be reviewed later when future ground investigation is carried out.

7.7.3 The classification of sediment samples given in **Table 7-20** above is used to estimate the quantities of different category of marine deposit to be dredged and disposed from HKBCF and HKLR. This information is vital to determine the disposal method of dredged marine deposit in accordance with ETWBTC (Works) No. 34/2002. The method to determine the portion of different category of dredged marine deposit in HKBCF and HKLR is given below:

7.7.4 HKBCF - Reclamation

7.7.4.1 As shown in **Figure 7.4**, the whole reclamation site of HKBCF is divided into portions and the classification of dredged sediment in each portion is represented by the corresponding vibrocore carried out in this Project. As discussed in **Section 4.4**, Sequence B of the reclamation method should be adopted in HKBCF and the reclamation layout is shown in **Figure 4.7** in **Section 4**. The area to be dredged is also plotted in **Figure 7.4**. In this way, the proportion of different Category of marine deposit to be dredged could be estimated by considering the dredge area and the result of the corresponding vibrocore. The estimate of the proportion of different category of dredged marine deposit is shown in **Table 7-21**.

APPENDIX D

Location and Monitoring Data of EPD Monitoring Station NS3

LEGEND

- Project Location
- Sediment Sampling Location at NS3

Meinhardt Infrastructure and Environment Limited 邁進基建環保工程顧問有限公司	Airport Tung Chung Link Project Sediment Sampling Location at NS3	Appendix D Scale: As Shown

Summary statistics for marine sediment quality in the North Western and Western Buffer WCZs, 2015 - 2019

Parameter	Pearl Island NS2	Pillar Point NS3	Urmston Road NS4	Chek Lap Kok (North) NS6	Tsing Yi (South) WS1	Hong Kong Island (West) WS2
Number of samples	10	10	10	10	10	10
Particle Size Fractionation <63µm (%w/w)	63 (34 - 97)	64 (41 - 96)	52 (30 - 72)	72 (33 - 99)	80 (72 - 94)	81 (65 - 91)
Electrochemical Potential (mV)	-162 (-298 - -59)	-203 (-382 - -125)	-196 (-388 - -118)	-184 (-377 - -118)	-231 (-350 - -109)	-202 (-347 - -102)
Total Solids (%w/w)	54 (39 - 65)	51 (44 - 63)	58 (50 - 65)	56 (47 - 70)	47 (40 - 52)	48 (44 - 54)
Total Volatile Soilds (%TS)	6.4 (4.8 - 7.8)	6.9 (5.0 - 8.5)	5.8 (4.7 - 7.5)	6.2 (3.0 - 8.2)	7.4 (6.2 - 9.1)	7.4 (6.1 - 9.8)
Chemical Oxygen Demand (mg/kg)	11310 (6900 - 15000)	13100 (11000 - 15000)	13400 (11000 - 17000)	11040 (8700 - 15000)	15500 (12000 - 21000)	13400 (11000 - 16000)
Total Carbon (%w/w)	0.8 (0.5 - 1.2)	0.7 (0.6 - 0.9)	0.6 (<0.1 - 0.8)	0.7 (0.4 - 1.2)	0.8 (0.5 - 1.1)	0.7 (0.6 - 1.2)
Ammonical Nitrogen (mg/kg)	5.25 (<0.05 - 13.00)	8.61 (0.07 - 31.00)	4.75 (0.17 - 24.00)	13.31 (<0.05 - 76.00)	11.18 (1.40 - 27.00)	5.57 (0.65 - 12.00)
Total Kjeldahl Nitrogen (mg/kg)	400 (280 - 540)	460 (400 - 530)	450 (330 - 740)	420 (340 - 570)	560 (500 - 770)	490 (370 - 600)
Total Phosphorus (mg/kg)	220 (170 - 280)	230 (210 - 260)	220 (190 - 250)	220 (160 - 310)	240 (210 - 270)	220 (170 - 250)
Total Sulphide (mg/kg)	28.7 (0.9 - 100.0)	54.6 (1.6 - 230.0)	20.0 (4.3 - 51.0)	9.2 (<0.2 - 35.0)	121.3 (52.0 - 320.0)	18.5 (<0.2 - 46.0)
Total Cyanide (mg/kg)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.2)
Arsenic (mg/kg)	10.9 (7.0 - 23.0)	11.9 (7.7 - 16.0)	10.7 (7.8 - 13.0)	15.2 (7.1 - 22.0)	9.1 (7.5 - 11.0)	9.0 (7.1 - 13.0)
Cadmium (mg/kg)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.2)	0.1 (<0.1 - 0.1)	0.1 (<0.1 - 0.1)	0.1 (0.1 - 0.2)	0.1 (<0.1 - 0.1)
Chromium (mg/kg)	32 (20 - 48)	29 (22 - 45)	26 (20 - 32)	31 (21 - 38)	34 (26 - 46)	31 (25 - 34)
Copper (mg/kg)	31 (17 - 48)	27 (17 - 51)	27 (17 - 44)	22 (13 - 34)	49 (26 - 100)	25 (18 - 33)
Lead (mg/kg)	45 (29 - 90)	38 (28 - 53)	34 (30 - 39)	39 (25 - 51)	38 (33 - 52)	35 (30 - 42)
Mercury (mg/kg)	0.09 (0.06 - 0.12)	0.10 (0.06 - 0.14)	0.08 (0.06 - 0.11)	0.09 (0.05 - 0.13)	0.17 (0.10 - 0.25)	0.10 (0.07 - 0.14)
Nickel (mg/kg)	19 (12 - 30)	17 (12 - 27)	16 (12 - 26)	19 (12 - 25)	20 (16 - 26)	20 (18 - 22)
Silver (mg/kg)	0.2 (<0.2 - 0.4)	0.2 (<0.2 - 0.4)	0.2 (<0.2 - 0.2)	<0.2 (<0.2 - <0.2)	0.6 (0.3 - 1.7)	0.3 (<0.2 - 0.5)
Zinc (mg/kg)	140 (79 - 220)	110 (83 - 160)	110 (90 - 150)	100 (61 - 180)	150 (94 - 300)	110 (86 - 170)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) [3]	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 18)	18 (18 - 19)
Low Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [4] [6]	110 (90 - 150)	110 (90 - 220)	100 (90 - 140)	110 (90 - 200)	130 (90 - 320)	120 (90 - 220)
High Molecular Weight Polycylic Aromatic Hydrocarbons (PAHs) (µg/kg) [5] [6]	59 (36 - 100)	69 (30 - 120)	100 (28 - 230)	57 (24 - 130)	170 (91 - 400)	360 (29 - 1500)

Note:
1. Data presented are arithmetic means ; data in brackets indicate ranges.
2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.
3. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.
4. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.
5. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.
6. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

APPENDIX E

Memo issued by Development Bureau on Control Measures for Management of Dredged/Excavated Contaminated Sediment

MEMO

From	Secretary for Development	*To*	Distribution
Ref	() *in* DEVB(W) 515/83/04	*(Attn :*	RECEIVED ON
Tel. No.	2848 2704	*Your Ref.*	
Fax No.	2536 9299	*dated*	- 6 OCT 2010
Email	wwchui@devb.gov.hk	*Fax No.*	Fill Management Division
Date	6 October 2010	*Total Pages*	4 + Encl.

TM/COM/21

Control Measures for Management of
Dredged/Excavated Contaminated Sediment

This memo is to promulgate control measures about management of dredged/excavated contaminated sediment.

2. Dredged/excavated contaminated sediment has been disposed of at mud pits at East of Sha Chau since 1992. However, with environmental, marine traffic and development constraints, the mud pits now under construction at East of Sha Chau and the mud pits being planned at South of the Brothers are the last mud pits available in Hong Kong.

3. To ensure maximum effort is made by the project proponent to reduce the consumption of the very limited mud pit capacity, it is necessary to tighten the control on management of dredged/excavated contaminated sediment, including the stepping up of sampling requirement at early stage of project planning, the exhaustive examination of options to reduce sediment generation and disposal, the requirement for cross-boundary disposal of Category Mp sediment and the enhancement of accountability of sediment disposal proposal.

4. The control measures to tighten up the control on management of dredged/excavated contaminated sediment are as follows:

(a) To enable a more accurate estimate of mud disposal volume be made available for consideration when provisional agreement for sediment disposal allocation is sought for projects involving dredging and excavation in areas where the expected contamination level is Category M/H, Marine Fill Committee (MFC) requires that the project proponent should take sediment samples at a 200m x 200m grid. The samples should be continuous and with a vertical profile. The top level of the sub-samples should be at seabed, 0.9m down, 1.9m

down, 2.9m down and then every 3m to the bottom of the dredged layers. The project proponent should as early as practicable submit the proposed sampling plan to the Dumping At Sea Ordinance (DASO) Team of the Environmental Protection Department (EPD) for comment.

(b) The project proponent is required to carry out an assessment on sediment management as outlined on the "Flow Chart for Management of Contaminated Sediment" at **Appendix A**. This requirement ensures that the project proponent has exhausted all management options to keep the sediment in place and explored in details all possible ex-situ treatment, disposal and beneficial reuse options before a decision is made to remove the sediment off site. Reference should be made to the consultancy study – FM01/2007 by the Civil Engineering and Development Department (CEDD) on various management options. A copy of the report is available on CEDD's website.

(c) Project proponents should apply for cross-boundary disposal of Category Mp sediment generated from their projects in accordance with the Agreement on Cross-boundary Marine Dumping and the Implementation Scheme on the Management of Cross-boundary Marine Dumping unless the genuinely estimated quantity of Category Mp sediment is less than 100,000 m^3. Other non-mud pit options for Category Mp sediment should also be examined. In case the application is not successful and there is no other feasible non-mud pit options, the project proponent should liaise with the Secretary of MFC about fall-back options.

(d) To enhance the accountability of the sediment disposal proposal, endorsement by the appropriate directorate officer of the works departments or the Authorized Person (AP) of the private project as indicated on the attached Flow Chart at **Appendix A** is required to be obtained prior to submission of the disposal option to the Secretary of MFC. Project proponents may seek advice from the Secretary of MFC, if necessary.

FM									
	CE	SE/P1	SE/P2	SE/P3		SE/BP	SE/HF	SE/S1	SE/S2
Initial									
Date									
E/			GR			CIR			
PS II			FM / /			BU			

(e) Project proponents are required to exhaust all management options and work out the estimated quantities of contaminated sediments to be disposed of based on the results of the sampling carried out as early as practicable according to (a) above and seek provisional agreement from MFC on allocation of disposal space at mud pit. Such allocation will have to be re-confirmed after the sediment quality report (SQR) is completed and approved by DASO team of EPD during the detailed design stage. During construction, a project proponent should review from time to time the estimated final quantity of contaminated sediment disposal and advise MFC of any changes in advance before the actual disposed quantity has reached 80% of the approved quantity. If the latest estimated final quantity **exceeds** the approved quantity by 5,000 m^3 (or 5% of the approved quantity, whichever is more), the project proponent should seek further approval from MFC as a new application with appropriate endorsement as follows:

Scenario		Endorsement
(I) Public Works Projects		
(i)	The estimated final quantity **does not exceed** the approved quantity by 100,000m^3 (or 5% of the approved quantity, whichever is more)	By a D2 officer for MFC's approval
(ii)	The estimated final quantity **exceeds** the approved quantity by 100,000m^3 (or 5% of the approved quantity, whichever is more)	By a D3 officer for MFC's approval
(II) Private Projects		Endorsement by the AP for MFC's approval

Examples illustrating how the threshold quantities are determined and how the requirements of new applications and endorsements apply are shown in **Appendix B**.

(f) If a public project proponent disposes a quantity of 5,000 m^3 (or 5% of the approved quantity, whichever is more) more

than the approved quantity without the prior approval of MFC, or a quantity less than the approved quantity by more than 5,000 m^3 (or 5% of the approved quantity, whichever is more) without prior notification to MFC, the respective Director should personally provide an explanation to MFC and copy it to the Permanent Secretary for Development (Works).

5. This memo should be read in conjunction with ETWB TCW No. 34/2002 - Management of Dredged/Excavated Sediment.

6. This memo takes immediate effect. Paragraph 4 (c) should only apply to those projects for which provisional agreement of MFC for allocation of sediment disposal space has not yet been granted.

7. If you require further information, please contact Mr M Y Tang, AS(WP)6, at 2848 2585.

(W W CHUI)
for Secretary for Development

Distribution:

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c.c.

Director of Buildings	(Attn: Mr L C SHUM)	Fax No. : 2845 1559
Secretary, MFC	(Attn: Mr Raymond CHENG)	Fax No. : 2714 0113

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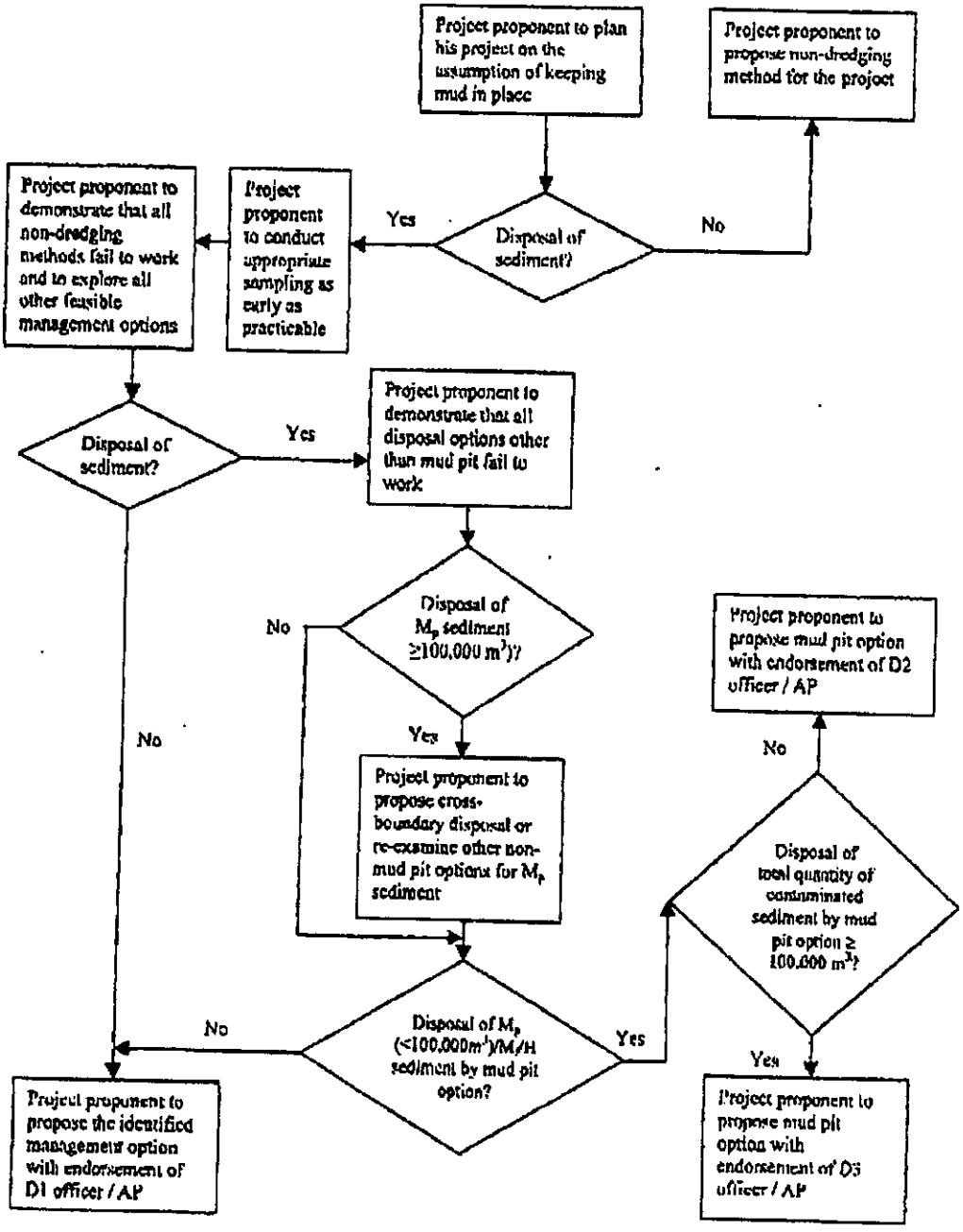
Appendix A

Flow Chart for Management of Contaminated Sediment#



This flow chart shall be read in conjunction with Appendix C of ETWB TC(W) No. 34/2002. M_p and M_f sediment refer to Category M sediment passing and failing respectively the biological screening.

Note: The volume refers to bulk volume.

Appendix B

Examples to illustrate how the threshold quantities are determined and how the requirements of new applications and endorsement apply

	Example	Threshold quantity for requirement of new application	Threshold quantity for requirement of endorsement by a D2/D3 Officer
		5,000m^3 or 5% of the approved quantity, whichever is more	**100,000m^3** or 5% of the approved quantity, whichever is more
(a)	Project with **large** quantity of contaminated sediment Approved Quantity: 2,500,000m^3 Estimated Quantity: 2,750,000m^3 (i.e. increase by 250,000m^3)	**125,000m^3** because 5% of approved quantity, i.e.125,000m^3 is more than 5,000m^3. A new application is required because the increased quantity i.e. 250,000m^3 exceeds 125,000m^3.	**125,000m^3** because 5% of the approved quantity, i.e. 125,000 m^3 is more than 100,000m^3. The new application shall be endorsed by a D3 officer because the increased quantity exceeds 125,000m^3.
(b)	Project with **medium** quantity of contaminated sediment Approved Quantity: 120,000m^3 Estimated Quantity: 132,00 m^3 (i.e. increase by 12,000m^3)	**6,000m^3** because 5% of approved quantity, i.e.6,000m^3 is more than 5,000m^3. A new application is required because the increased quantity i.e. 12,000m^3 exceeds 6,000m^3.	**100,000m^3** because 100,000m^3 is more than 5% of the approved quantity, i.e. 6,000 m^3. The new application shall be endorsed by a D2 officer because the increased quantity does not exceed 100,000m^3.
(c)	Project with **small** quantity of contaminated sediment Approved Quantity: 10,000m^3 Estimated Quantity: 11,000m^3 (i.e. increase by 1,000m^3)	**5,000m^3** because 5,000m^3 is more than 5% of approved quantity, i.e.500m^3. A new application is <u>not</u> required because the increased quantity, i.e. 1,000m^3 does not exceed 5,000m^3.	NA

* The threshold quantities determined for the respective example cases are shown in bold.