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MTR Corporation Limited

Consultancy Agreement No. C1502

Environmental Impact Assessment Study for Tuen Ma Extension

Sediment Sampling and Testing Plan

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1 INTRODUCTION

1.1 Background

1.1.1 The Tuen Ma (TME) Extension (hereinafter referred to as the "the Project") is one of the seven recommended railway schemes in the Railway Development Strategy 2014 (RDS-2014). The Project will extend the West Rail Line (WRL) from Tuen Mun Station (TUM) southwards by about 2.4 kilometres, including the provision of an elevated intermediate station at Tuen Mun Area 16 (A16) near the Tuen Mun Swimming Pool and a new station along Wu King Road near Tuen Mun Ferry Pier (i.e. Tuen Mun South Station (TMS)).

1.1.2 The Project will enhance railway access to the community south of the Tuen Mun town centre, through its serving the community south of the current Tuen Mun town centre, near Nerine Cove, The Sea Crest, Wu King Estate, Pierhead Garden, Richland Garden, Siu Hei Court, Yuet Wu Villa and Tuen Mun Ferry Pier.

1.1.3 The Project is situated on reclaimed land and Tuen Mun River. Based on previous geological investigation (GI) records, sediment is expected within the Project area and maybe encountered during the excavation works under the Project.

1.1.4 AECOM Asia Co. Ltd. (AECOM) was commissioned by the MTRCL to undertake the Environmental Impact Assessment (EIA) study under Consultancy Agreement No. C1502 and is responsible to conduct sediment quality assessment.

1.2 Objective of this Plan

1.2.1 In accordance with Clause 3 in Appendix E of the EIA Study Brief (No. ESB-332/2020), 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. 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) (with reference to section 4.4.2(c) of the *Technical Memorandum on the Environmental Impact Assessment Process*) prior to the commencement of the tests and document in the EIA report for consideration.

1.2.2 This Sediment Sampling and Testing Plan (SSTP) is to present the above sediment sampling and testing requirements according to Clause 3 in Appendix E of the EIA Study Brief for DEP agreement. The SSTP is prepared with reference to *the Practice Note for Authorized Persons and Registered Structural Engineers No. 252 – Management Framework for Disposal of Dredged / Excavated Sediment* (PNAP No. 252 (ADV-21)). 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.

1.2.3 It should be noted that to fulfil the requirements under the Dumping at Sea Ordinance (DASO), a separate SSTP may need to be submitted to EPD for agreement for the application of the dumping permit. Furthermore, the rationale for sediment removal should also be provided to the Secretary of Marine Fill Committee (MFC) for agreement in accordance with ADV-21.

1.3 Structure of Plan

1.3.1 Apart from this introductory section, the other sections of the SSTP are as follows:

- Section 2 presents the guidelines and criteria for the sediment assessment;
- Section 3 describes the proposed sediment excavation works and the existing sediment quality;
- Section 4 discusses the sediment sampling plan;
- Section 5 discusses the laboratory analysis requirements; and
- Section 6 presents the conclusion.

2 ENVIRONMENTAL GUIDELINES AND CRITERIA

2.1 General

2.1.1 The ADV-21 sets out the procedure for seeking approval to and the management framework for marine disposal of dredged/excavated sediment. It outlines the requirements to be followed in assessing and classifying the sediment and explains the marine disposal arrangement for the classified material. Based on the ADV-21, there are 3 types of disposal options for dredged/excavated sediments.

- Type 1 - Open Sea Disposal or Open Sea Disposal in Dedicated Sites;
- Type 2 - Confined Marine Disposal; and
- Type 3 – Special Treatment / Disposal

2.1.2 According to Appendix C of ADV-21, the management framework of dredged/excavated sediment in Hong Kong is implemented under the following three-tier approach.

2.2 Tier I Screening

2.2.1 Tier I screening is a desktop study to review the available information and to determine whether the sediment of concern belongs to Category L materials that are suitable for open sea disposal. If there is insufficient information to arrive at such conclusion, Tier II chemical screening should be proceeded accordingly.

2.3 Tier II Chemical Screening

2.3.1 The Tier II chemical screening is designed to categorise the sediment based on its chemical contaminant levels and to determine whether the sediment is suitable for open sea disposal without further testing. Sediment will be assessed according to the sediment quality criteria for the classification of sediment as stipulated in ADV-21 and as shown in **Table 2.1** below.

Table 2.1 Details of Proposed Sampling Locations

Contaminants	Lower Chemical Exceedance Level (LCEL)	Upper Chemical Exceedance Level (UCEL)
Metals (mg/kg dry wt.)		
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 wt.)		
Arsenic	12	42
Organic-PAHs (μg/kg dry wt.)		
Low Molecular Weight PAHs	550	3160
High Molecular Weight PAHs	1700	9600
Organic-non-PAHs (μg/kg dry wt.)		
Total PCBs	23	180

Contaminants	Lower Chemical Exceedance Level (LCEL)	Upper Chemical Exceedance Level (UCEL)
Organometallics (μg TBT/L in Interstitial water)		
Tributyltin*	0.15	0.15

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

2.3.2 Sediment will be classified into the following 3 categories based on the sediment quality criteria:

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 the 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 the final disposal.

2.3.3 Category L and Category H sediment with all contaminant levels at or below the 10 times the LCEL will require Type 1 and Type 2 disposal respectively. For Category M and Category H sediment with one or more contaminant levels exceeding 10 times the LCEL, Tier III biological screening will be required to determine the disposal options.

2.4 Tier III Biological Screening

2.4.1 The Tier III biological screening is to identify the most appropriate disposal option for Category M (either Type 1 or Type 2 disposal) and Category H sediment with one or more contaminant levels exceeding 10 times the LCEL (either Type 2 or Type 3 disposal).

2.4.2 Sediment classified as Category M will be subjected to the following 3 toxicity tests:

- A 10-day burrowing amphipod toxicity test;
- A 20-day burrowing polychaete toxicity test; and
- A 48-96 hour larvae (bivalve or echinoderm) toxicity test.

2.4.3 Sediment classified as Category H and with one or more contaminant levels exceeding 10 times the LCEL will also be subjected to the above 3 toxicity tests but in a diluted manner (dilution test).

2.4.4 **Table 2.2** summarises the details of the test endpoints and failure criteria of the 3 toxicity tests. The sediment is deemed to have failed the biological test if it fails in any one of the toxicity tests:

Table 2.2 Test Endpoints and Decision Criteria for Tier III Biological Screening

Toxicity Test	Endpoints Measured	Test Methods	Failure Criteria
10-day amphipod	Survival	USEPA Standard Methods for Assessing Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods, 1994	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]	PSEP Standard Recommended Guidelines for Conducting Laboratory Bioassays on the Puget Sound Sediments – Juvenile Polychaete Sediment Bioassay, 1995	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]	PSEP Standard Recommended Guidelines for Conducting Laboratory Bioassays on the Puget Sound Sediments – Juvenile Polychaete Sediment Bioassay, 1995	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.

Remarks:
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.

2.4.5 Category M sediment that fails the biological test will require Type 2 disposal whereas Category H sediment that fails the dilution test will require Type 3 special treatment / disposal.

3 DESCRIPTION OF PROPOSED SEDIMENT EXCAVATION WORKS AND EXISTING SEDIMENT QUALITY

3.1 Proposed Excavation Extent

3.1.1 The Project extend the WRL from TUM southwards by about 2.4 km, including the provision of elevated intermediate station at A16 near Tuen Mun Swimming Pool and a new station, TMS, near Tuen Mun Ferry Pier. At the time of this SSTP, the location of the intermediate A16 station is under review. Based on the current engineering design, three alignment options (namely Alignment Option A3, Alignment Option A4 and Alignment Option C) are being reviewed and are shown in **Figure Nos. C1502/C/TME/ACM/M61/001**, **C1502/C/TME/ACM/M61/002** and **C1502/C/TME/ACM/M61/003** respectively.

3.1.2 The EIA Study, including the waste management implications assessment, will evaluate the environmental impacts arising from the preferred alignment option only. However, given that the Project is under a tight programme and the GI works are imminent, this SSTP will cover all three alignment options.

3.1.3 All the proposed three alignment options fall on Tuen Mun River and reclaimed land. Based on the geological profile in the area (**Annex A** refers), underlying marine deposits are present in the vicinity of the alignment and stations. The construction of the piers and columns for the viaducts and stations under all the alignment options will require the excavation of the underlying marine deposits if present.

3.2 Review of Existing Sediment Quality

3.2.1 EPD conducts routine monitoring of the bottom sediment quality at 60 stations across the territory of Hong Kong waters. Among these 60 stations, the Tuen Mun Typhoon Shelter monitoring station (NS5) is the closest to the Project. Location of NS5 is shown in **Figure Nos. C1502/C/TME/ACM/M61/001**, **C1502/C/TME/ACM/M61/002** and **C1502/C/TME/ACM/M61/003**.

3.2.2 The sediment quality data at NS5 from 2015 to 2019, as extracted from the latest available EPD's Annual Marine Water Quality Report[1], is summarised in **Table 3.1**. As shown in **Table 3.1**, except for silver, zinc and arsenic, all the levels of metals, organic-PAHs and non-organic PAHs were below the LCEL. For zinc and arsenic, the highest levels measured (zinc: 260 mg/kg and arsenic: 14 mg/kg) were above the corresponding LCEL but below the UCEL. For silver, the arithmetic mean value (1.5 mg/kg) had exceeded the LCEL but below the UCEL and the highest level measured (9.7 mg/kg) was above the UCEL.

1 Environmental Protection Department, Marine Water Quality in Hong Kong in 2019.

Table 3.1 Summary of Sediment Quality Data at EPD Monitoring Station NS5 (Year 2015 to 2019)[1]

Contaminants	LCEL	UCEL	Arithmetic Mean Concentration (Data in Brackets Indicate Ranges)[2]
Metals (mg/kg dry wt.)			
Cadmium (Cd)	1.5	4	0.2 (<0.1 – 0.6)
Chromium (Cr)	80	160	35 (26 – 43)
Copper (Cu)	65	110	42 (26 – 64)
Mercury (Hg)	0.5	1	0.09 (0.05 – 0.12)
Nickel (Ni)	40	40	19 (14 – 24)
Lead (Pb)	75	110	49 (31 – 68)
Silver (Ag)	1	2	1.5 (0.3 – **9.7**)
Zinc (Zn)	200	270	160 (98 – 260)
Metalloid (mg/kg dry wt.)			
Arsenic (As)	12	42	9.9 (7.8 – 14)
Organic-PAHs (µg/kg dry wt.)			
Low Molecular Weight PAHs[3]	550	3160	180 (90 – 340)
High Molecular Weight PAHs[4]	1700	9600	110 (35 – 200)
Organic-non-PAHs (µg/kg dry wt.)			
Total PCBs[5]	23	180	18 (18 – 18)
Organometallics (µg TBT/L in interstitial water)			
Tributyltin	0.15	0.15	N/A[6]

Remarks:
1. Data extracted from EPD's Marine Water Quality in Hong Kong in 2019.
2. Underline value denotes the contaminant level exceeds the LCEL but below the UCEL. Bold value denotes the contaminant level exceeds the UCEL.
3. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely: Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene and Phenanthrene.
4. 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.
5. 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.
6. Sediment quality data not available.

4 PROPOSED SEDIMENT SAMPLING PLAN

4.1 Proposed Sampling Locations

4.1.1 As discussed in **Section 3**, given the presence of sediment in the Project area, sampling locations are recommended along the proposed viaducts and elevated A16 / TMS stations. As contaminants exceeding the LCEL / UCEL were identified in the EPD monitoring data, a 200m x 200m sampling grid arrangement with reference to the memo "*Control Measures for Management of Dredged/Excavated Contaminated Sediment"* issued by Development Bureau (ref: 0 in DEVB(W) 515/83/04) (**Annex B** refers) would be suffice. However, in order to refine the sediment profile and quantities estimation, a more stringent 100 x 100m sampling grid arrangement, as recommended in ADV-21 for expected high sediment contamination level, is proposed.

4.1.2 From the above, a total of 32 sediment sampling locations are proposed within the reclaimed land area and Tuen Mun River. Due to site constraints (e.g. road traffic / existing structure), some of the sampling locations are proposed to be shifted to nearby footpaths or vacant areas but are all well within the corresponding sampling grids. The sampling locations for land-based and river-based sediment with Hong Kong metric grid coordinates are shown in **Table 4.1** below and in **Figure Nos. C1502/C/TME/ACM/M61/004** and **C1502/C/TME/ACM/M61/005** respectively. Furthermore, if biological screening is required, grab sample will also be collected from EPD's routine sediment monitoring station PS6 at Port Shelter (E850234, N820057) as the reference sediment sample.

Table 4.1 Proposed Sediment Sampling Locations

Sampling ID	Sampling Method	Sampling Depth	Coordinates[1]	
			Easting	Northing
Reclaimed Land Area				
1530-TME-EDH117	Borehole Drilling	Top of marine deposit, 0.9m down, 1.9m down, 2.9m down, thereafter 3m to 1m below the marine deposit layer	814464.5	826002.7
1530-TME-EDH215			814507.0	826046.4
1530-TME-EDH114			814536.1	826156.8
1530-TME-EDH213			814558.3	826250.2
1530-TME-EDH227(P)			814591.8	826365.7
1530-TME-EDH111			814614.0	826447.1
1530-TME-EDH210(P)			814629.3	826547.4
1530-TME-EDH116			814645.2	826619.2
1530-TME-EDH109(P)			814678.2	826732.1
1530-TME-EDH315			814747.5	827070.0
1530-TME-EDH207			814779.5	827140.1
1530-TME-EDH206			814827.2	827250.7
1530-TME-EDH306			814886.7	827322.2
1530-TME-EDH205(P)			814981.1	827404.1
1530-TME-EDH204			815038.5	827473.0
1530-TME-EDH203			815076.6	827528.4
Tuen Mun River				
1530-TME-MEDH116	Grab and Vibrocoring / Borehole Drilling	Riverbed surface, 0.9m down, 1.9m down, 2.9m down, thereafter 3m to 1m below the marine deposit layer	814699.6	826790.6
1530-TME-MEDH115			814698.2	826893.3
1530-TME-MEDH114			814710.5	826993.0
1530-TME-MEDH113			814726.9	827091.8
1530-TME-MEDH112			814771.1	827184.5
1530-TME-MEDH111			814810.2	827278.3
1530-TME-MEDH110			814896.2	827361.9

Sampling ID	Sampling Method	Sampling Depth	Coordinates[1]	
			Easting	Northing
1530-TME-MEDH109			814983.4	827445.2
1530-TME-MEDH108			815064.9	827536.0
1530-TME-MEDH107			815112.6	827624.9
1530-TME-MEDH106			815142.4	827718.8
1530-TME-MEDH105			815164.3	827817.6
1530-TME-MEDH117			815187.9	827914.9
1530-TME-MEDH203			815209.3	828014.6
1530-TME-MEDH102			815227.3	828107.8
1530-TME-MEDH101			815247.5	828203.9
PS6 (Reference)[2]	Grab Sample	Seabed Surface[2]	850234.0	820057.0

Remarks:
1 Actual locations subject to fine adjustments on-site
2 Reference sample will be collected at Port Shelter if biological testing is required.

4.1.3 The exact sampling locations will be determined on site and subject to fine adjustment due to site specific conditions (e.g. locations, presence of foundations, underground utilities, delivery pipes and services). Details of the adjustments, if any, will be reported in the EIA Report.

4.2 Sediment Sampling at Reclaimed Land Area and Tuen Mun River

Reclaimed Land Area

4.2.1 Upon determination of the exact sampling locations, a survey will be undertaken to measure the Hong Kong Grid Coordinates and metres above the Principal Datum (mPD) of the sampling locations.

4.2.2 Sediment samples will be collected using borehole drilling method. The borehole will be undertaken by means of dry rotary drilling method (i.e. without the use of flushing medium) as much as possible. For safety reasons, an inspection pit will be excavated down to 1.5m below ground level (m bgl) to inspect for underground utilities at the proposed borehole locations.

4.2.3 Undisturbed samples using U100 sampler (made of stainless steel or other appropriate materials) will be collected at depth where marine sediments are firstly encountered and samples will be taken at that particular depth (i.e. level of marine deposit), 0.9 m down, 1.9 m down, 2.9 m down and then every 3m down to the borehole termination depth. The depth of sediment sampling will be terminated at least 1m below the base of marine sediment. Sufficient amount of sediment sample will be taken for both chemical and biological testing. The undisturbed samples will be sealed up with tightly fitting rubber caps and duct-taped in place. Each sample will be clearly labeled 'top' and 'bottom' and with sample identity (e.g. station number, sample depth, sampling date and time, together with full description of the sample).

Tuen Mun River

4.2.4 Sediment samples will be collected by means of grab sampling at the riverbed level and borehole drilling or vibrocoring method for the vertical sediment profiles below. Borehole drilling and vibrocoring should terminate at least 1 m below the bottom of marine deposit layer.

4.2.5 Prior to sampling at each location, the sampling location will be set out with the aid of a differential global positioning system (DGPS) or equivalent device. After setting out, the water depth and river levels, in metres below the Principal Datum (mPD), will be

measured.

Grab Sampling

4.2.6 Surface sediment will be taken by a closed grab sampler. The surface sediment samples will be recovered on site and placed in laboratory-provided clean high-density polyethylene containers, wide mouth borosilicate glass bottles with Teflon lined lids or other appropriate containers and sealed to prevent leakage. Only new or pre-cleaned sample containers will be used to hold the sediment samples. The containers will be labelled with station number, sample depth, sampling date and time, together with full description of the sample.

Borehole Drilling

4.2.7 Undisturbed samples using U100 sampler (made of stainless steel or other appropriate materials) or other appropriate sampler will be collected at the top level of marine sediments and samples will be taken at that particular depth (i.e. top level of marine deposit), 0.9 m down, 1.9 m down, 2.9 m down and then every 3m down to the borehole termination depth. Sufficient amount of sediment sample will be taken for both chemical and biological testing. The undisturbed samples will be sealed up with tightly fitting rubber caps and duct-taped in place. Each sample will be clearly labeled 'top' and 'bottom' and with sample identity (e.g. station number, sample depth, sampling date and time, together with full description of the sample).

Vibrocoring

4.2.8 Vertical profiles of sediment samples will be taken continuously by means of vibrocoring, from top level of marine deposits, 0.9 m down, 1.9 m down, 2.9 m down and thereafter every 3 m to the bottom of the termination depth. The vibrocore sample should be sub-sampled and cut on-site into sections. The top levels of the sub-samples should be top level of marine deposits, 0.9 m down, 1.9 m down, 2.9 m down and then every 3 m to the proposed termination depth. Both cut ends of each vibrocore sub-sample will be sealed up with tight fitting rubber caps and duct-taped in place. Each sub-sample will be clearly labelled 'top' and 'bottom' and with sample identity (e.g. station number, sample depth, sampling date and time, together with full description of the sample).

Strata Logging

4.2.9 Strata logging for boreholes should be undertaken during the course of drilling/digging and sampling by a qualified geologist. The logs should include the general stratigraphic description, depth of soil sampling, sample notation and level of groundwater (if encountered). The presence of rocks/boulders/cobbles and foreign materials such as metals, wood and plastics should also be recorded.

Decontamination Procedures

4.2.10 All equipment in contact with the sediment should be thoroughly decontaminated between each excavation, drilling and sampling event to minimize the potential for cross contamination. The equipment (including drilling equipment and sediment samplers) should be decontaminated by steam cleaning or high-pressure hot water jet, then washed by phosphate-free detergent and finally rinsed by distilled water.

4.3 Sediment Sampling at Port Shelter

4.3.1 Prior to sampling, the sampling location should set out with the aid of a differential

global positioning system (DGPS) or equivalent device. After the setting out, the depth of water or the seabed surface level, in metres below the Principal Datum (mPD), should be measured.

4.3.2 Surface sediment will be taken by a closed grab sampler at EPD's routine marine sediment monitoring station PS6 at Port Shelter (E850234, N820057) as the reference sample. The grab sampler will be thoroughly washed with seawater prior to each sampling attempt.

4.3.3 The surface sediment samples will be recovered on site and placed in laboratory-provided clean high-density polyethylene containers, wide mouth borosilicate glass bottles with Teflon lined lids or other appropriate containers and sealed to prevent leakage. Only new or pre-cleaned sample containers will be used to hold the sediment samples. The containers will be labelled with station number, sample depth, sampling date and time, together with full description of the sample.

4.4 Sample Size and Sample Handling

4.4.1 Prior to sampling, the laboratory responsible for analysis should be consulted for the particular sample size for chemical / biological testing. According to ADV-21, the recommended sample sizes for each parameter and test are as follows.

Table 4.2 Recommended Sample Size

Parameters to be tested	Sample Size
Metals and metalloid	0.5 L
Others	0.5 L
Biological response	6 L

4.4.2 The sample storage and pretreatment procedure will be in accordance with ADV-21. The samples will be stored, transported and maintained at 4°C or lower without being frozen in the dark prior to any laboratory testing. All samples will be packed and transported in such manner as to avoid shock, vibration or any other disturbance of the samples. Samples will be delivered to laboratory within 24 hours after collection and analysed within 14 days of delivery for chemical testing. The chain-of custody procedure will be followed to record the flow of sample handling, from collection of samples to delivery of samples to the designated laboratory.

5 LABORATORY ANALYSIS

5.1 Tier II Chemical Screening

5.1.1 Sediment samples collected will be tested for parameters stated in Table 1 – Analytical Methodology in Appendix B of ADV-21. The parameters to be analyzed, methodology used and reporting limits are presented in **Table 5.1** below.

Table 5.1 Chemical Testing Parameters

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

Notes:

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

\+ 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.

+++ 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/IOC/IAEC refers to IAEA's Marine Environment Laboratory reference methods. Interstitial water to be obtained by centrifuging the sediment and collecting the overlying water.

5.2 Tier III Biological Screening

5.2.1 In accordance with ADV-21, Tier III biological screening will be necessary for all Category M and certain Category H sediment samples in which one or more contaminants exceed 10 times of Lower Chemical Exceedance Level (LCEL) as identified in the Tier II chemical screening. The methods will follow ADV-21.

5.2.2 The biological screening will either be conducted on the composite samples or individual samples, depending on the category and distribution profile. If composite samples are to be tested, they should be prepared by mixing up to 5 samples of the same category (M or H) which are continuous in vertical or horizontal profile.

5.2.3 According to ADV-21, the following three toxicity tests (to be considered as one set) will be conducted on Category M sediment and Category H sediment with one or more contaminant levels exceeding 10 times LCEL:

- a 10-day burrowing amphipod toxicity test;
- a 20-day burrowing polychaete toxicity test; and
- a 48-96 hour larvae (bivalve or echinoderm) toxicity test.

5.2.4 The species to be used for each type of biological test and the test conditions are listed in **Table 5.2** below.

Table 5.2 Testing Species for Biological Screening

Test Type	Species	Reference Test Condition[(1)(2)]
10-day burrowing amphipod toxicity test	*Ampelisca abdita*	USEPA (1994) / PSEP (1995)
	Leptocheirus plumulosus	USEPA (1994)
	Eohaustorius estuaries	USEPA (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.* *Crassostrea gigas*	PSEP (1995)
	Echinoderm: *Dendraster excentricus* *Strongylocentrotus spp.*	

Remarks:
(1) 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.
(2) PSEP (Puget Sound Estuary Program) 1995. Recommended guidelines for conducting laboratory bioassays on Puget Sound sediments.

5.2.5 Category H sediment with one or more contaminant levels exceeding 10 times LCEL should also be subjected to the above three toxicity tests but in a diluted manner (dilution test).

5.2.6 All biological tests should be conducted by accredited laboratories and include appropriate quality assurance / quality control such as negative control and positive control. Samples of reference sediment will also be tested.

5.2.7 Additional ancillary parameters including moisture content, grain size, total organic content (TOC), ammonia and salinity of pore water should also be tested on the composite and reference samples. The ancillary test will provide necessary information

on the general characteristic of the sediment. Test organisms will be selected based on their application limits for sediment grain size and porewater salinity. 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.

5.2.8 Sediment samples will be thoroughly homogenized prior to initiation of any tests to minimize variance among test replicates. Debris and indigenous organisms present in the sediment will be removed beforehand so that neither false positive results (due to presence of predatory species) nor false negative results (from indigenous species that are taxonomically similar to the test species) will be generated.

5.2.9 The samples should be promptly analysed with maximum holding time of 2 weeks for chemical test and 8 weeks for biological test.

5.3 QA/QC Requirements

5.3.1 All tests will be conducted by laboratories accredited by Hong Kong Laboratory Accreditation Scheme (HOKLAS) or, in case of overseas laboratories, by equivalent accreditation for these tests.

5.3.2 For chemical screening, the following QC plan will be implemented for the laboratory testing:

- Method Blank;
- Duplicate (at 5% level i.e. one for every 20 samples); and,
- Matrix Spike (at 5% level i.e. one for every 20 samples).

5.3.3 The proposed data quality objectives are shown in **Table 5.3**.

Table 5.3 Data Quality Objectives for Chemical Screening

Quality Controls	Acceptance Criteria
Method Blank	Less than method detection limit (MDL)
Duplicate	Agree within ±25% of the mean of duplicate results
Matrix Spike	Agree within ±25% of the recovery of spike concentration

5.3.4 For biological screening, negative and positive control should be included as appropriate quality assurance/quality control.

6 CONCLUSION

6.1.1 The proposed alignment options for the Project fall on Tuen Mun River and reclaimed land. Based on the geological profile, underlying marine deposits are present along the alignment and stations. The construction of the piers and columns for the viaducts and stations would require excavation of the underlying marine deposits if present.

6.1.2 This SSTP presented the sampling and testing requirements for the abovementioned marine deposits according to Clause 3 in Appendix E of the EIA Study Brief. A total of 32 sediment sampling locations, with reference to ADV-21, are proposed along different alignment options. 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.

Figures

826400 N
827000 N
827600 N
815600 E
815000 E

LEGEND:

PROPOSED ALIGNMENT (OPTION A3)

NS5 EPD'S SEDIMENT MONITORING STATION

NS5

TUEN MUN RIVER CHANNEL

TUEN MUN TYPHOON SHELTER

0 30 60 90 120 150
METRES
1 : 6000

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MTR

TUEN MA EXTENSION

ORIGINATOR

AECOM

CADD REF. C1502_C_TME_ACM_M61_001.dgn

TITLE

C1502
TUEN MA EXTENSION
PROJECT LAYOUT PLAN (ALIGNMENT OPTION A3)

SCALE	FIGURE NO.	REV.
1 : 6000 (A3)	C1502/C/TME/ACM/M61/001	–

826400 N
827000 N
827600 N
815600 E
815000 E

LEGEND:

PROPOSED ALIGNMENT (OPTION A4)

NS5 EPD'S SEDIMENT MONITORING STATION

N

NS5

TUEN MUN RIVER CHANNEL

TUEN MUN TYPHOON SHELTER

0 30 60 90 120 150
METRES
1 : 6000

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APPROVED	
DATE	

MTR

TUEN MA EXTENSION

ORIGINATOR

AECOM

CADD REF. C1502_C_TME_ACM_M61_002.dgn

TITLE

C1502
TUEN MA EXTENSION
PROJECT LAYOUT PLAN (ALIGNMENT OPTION A4)

SCALE	FIGURE NO.	REV.
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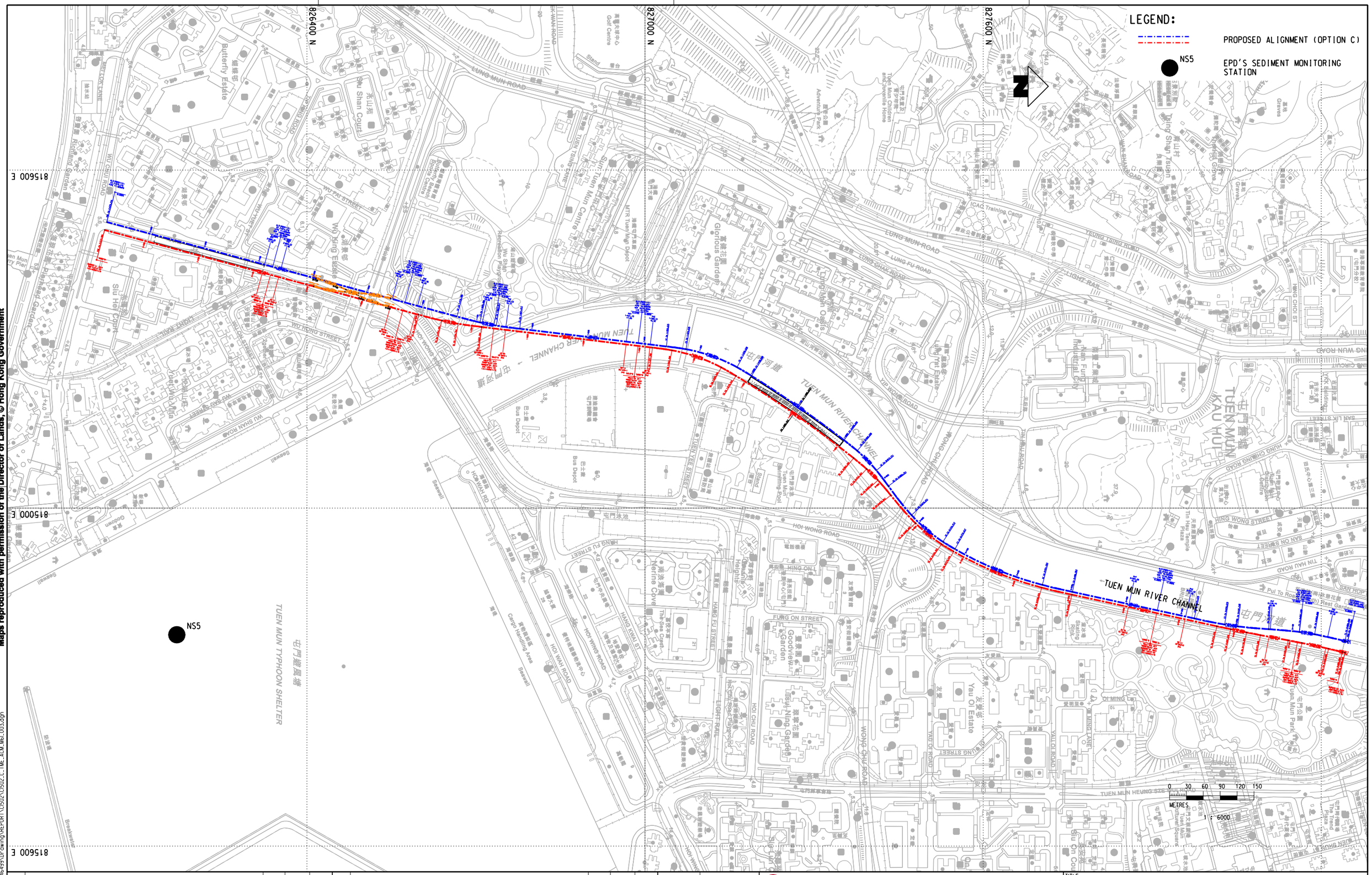

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DESIGNED	
CHECKED	
APPROVED	
DATE	

MTR

TUEN MA EXTENSION

ORIGINATOR

AECOM

CADD REF. C1502_C_TME_ACM_M61_003.dgn

TITLE

C1502
TUEN MA EXTENSION
PROJECT LAYOUT PLAN (ALIGNMENT OPTION C)

SCALE	FIGURE NO.	REV.
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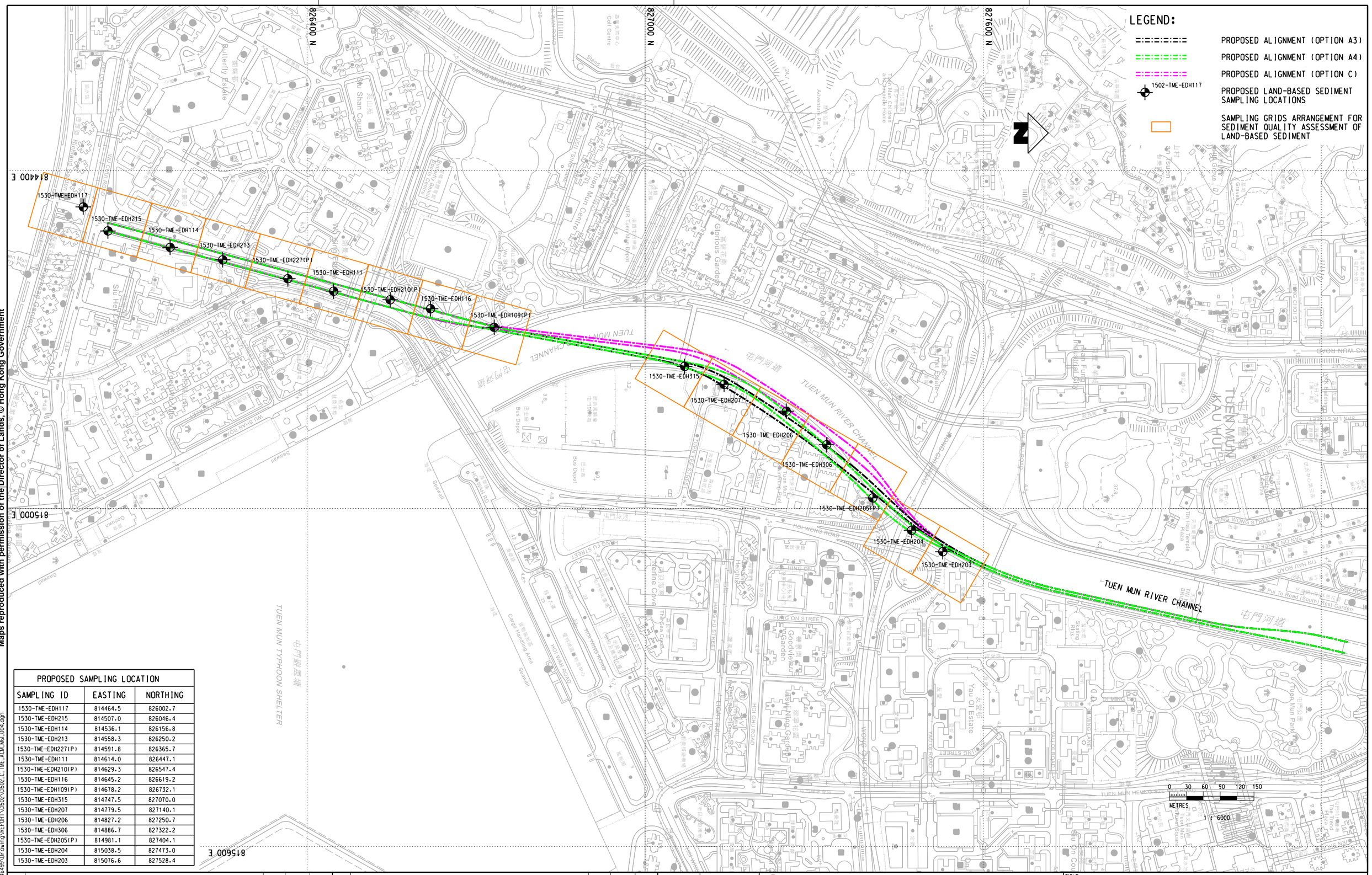

PROPOSED SAMPLING LOCATION		
SAMPLING ID	EASTING	NORTHING
1530-TME-EDH117	814464.5	826002.7
1530-TME-EDH215	814507.0	826046.4
1530-TME-EDH114	814536.1	826156.8
1530-TME-EDH213	814558.3	826250.2
1530-TME-EDH227(P)	814591.8	826365.7
1530-TME-EDH111	814614.0	826447.1
1530-TME-EDH210(P)	814629.3	826547.4
1530-TME-EDH116	814645.2	826619.2
1530-TME-EDH109(P)	814678.2	826732.1
1530-TME-EDH315	814747.5	827070.0
1530-TME-EDH207	814779.5	827140.1
1530-TME-EDH206	814827.2	827250.7
1530-TME-EDH306	814886.7	827322.2
1530-TME-EDH205(P)	814981.1	827404.1
1530-TME-EDH204	815038.5	827473.0
1530-TME-EDH203	815076.6	827528.4

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APPROVED	
DATE	

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TUEN MA EXTENSION

ORIGINATOR

AECOM

CADD REF. C1502_C_TME_ACM_M61_004.dgn

TITLE

C1502
TUEN MA EXTENSION
THE PROPOSED SEDIMENT SAMPLING LOCATIONS FOR LAND-BASED SEDIMENT

SCALE	FIGURE NO.	REV.
1 : 6000 (A3)	C1502/C/TME/ACM/M61/004	–

826400 N
827000 N
827600 N
814400 E
815000 E
815600 E

LEGEND:

- PROPOSED ALIGNMENT (OPTION A3)
- PROPOSED ALIGNMENT (OPTION A4)
- PROPOSED ALIGNMENT (OPTION C)
- 1502-TME-ERBS01 — PROPOSED RIVER-BASED SEDIMENT SAMPLING LOCATIONS
- SAMPLING GRIDS ARRANGEMENT FOR SEDIMENT QUALITY ASSESSMENT OF RIVER-BASED SEDIMENT

1530-TME-MEDH116
1530-TME-MEDH115
1530-TME-MEDH114
1530-TME-MEDH113
1530-TME-MEDH112
1530-TME-MEDH111
1530-TME-MEDH110
1530-TME-MEDH109
1530-TME-MEDH108
1530-TME-MEDH107
1530-TME-MEDH106
1530-TME-MEDH105
1530-TME-MEDH117
1530-TME-MEDH203
1530-TME-MEDH102
1530-TME-MEDH101

TUEN MUN RIVER CHANNEL
TUEN MUN TYPHOON SHELTER

0 30 60 90 120 150
METRES
1 : 6000

PROPOSED SAMPLING LOCATION		
SAMPLING ID	EASTING	NORTHING
1530-TME-MEDH116	814699.6	826790.6
1530-TME-MEDH115	814698.2	826893.3
1530-TME-MEDH114	814710.5	826993.0
1530-TME-MEDH113	814726.9	827091.8
1530-TME-MEDH112	814771.1	827184.5
1530-TME-MEDH111	814810.2	827278.3
1530-TME-MEDH110	814896.2	827361.9
1530-TME-MEDH109	814983.4	827445.2
1530-TME-MEDH108	815064.9	827536.0
1530-TME-MEDH107	815112.6	827624.9
1530-TME-MEDH106	815142.4	827718.8
1530-TME-MEDH105	815164.3	827817.6
1530-TME-MEDH117	815187.9	827914.9
1530-TME-MEDH203	815209.3	828014.6
1530-TME-MEDH102	815227.3	828107.9
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APPROVED	
DATE	

MTR

TUEN MA EXTENSION

ORIGINATOR

AECOM

CADD REF. C1502_C_TME_ACM_M61_005.dgn

TITLE

C1502
TUEN MA EXTENSION
THE PROPOSED SEDIMENT SAMPLING LOCATIONS FOR RIVER-BASED SEDIMENT

SCALE	FIGURE NO.	REV.
1 : 6000 (A3)	C1502/C/TME/ACM/M61/005	–

Annex A

Geological Profile Near the Proposed Alignment Options

NOTE: THE ALIGNMENT SHOWN IS ONLY INDICATIVE
BASED ON THE PREVIOUS ALIGNMENT OPTION.

TMS

A16

TUM

A
13.2 & 13.3

LEGEND:

- MODIFIED RDS SCHEME ALIGNMENT
- PROPOSED SCHEME ALIGNMENT
- -20 — INFERRED CAT1(c) ROCKHEAD CONTOUR (5m INTERVAL)
- FILL — (NATURAL EARTH AND WASTE)
- ALLUVIUM — Qa — CLAY/SILT, SAND AND GRAVEL; WELL-SORTED TO SEMI-SORTED
- BEACH DEPOSITS — Qb — SAND
- RAISED BEACH DEPOSITS — Qrb — SAND
- QHH — UNDIVIDED, MAINLY DARK GREY MARINE MUD
- MARINE SAND — ms — SAND, PART SILTY
- DEBRIS FLOW DEPOSITS — UNSORTED SAND, GRAVEL, COBBLES AND BOULDERS; CLAY/SILT MATRIX
- DEBRIS FLOW DEPOSITS — Qpd — SILT/SAND, GRAVELLY, CLAYEY WITH COBBLES AND BOULDERS; UNSORTED
- MEGACRYSTIC — gf — FINE-GRAINED GRANITE, < 2mm
- gfm — FINE TO MEDIUM-GRAINED GRANITE
- b — BASALT
- rq — QUARTZPHYRIC RHYOLITE
- FAULT (1:100,000 GEOLOGICAL MAP)
- POTENTIAL TREND OF INFERRED FAULT/ ROCKHEAD DEPRESSION/ MAJOR JOINTING BASED ON EXISTING GI, TOPOGRAPHY AND GEOLOGICAL MAPS

1:8 000 SCALE BAR

Consultant
AECOM in association with
TFP | FARRELLS

TUEN MUN SOUTH EXTENSION
CONSULTANCY AGREEMENT NO. NEX/1060 - TECHNICAL STUDY ON TUEN MUN SOUTH EXTENSION
INFERRED ROCKHEAD CONTOUR LAYOUT PLAN

MTR

SCALE	1 : 8000 @ A3	FIGURE No.	13.1
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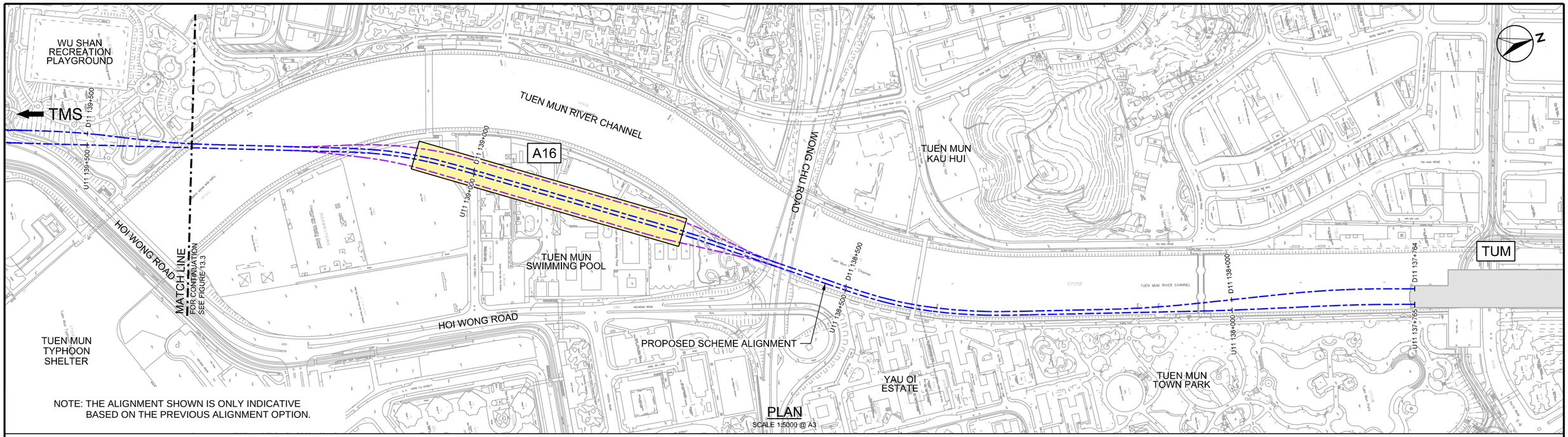
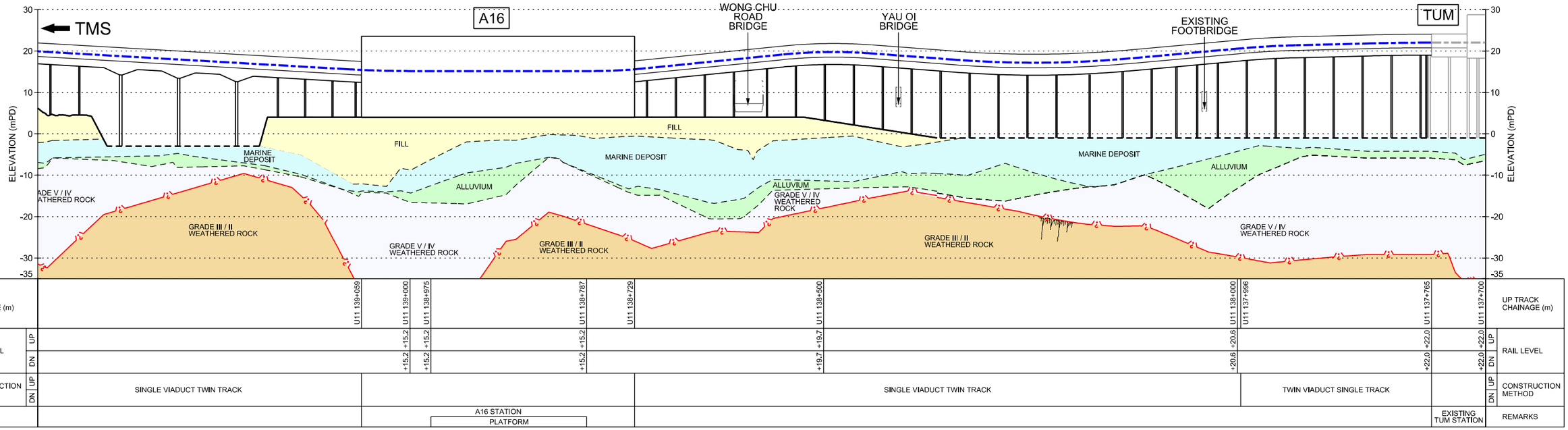


NOTE: THE ALIGNMENT SHOWN IS ONLY INDICATIVE BASED ON THE PREVIOUS ALIGNMENT OPTION.

PLAN
SCALE 1:5000 @ A3



LONGITUDINAL PROFILE
HOR. SCALE 1:5000, VER. SCALE 1:1000 @ A3

LEGEND:

FILL | MARINE DEPOSIT | ALLUVIUM | GRADE V / IV WEATHERED ROCK | GRADE III / II WEATHERED ROCK | PROPOSED SCHEME ALIGNMENT | STABLING SIDING

1 : 1000 SCALE BAR (0 5 10 15 20 25 m)

1 : 5000 SCALE BAR (0 25 50 75 100 125 m)

Consultant
AECOM in association with
TFP | FARRELLS

TUEN MUN SOUTH EXTENSION
CONSULTANCY AGREEMENT NO. NEX/1060 - TECHNICAL STUDY ON TUEN MUN SOUTH EXTENSION
PROPOSED SCHEME ALIGNMENT - PLAN AND PROFILE
(SHEET 1 OF 2)

MTR

SCALE	AS SHOWN @ A3	FIGURE No.
CAD REF.	FIN_RPT_FIG_13-02.dgn	13.2

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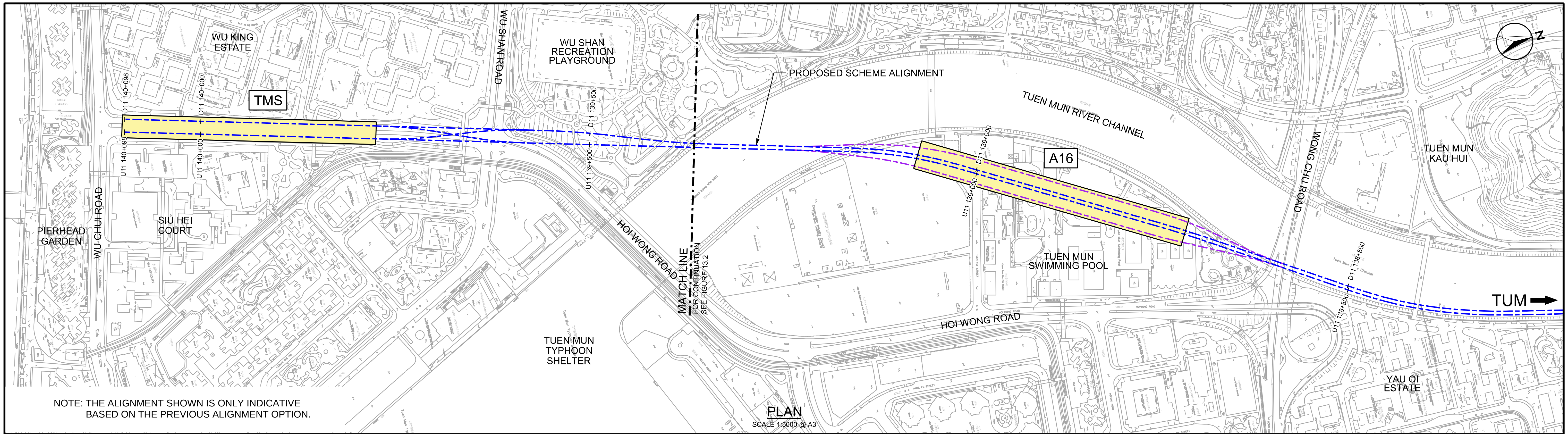
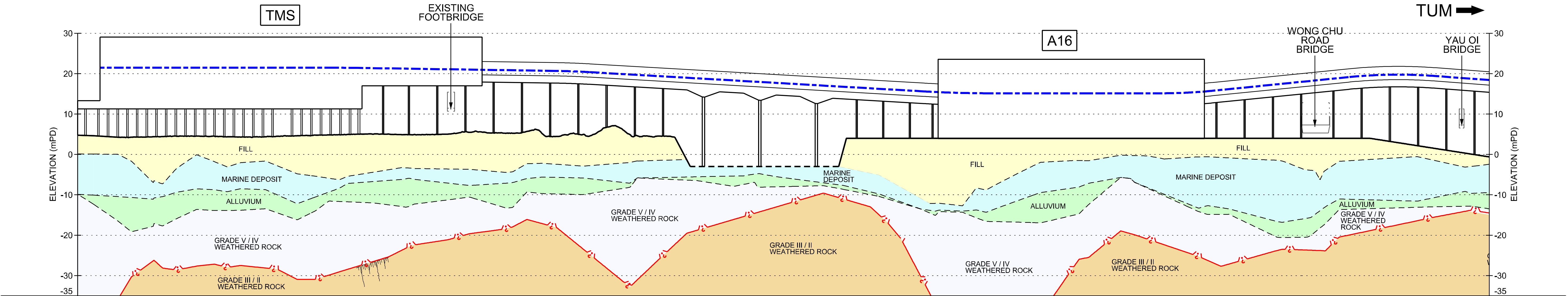


PLAN

SCALE 1:5000 @ A3



UP TRACK CHAINAGE (m)	RAIL LEVEL UP	RAIL LEVEL DN
U11 140+098	+21.5	+21.5
U11 140+008		
U11 140+002	+21.5	+21.5
U11 139+814	+21.5	+21.5
U11 139+773		
U11 139+575		
U11 139+500	+20.5	+20.5
U11 139+477		
U11 139+059		
U11 139+000	+15.2	+15.2
U11 138+975	+15.2	+15.2
U11 138+787	+15.2	+15.2
U11 138+729		
U11 138+500	+19.7	+19.7

CONSTRUCTION METHOD	REMARKS
OVERRUN	
	TMS STATION PLATFORM
SINGLE VIADUCT TWIN TRACK	CROSSOVER
TWIN VIADUCT SINGLE TRACK	
SINGLE VIADUCT TWIN TRACK	
	A16 STATION PLATFORM
SINGLE VIADUCT TWIN TRACK	

LONGITUDINAL PROFILE

HOR. SCALE 1:5000, VER. SCALE 1:1000 @ A3

LEGEND:

- FILL
- MARINE DEPOSIT
- ALLUVIUM
- GRADE V / IV WEATHERED ROCK
- GRADE III / II WEATHERED ROCK
- PROPOSED SCHEME ALIGNMENT
- STABLING SIDING

0 5 10 15 20 25 m — 1 : 1000 SCALE BAR

0 25 50 75 100 125 m — 1 : 5000 SCALE BAR

Consultant AECOM in association with TFP | FARRELLS

TUEN MUN SOUTH EXTENSION

CONSULTANCY AGREEMENT NO. NEX/1060 - TECHNICAL STUDY ON TUEN MUN SOUTH EXTENSION

PROPOSED SCHEME ALIGNMENT - PLAN AND PROFILE

(SHEET 2 OF 2)

MTR

SCALE	AS SHOWN @ A3
CAD REF.	FIN_RPT_FIG_13-03.dgn
FIGURE No.	13.3

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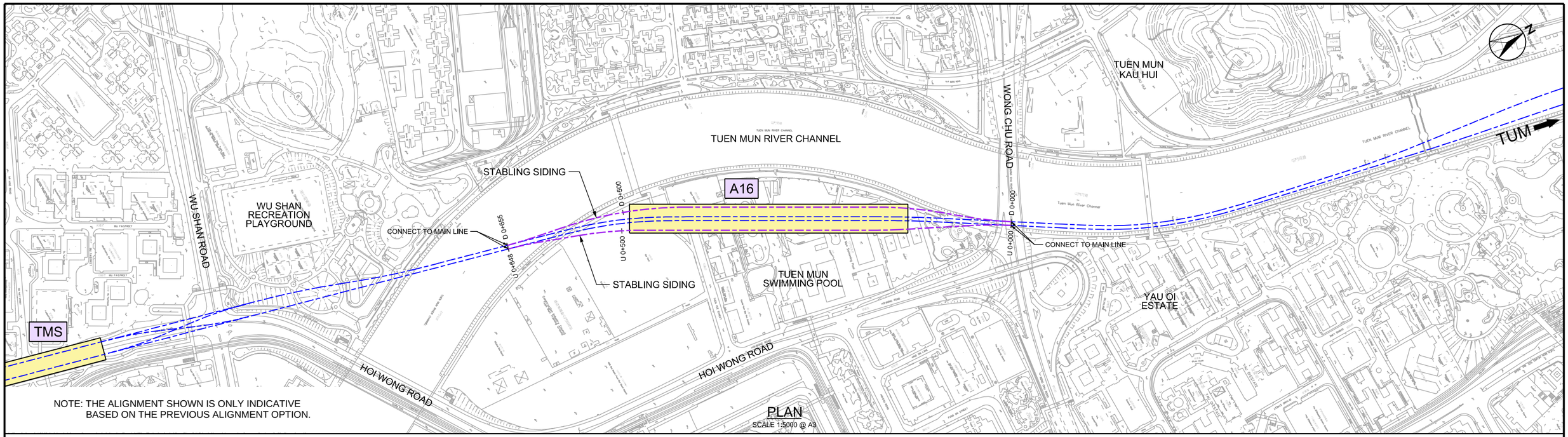
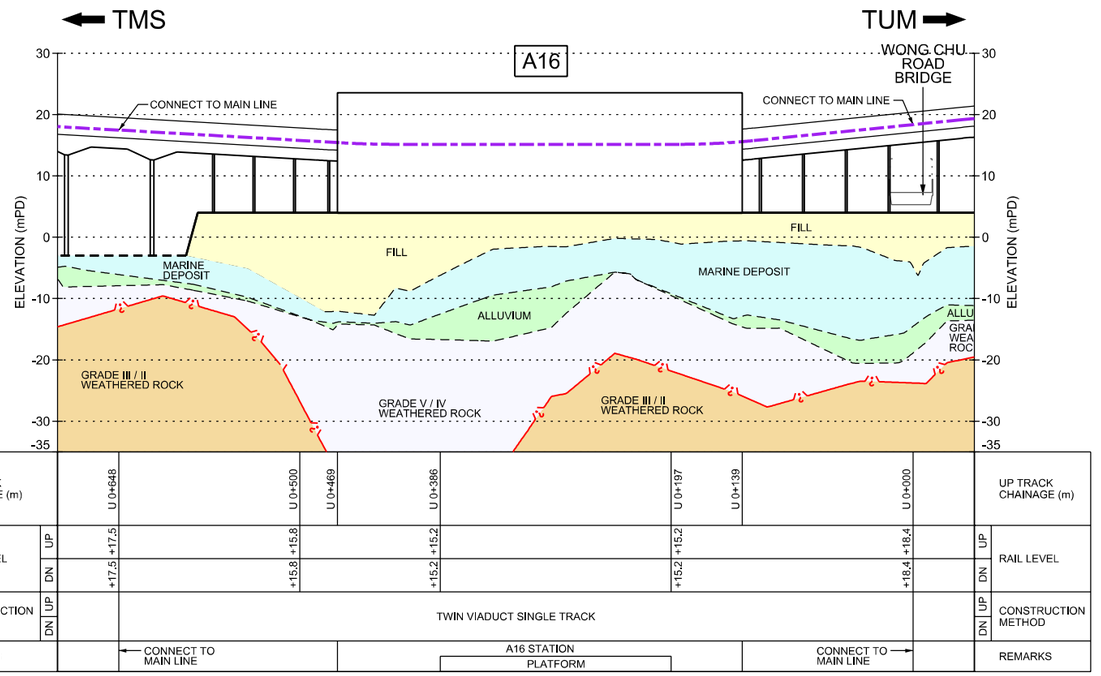


NOTE: THE ALIGNMENT SHOWN IS ONLY INDICATIVE BASED ON THE PREVIOUS ALIGNMENT OPTION.

PLAN
SCALE 1:5000 @ A3



LONGITUDINAL PROFILE
HOR. SCALE 1:5000, VER. SCALE 1:1000 @ A3

LEGEND:

FILL | MARINE DEPOSIT | ALLUVIUM | GRADE V / IV WEATHERED ROCK | GRADE III / II WEATHERED ROCK | PROPOSED SCHEME ALIGNMENT | STABLING SIDING

0 5 10 15 20 25 m
1 : 1000 SCALE BAR

0 25 50 75 100 125 m
1 : 5000 SCALE BAR

Consultant
AECOM in association with
TFP | FARRELLS

TUEN MUN SOUTH EXTENSION
CONSULTANCY AGREEMENT NO. NEX/1060 - TECHNICAL STUDY ON TUEN MUN SOUTH EXTENSION
PROVISION FOR STABLING SIDING - PLAN AND PROFILE

MTR

SCALE	AS SHOWN @ A3	FIGURE No. 13.4
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Annex B

Memo 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.

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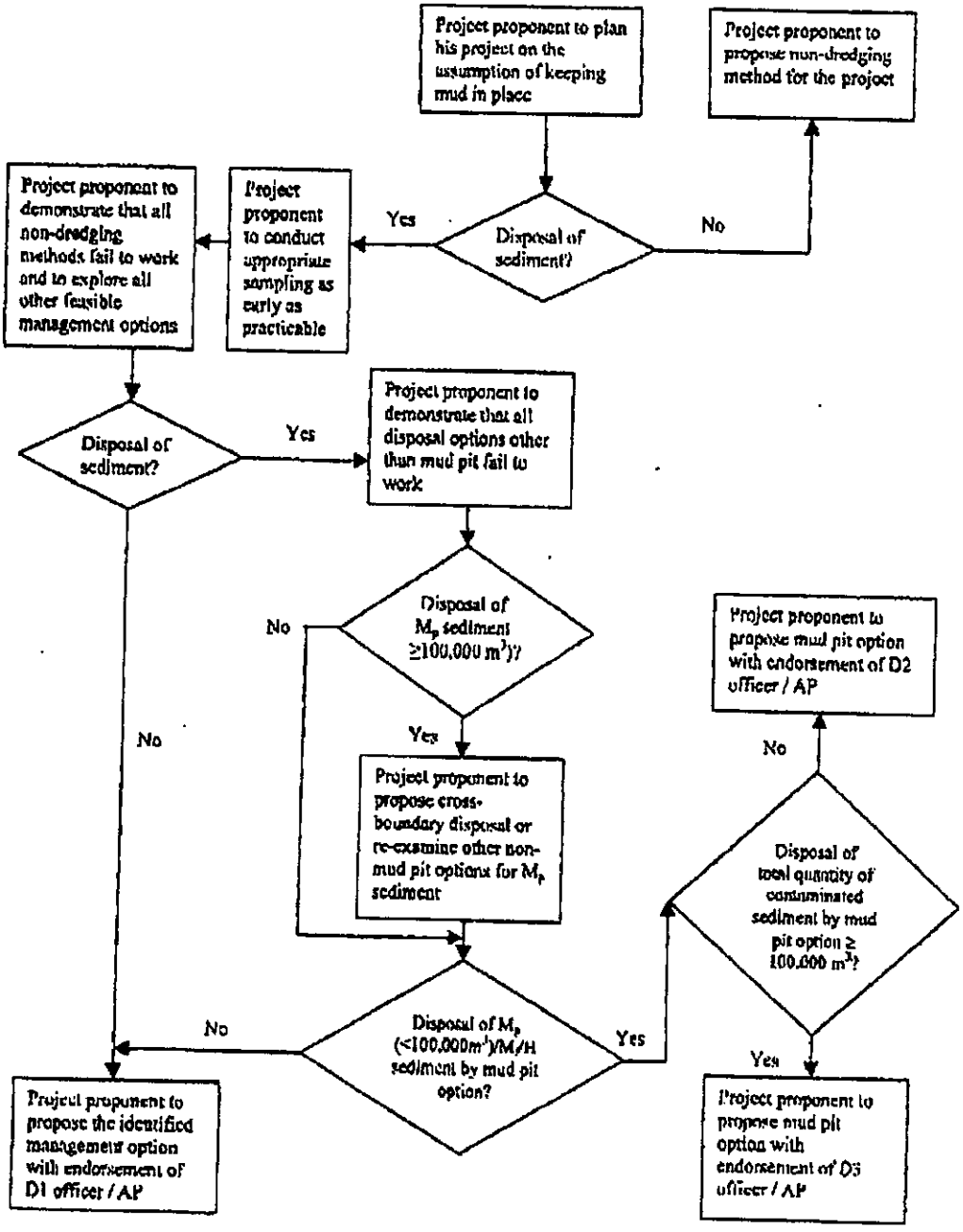
Appendix A

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.