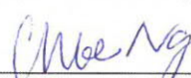



MTR Corporation Limited

Consultancy Agreement No. C1502

**Environmental Impact Assessment  
Study for Tuen Mun South Extension****Contamination Assessment Plan**

April 2022

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Version:	3	Date: 19 April 2022
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## **1 INTRODUCTION**

### **1.1 Background**

- 1.1.1 The Tuen Mun South Extension as defined in Project Profile (No. PP-[604/2020]) has been renamed as Tuen Mun South Extension (TME) (hereinafter referred to as the “the Project”). 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 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 land contamination assessment.

### **1.2 Objectives of this Plan**

- 1.2.1 In accordance with Clause 3.4.8 of the EIA Study Brief (No. ESB-332/2020), an assessment on the potential land contamination issues within the Project Area is required.
- 1.2.2 This Contamination Assessment Plan (CAP) is prepared for the EIA study. The purposes of this CAP are to present the findings of the site appraisal on the past and present potentially contaminative land uses / activities and to propose sampling and testing plan for the subsequent site investigation (SI) works in order to assess the presence, nature and extent of any contamination within the Project Area.

### **1.3 Environmental Guidelines, Standards and Criteria**

- 1.3.1 The relevant environmental guidelines, standard and criteria for the land contamination assessment are as follow:
- *Section 3 (Potential Contaminated Land Issues) of Annex 19 of the ‘Guidelines for Assessment of Impact on Sites of Cultural Heritage and Other Impacts’ from the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)*
  - *Guidance Note for Contaminated Land Assessment and Remediation (Guidance Note)*

The Guidance Note sets out the requirements for proper assessment and management of potentially contaminated sites such as oil installations (e.g. oil depots, petrol filling stations), gas works, power plants, shipyards/boatyards, chemical manufacturing / processing plants, steel mills/metal workshops, car repairing/dismantling workshops and scrap yards.
  - *Practice Guide for Investigation and Remediation of Contaminated Land (Practice Guide)*

The Practice Guide outlines typical investigation methods and remediation strategies for the range of potential contaminants typically encountered in Hong Kong.

- *Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management* (Guidance Manual)

The Guidance Manual presents the risk based approach for contamination assessment and instructions for comparison of soil and groundwater data with Risk-Based Remediation Goals (RBRGs) for 54 chemicals of concerns (COCs) commonly found in Hong Kong. The RBRGs were derived to suit Hong Kong conditions and were designed to protect the health of people who could potentially be exposed to land impacted by chemicals under four broad post-restoration land use categories. RBRGs also serve as the remediation targets if remediation is necessary.

- 1.3.2 The Risk-based Remediation Goals (RBRGs) stipulated in the Guidance Manual will be adopted as the criteria for assessing any soil and groundwater contamination.

#### **1.4 Structure of the Plan**

- 1.4.1 Apart from this introductory section, the other sections of the CAP are as follows:

- Section 2 presents the findings of the site appraisal;
- Section 3 proposes the sampling and testing plan for subsequent site investigation (SI) works;
- Section 4 discusses the analytical testing requirements for the SI works;
- Section 5 evaluates the potential land contamination impact and the possible remediation measures;
- Section 6 presents the way forward and tentative schedule for the follow-up works; and
- Section 7 presents the conclusion.

**2 SITE APPRAISAL**

**2.1 General**

2.1.1 The Project, including the viaduct, stations and the associated works areas / works sites, with a total area of approximately 25 hectares, is located in the southern part of Tuen Mun. The current land uses of the Project mainly comprises a recycling station, a swimming pool, open car parks, parks / gardens, vegetated land, vacant land, river channel and road. The proposed works areas / works sites of the Project (i.e. the Project Area) is shown in **Figure No. C1502/C/TME/ACM/M55/001**.

2.1.2 The surrounding environment of the Project is urbanized, with existing land uses comprising mainly high-density residential developments [Residential (Group A)], Government, Institution or Community (G/IC), Green Belt (GB) and Open Space (O).

2.1.3 The Project also includes an offsite construction works area at Mong Wing Street, which is currently used as site office for the project “Tuen Mun - Chek Lap Kok Link (TM-CLKL)”, to support the construction of the Project. This works area would be handed over by Highway Department in 2024 tentatively. This offsite works area will only be used as site office, material storage for pre-cast unit (non-dusty material) and temporary tree nursery, and there would be no excavation works, earthworks and stockpiling of dusty materials to be conducted at this works area. The entire area was paved with intact concrete in good condition (Refer to **Figure No. C1502/C/TME/ACM/M55/024**). Hence, no potential land contamination implication associated with this offsite construction works area is anticipated for the Project. The proposed offsite temporary works area is shown in **Figure No. C1502/C/TME/ACM/M55/002**.

**2.2 Review of Historical Land Uses**

2.2.1 A review of aerial photographs has been undertaken to evaluate the likelihood of potential contamination associated with past land uses within the Project Area. The development history of the Project Area and the list of aerial photographs reviewed is summarised in **Table 2.1** below. The selected aerial photographs are provided in **Annex A**.

**Table 2.1 Aerial Photographs Reviewed**

Year	Reference of Aerial Photos in Annex A	Description of Land-Uses and Site Operation / Activities
1963	<b>C1502/C/TME/ACM/M55/010</b> (#1963-6113, #1963-6115, #1963-6390, #1963-8237)	<ul style="list-style-type: none"> <li>The Project Area was occupied by open waters.</li> </ul>
1973	<b>C1502/C/TME/ACM/M55/011</b> (#03348, #04221, #04229)	<ul style="list-style-type: none"> <li>Reclamation works and reclaimed land were observed in the north and the east of the Project Area.</li> <li>The nullah was modified to the existing configuration in the north of the Project Area.</li> <li>No significant land use change was observed in the remaining portions of the Project Area.</li> </ul>
1983	<b>C1502/C/TME/ACM/M55/012</b> (#47923, #47925)	<ul style="list-style-type: none"> <li>Reclaimed land was observed in the centre and south of the Project Area. Tuen Mun Park and Tuen Mun 3<sup>rd</sup> Village Temporary Housing Area were observed.</li> </ul>

Year	Reference of Aerial Photos in Annex A	Description of Land-Uses and Site Operation / Activities
		<ul style="list-style-type: none"> <li>The nullah was largely modified to the existing configuration except for the southwest of the Project Area.</li> <li>No significant land use change was observed in the remaining portions of the Project Area.</li> </ul>
1993	<p><b>C1502/C/TME/AC M/M55/013</b>                      (#CN03250, #CN03253)</p>	<ul style="list-style-type: none"> <li>A suspected industrial facility with electrical substation (Site TME-S1) was observed in the centre of the Project Area. The area appeared to be concrete paved.</li> <li>An open storage (Site TME-S2) was observed in the south of the Project Area.</li> <li>A cargo working area was also observed in the south of the Project Area. The area appeared to be concrete paved with containers, construction materials and barging point for cargo handling.</li> <li>The existing Tuen Mun Swimming Pool, garden, playground and existing Wong Chu Road were observed. The Tuen Mun River Channel was modified to the existing configuration. Tuen Mun 3<sup>rd</sup> Village Temporary Housing Area was replaced by the existing Tuen Mun Park.</li> <li>No significant land use change was observed in the remaining portions of the Project Area.</li> </ul>
2003	<p><b>C1502/C/TME/AC M/M55/014</b>                      (#CW52242, #CW52266, #CW52407)</p>	<ul style="list-style-type: none"> <li>The suspected industrial facility (Site TME-S1) was replaced by an open storage.</li> <li>The open storage (Site TME-S2) was replaced by an existing open car park, vegetated land and vacant land.</li> <li>The cargo working area was replaced by an existing open car park.</li> <li>A construction site was observed in the northern portion of the Project Area.</li> <li>The existing Construction Industry Training Authority (CITA) / Construction Industry Council (CIC) Tuen Mun Training Ground was observed in the central portion of the Project Area. The existing open car park, a construction site and a temporary structure were also observed in the central portion of the Project Area.</li> <li>The existing Wu King Road Garden, Wu Shan Recreation Playground, Tuen Mun Promenade and public toilet were observed in the south of the Project Area.</li> <li>No significant land use change was observed in the remaining portions of the Project Area.</li> </ul>
2013	<p><b>C1502/C/TME/AC M/M55/015</b>                      (#CS44165, #CS44166, #CS44242, #CS44327, #CS44355)</p>	<ul style="list-style-type: none"> <li>The existing Pui To Road (South) Rest Garden and Hoi Wong Road Garden were observed in the north of the Project Area. A site office was observed in the central portion of the Project Area.</li> <li>No significant land use change was observed in the remaining portions of the Project Area.</li> </ul>

Year	Reference of Aerial Photos in Annex A	Description of Land-Uses and Site Operation / Activities
2020	<b>C1502/C/TME/ACM/M55/016</b> (#E096497C, #E096996C, #E100267C, #E100289C, #E100319C)	<ul style="list-style-type: none"> <li>• The open storage (Site TME-S1) was turned into the existing Tuen Mun Community Green Station.</li> <li>• The site office was vacated. Tuen Mun River (Eastern Bank) Garden was observed.</li> <li>• An existing works site was observed within Tuen Mun Park.</li> <li>• No significant land use change was observed in the remaining portions of the Project Area.</li> </ul>

*Remark: Source of aerial photographs: Survey and Mapping Office, Lands Department*

2.2.2 Based on the review of aerial photographs, the concerned land uses identified within the Project Area include a former suspected industrial facility with electrical substation (year 1993 to 2002) / open storage (year 2003 to 2019) (i.e. Site TME-S1), a former open storage (year 1993 to 2002) (i.e. Site TME-S2) and a cargo working area (year 1993 to 2002). However, for the cargo working area, the area appeared to be concrete paved and used for cargo handling only (e.g. loading and unloading of goods). Goods including containers and construction materials were likely to be temporarily stored on-site and transported off-site by barges / vehicles. Potential land contamination issues associated with the operation of the former cargo working area to the Project are therefore not anticipated.

2.2.3 Based on the above, apart from the former suspected industrial facilities / open storage (Site TME-S1) and the former open storage (Site TME-S2), no other historical potentially contaminating land uses were identified within the Project Area.

**2.3 Site Geology and Hydrogeology**

2.3.1 The Project Area is largely located on land reclaimed previously in the early 1970-80s. The Project Area is generally flat with levels varying from +4.5 mPD to +10.8 mPD.

2.3.2 According to the preliminary borehole records of ground investigation (GI) works under this Project, the general thickness of reclamation fill ranges from 2m to 14.7m. The Project Area is generally further underlain by marine deposit with thickness ranging from 2m to 9.5m and / or alluvium with thickness ranging from 1.7 m to 9m. Colluvium of approximately 0.5m in thickness is also anticipated. In-situ decomposed rock (i.e. Grade IV/V materials) is anticipated with thickness ranging from 0.2m to 34.8m. Engineering rockhead is anticipated to be situated at -9.4 mPD to -40.1 mPD.

**2.4 Site Reconnaissance**

2.4.1 Site walkovers were conducted on 25 January, 4 February, 6 May, 12 May, 17 May and 21 May 2021 to investigate any contaminative issues associated with current land uses and activities within the Project Area. Findings of the site walkovers, including the photographic records and site layout plan, are shown in **Figure Nos. C1502/C/TME/ACM/M55/017 to C1502/C/TME/ACM/M55/023**. Site walkover checklists are provided in **Annex B**.

2.4.2 The Project Area was mainly occupied by non-contaminating land uses including Wong Chu Road, public car parks (e.g. STT No. MX16013, MX16007 and MX17003), gardens / parks / promenade (including Pui to Road (South) Rest Garden, Tuen Mun Park, Tuen Mun River (Eastern Bank) Garden, Hoi Wong Road Garden, Wu Shan Recreation Playground (including Tuen Mun Road Safety Town), Wu King Road Garden and Tuen Mun Promenade), Tuen Mun Swimming Pool, Tuen Mun Community



Green Station, Tuen Mun Ferry Pier Public Toilet, Tuen Mun River Channel, vacant land and vegetated land (refer to **Figure No. C1502/C/TME/ACM/M55/017 to 023** and **Annexes B-1** and **B-2**). No potentially contaminating land uses / activities (e.g. vehicle maintenance activity) were observed in these areas during the site walkover.

- 2.4.3 In addition, a portion of the existing Construction Industry Council (CIC) *Tuen Mun Training Ground* is within the Project Area. Given that the identified concerned areas i.e. the chemical / chemical waste storage areas were located outside the Project Area, potential land contamination issues associated with the operation of the CIC Tuen Mun Training Ground to the Project is not anticipated. Findings of the site walkover are summarised in **Table 2.5**. Questionnaire was conducted with available site representative and the site walkover checklist is provided in **Annex B-3**. The corresponding photographic records taken during the site walkover are shown in **Figure No. C1502/C/TME/ACM/M55/021**.
- 2.4.4 However, the electrical substation (No. 08271-1) at Tuen Mun Swimming Pool (Site TME-S3) and the diesel generator in the works site of *Contract No. DC/2018/09 Rehabilitation of Trunk Sewers in Tuen Mun* at Tuen Mun Park (Site TME-S4) were identified with potential land contamination concerns during the site walkovers. The potentially contaminating activities identified within the concerned areas are detailed in **Table 2.5**. Questionnaires were conducted with available site representatives and the site walkover checklists are provided in **Annexes B-2** and **B-4**. The corresponding photographic records are shown in **Figure No. C1502/C/TME/ACM/M55/017** and **019**.

**2.5 Information from Government Authorities**

- 2.5.1 The Environmental Compliance Division of Environmental Protection Department (EPD) and Licensing and Certification Command of Fire Services Department (FSD) have been contacted for (i) records of any spillage / leakages of chemicals and chemical waste, (ii) records of Dangerous Goods (DG), (iii) records of Chemical Waste Producer(s) (CWP) and (iv) records of reported fire incidents within the Project Area. EPD and FSD’s replies on the request have been received and attached in **Annex C**. The information is summarised below.

Information from Environmental Protection Department

- 2.5.2 Based on the replies given by EPD on 28 January and 14 May 2021, visits to EPD’s Southern Centre Office were undertaken on 3 March and 11 May 2021 to review the available CWP records. According to the records given by EPD, there are 6 valid and 4 invalid registered CWPs identified within the Project Area. Details are summarised in **Table 2.2**. Furthermore, there were not any chemical spillage / leakage records within the Project Area from EPD, and also no records of incidents of spillage / leakage of dangerous goods within the Project Area from FSD according to the replies from FSD on 1 February and 7 June 2021.

**Table 2.2 Registered Chemical Waste Producers within the Project Area**

ID	Chemical Waste Producer (CWP)	Address	Status	Nature of Business	Major Chemical Waste Types*
1	Construction Industry Council	Tuen Yee Street Area 16, NT	Valid	Training & assessment of loadshifting machinery operation	Spent lubrication oil

ID	Chemical Waste Producer (CWP)	Address	Status	Nature of Business	Major Chemical Waste Types*
2	Yan Oi Tong Ltd.	9 Tuen Yee Street, Tuen Mun	Valid	Government facility	Spent batteries and fluorescent lamps
3	United Contractors Ltd.	Tuen Mun Park, Tuen Mun, NT	Valid	Building Maintenance & construction works	-
34	Chun Wo Construction and Engineering Company	DSD Contract No. DC/2018/09: Rehabilitation of Trunk Sewer in Tuen Mun, Tin Hau Road, Lung Mun Road, across Tuen Mun River Channel near Tin Hau Road and across Tuen Mun Channel near Tuen Yee Street, Tuen Mun, N.T.	Valid	Construction	Spent lubricating oil
5	Chun Wo Construction and Engineering Company	Temporary Government Land Allocation No. TTM622 near Tuen Yee Street Fire Station, Tuen Mun, N.T.	Valid	Construction	-
6	Kwan On - China Geo Joint Venture	Construction site at Wu Shan Road Junction with Wu King Road, Tuen Mun, N.T. (HYD Contract No.: HY/2014/12)	Valid	Construction	-
7	Construction Industry Council	Tuen Yee Street Area 16 NT	Invalid	Training of Construction Trade Skills	-
8	Leighton Contractors (Asia) Ltd.	KCRC Contract CC230 Pui To Road Tuen Mun	Invalid	Construction	-
9	Dragages (HK) Joint Venture	Misc. 150, Site C,D & H, - CLP Tuen Mun River Crossing Site Adjacent to Wong Chu Road & Hoi Wong Road, Tuen Mun, NT	Invalid	Construction	-
10	Intrafor Hong Kong Limited	CLP Power Cable Tunnel Projects Tuen Mun River Crossing Shafts Adjacent to Tuen Mun River & Wong Chu Road Tuen Mun NT	Invalid	Construction	-

Note: \* Based on information provided by the site representative during site walkover.

- 2.5.3 CWP ID 1 and 7 (Construction Industry Council) are associated with the operation of the existing CIC Tuen Mun Training Ground. Although the Training Ground has occupied the site for at least 18 years since 2003 (refer to **Table 2.1**) and there are consecutive CWP records for the operation, the chemical / chemical waste storage areas were outside of the Project Area for at least 50 m and no major renovation / rearrangement in site layout / operation were reported by the site representative (refer to **Annex B-3** and Photo 0916, 0926 and 5763 in **Figure No. C1502/C/TME/ACM/M55/021**), the storage of chemical wastes is unlikely to have caused any land contamination issues to the Project Area.
- 2.5.4 CWP ID 2 (Yan Oi Tong Limited) is the operator of the existing Tuen Mun Community Green Station (Site TME-S1). Given the Community Green Station has occupied the site for 3 years only since 2018, and the storage of chemical wastes (spent batteries and fluorescent lamps) on-site was only temporary as the spent batteries and fluorescent lamps are reportedly delivered off-site regularly for recycling, and the entire storage area was concrete paved with no signs of stains / spillages observed (refer to **Annex B-1** and Photo 1023 in **Figure No. C1502/C/TME/ACM/M55/020**), the storage of chemical wastes is unlikely to have caused any land contamination issues to the Project Area.
- 2.5.5 CWP ID 3 (United Contractors Limited) is likely to be associated with the maintenance and construction works of buildings and facilities within Tuen Mun Park. Given that no relevant construction sites / chemical waste storages were observed within the encroached portion of Tuen Mun Park during the site walkover (refer to **Section 2.4.2**), the storage of chemical wastes associated with this CWP record is unlikely to have caused any land contamination issues to the Project Area.
- 2.5.6 CWP ID 4 (Chun Wo Construction and Engineering Company) is associated with the rehabilitation of trunk sewers in Tuen Mun, which is an on-going construction project. A works site was observed within Tuen Mun Park within the Project Area during the site walkover (refer to **Annex B-3** and Photo 2624, 6970, 7456, 7461 and 7463 in **Figure No. C1502/C/TME/ACM/M55/017**). As reported by the site representative, all chemical wastes (spent lubricating oils) generated were stored at another works site outside the Project Area and no chemical waste were stored within this works site. No chemical wastes were observed during the site walkover either. Therefore, the storage of chemical wastes associated with this CWP record is unlikely to have caused any land contamination issues to the Project Area.
- 2.5.7 CWP ID 5 (Chun Wo Construction and Engineering Company) is likely to be associated with the former site office near Castle Peak Bay Fire Station at Tuen Yee Street (refer to **Drawing No. C1502/C/TME/ACM/M55/015** in **Annex A**). The registration is likely to be inactive as the site office was no longer observed in 2020 (refer to **Drawing No. C1502/C/TME/ACM/M55/016** in **Annex A**). Based on the site walkover, the site is currently an open car park (STT No. MX17003) (refer to Photo 0892 in **Figure No. C1502/C/TME/ACM/M55/018**). Given that no relevant construction sites / chemical waste storages / stains or spillage were observed at this site during the site walkover, the storage of chemical wastes associated with this CWP record was unlikely to have caused any land contamination issues to the Project Area.
- 2.5.8 CWP ID 6 (Kwan On - China Geo Joint Venture) is associated with the construction of ramps and lifts for the existing footbridge at Wu Shan Road / Wu King Road Junction. The registration is likely to be inactive as the associated construction works were completed. No relevant construction sites / chemical waste storages were observed within the Project Area during the site walkover (refer to Photo 0962 in **Figure No. C1502/C/TME/ACM/M55/022**). Given the construction works is completed and no relevant construction sites / chemical waste storages / stains or spillage were observed

at the existing footbridge at Wu Shan Road / Wu King Road Junction, the storage of chemical wastes associated with this CWP record was unlikely to have caused any land contamination issues to the Project Area.

- 2.5.9 CWP ID 8 (Leighton Contractors (Asia) Limited) is associated with the construction of Light Rail Extension at Pui To Road. The works are completed as the CWP record is invalid and no relevant construction sites / chemical waste storages were observed within the Project Area during the site walkover (refer to Photo 0984 in **Figure No. C1502/C/TME/ACM/M55/017**). Given the construction works is completed and no relevant construction sites / chemical waste storages / stains or spillage were observed, the storage of chemical wastes associated with this CWP record was unlikely to have caused any land contamination issues to the Project Area.
- 2.5.10 CWP ID 9 and 10 (Dragages (HK) Joint Venture and Intrafor Hong Kong Limited) are associated with the construction works of underground CLP power cable tunnel located at the Tuen Mun River Channel near Wong Chu Road. The works are completed as the CWP records are invalid and no relevant construction sites / chemical waste storages were observed within the Project Area during the site walkover (refer to **Figure No. C1502/C/TME/ACM/M55/018**). Given the Tuen Mun River Crossing is located outside the Project Area, the storage of chemical wastes associated with this CWP record was unlikely to have caused any land contamination issues to the Project Area.
- 2.5.11 Based on the above, no potential land contamination implications associated with the identified CWP records are anticipated within the Project Area.

Information from Fire Services Department

- 2.5.12 Based on the reply from FSD on 1 February and 7 June 2021, and further clarifications on 18 June 2021, 2 records of DG license and 1 incident record were found. Details are summarised in **Table 2.3** and **Table 2.4** respectively.

**Table 2.3 Dangerous Goods License Record provided by FSD**

Item	Type of DG	Quantity	Storage Method	Address
1.	Acetylene	18 Cylinders x 48L	Inside an approved DG Store at open ground	Construction Site of <i>Contract No.: DC/2018/09 Rehabilitation of Trunk Sewers in Tuen Mun, Tin Hau Road.</i>
2.	Oxygen	18 Cylinders x 47L		

- 2.5.13 The DG records are associated with the rehabilitation of trunk sewers in Tuen Mun, which is an on-going construction project. A works site under this construction project was observed at Tuen Mun Park within the Project Area during the site walkover (refer to **Section 2.4.3**). However, based on site observations and information provided by the site representative, no DG are stored at the works site. No DG stores were observed within the entire Project Area during the site walkover. In addition, the DGs associated with the records are Cat. 2 DG (compressed gases) which are not considered as potential source of land contamination. Therefore, the storage of DG associated with these records is unlikely to have caused any land contamination issues to the Project Area.

**Table 2.4 Incident Record provided by FSD**

Date	Type of Incident	Address
25 April 2019	Vessel Fire	Tuen Mun Typhoon Shelter Seafront near No. 101 Wu Shan Road

2.5.14 Given the incident occurred at the waters outside of the Project Area (refer to **Figure No. C1502/C/TME/ACM/M55/023**), it was not expected to pose any potential land contamination issues to the Project Area.

**2.6 Summary of Site Appraisal**

2.6.1 Based on the findings of the site appraisal, the following 4 facilities / areas with potential land contamination concerns (or ‘hotspots’) were identified within the Project Area:

- Tuen Mun Community Green Station (former open storage, former suspected industrial land use and former electrical substation) (Site TME-S1);
- Wu Shan Road Car Park (STT No. MX16007) and land in the vicinity (former open storage) (Site TME-S2);
- Electrical substation (No. 08271-1) at Tuen Mun Swimming Pool (Site TME-S3); and
- Diesel generator in Works site of *Contract No. DC/2018/09* (Site TME-S4).

2.6.2 Locations of the concerned areas are shown in **Figure No. C1502/C/TME/ACM/M55/026 to 028** and details of the site appraisal for these concerned areas are summarised in **Table 2.5**. Intrusive site investigation (SI) works are considered necessary to confirm any land contamination within the concerned areas.

**2.7 Future Land Uses**

2.7.1 Land contamination assessment on the potentially contaminated sites would need to be evaluated against the Risk-based Remediation Goals (RBRGs) and if there were presence of non-aqueous phase liquid (NAPL), soil saturation (C<sub>sat</sub>) / solubility limits, as stipulated in Table 2.1 and Table 2.2 of the Guidance Manual.

2.7.2 The RBRGs were developed based on a risk assessment approach to suit the local environmental conditions and community needs in Hong Kong. Decisions on contaminated soil and groundwater remediation are based on the nature and extent of the potential risks that are posed to human receptors as a result of exposure to chemicals in the soil and/or groundwater. RBRGs were developed for four different land use scenarios as below reflecting the typical physical settings in Hong Kong under which people could be exposed to contaminated soil and groundwater:

- Urban Residential;
- Rural Residential;
- Industrial; and
- Public Park.

2.7.3 In addition to the RBRGs, screening criteria (soil saturation limits, C<sub>sat</sub>, developed for NAPL in soil and solubility limits for NAPL in groundwater) for the more mobile organic chemicals must be considered to determine whether a site requires further action.

- 2.7.4 For the potentially contaminated sites, based on the latest development plan of the Project, the future land uses include railways, stations, residential development, car park, open space and sports ground, the RBRGs for Industrial, Urban Residential and Public Park land use scenarios are considered appropriate for the assessment. Where a site would be developed into more than one land use, the most stringent set of RBRGs would be adopted.
- 2.7.5 The proposed RBRGs land use scenario recommended for this Project is summarised in **Table 2.5**. Relevant RBRGs are shown in **Annex D**.

**Table 2.5 Summary of Potential Land Contamination Issues within the Project Area**

Site ID / Concerned Site (Affected Land Lot No. / Address) <sup>1</sup>	Current Land Use	Site Observation / Current Potentially Contaminating Activities	Corresponding Photographic Record Reference	Other Past Potential Contaminating Land Use / Activities	Corresponding Aerial Photo Reference in Annex A	Approx. Site Area (m <sup>2</sup> )	Any Potential Land Contamination Issues?	Potential COCs	Future Land Uses	RBRGs Land Use Scenario <sup>3</sup>
TME-S1 Tuen Mun Community Green Station (GLA-TTM 717)	Recycling station	<p>The Tuen Mun Community Green Station is located in the central portion of the Project Area.</p> <p>As reported by the site representative and observed during the site walkover, the site mainly consists of an office (comprising an office area, an activity room and a toilet) in the centre, a garden in the south, a warehouse and a storage yard for the temporary storage of recyclables (e.g. paper, plastics and aluminum cans) in the northern portion of the site. Except for the landscaped areas, the entire site was paved with no stains / stressed vegetation observed.</p> <p>A chemical waste storage room for temporary storage of spent fluorescent lamp tubes and batteries was observed in the west of the warehouse. As reported by the site representative, the spent fluorescent lamp tubes and batteries are delivered off-site regularly for recycling. A hydraulic waste baler was also observed in the northwest of the warehouse. Based on site observations and information reported by the site representative, hydraulic oil is used for the operation of the baler and the oil is stored in the hydraulic oil tank within the baler machine which is at least 2 m above ground level. The entire warehouse was paved with intact concrete in good condition with no signs of oil stains / chemical spillages observed. No potentially contaminating activities were observed at the site during the site walkover.</p> <p>Based on EPD information, 1 valid CWP record registered for government facility was identified for the site.</p> <p>Based on FSD/EPD information, there were no DG / fire incident / spillage records for the site.</p>	C1502/C/TME/ACM/M55/020	<p>Open storage (year 2003 to 2019)</p> <p>Suspected industrial land use &amp; electrical substation (year 1993 to 2002)</p>	C1502/C/TME/ACM/M55/013 to C1502/C/TME/ACM/M55/016	2,760	<p><b>Yes</b></p> <ul style="list-style-type: none"> <li>Potential land contamination issues associated with past land uses.</li> <li>Given the storage of spent batteries and fluorescent lamps in the chemical waste storage room was only temporary as these chemical wastes are reportedly delivered off-site regularly, and the hydraulic oil tank is located within the baler machine at least 2m above ground level, and the entire warehouse was paved with concrete in good conditions with no signs of oil stains / chemical spillages observed, no potential land contamination issues associated with these two areas to the Project are anticipated.</li> </ul>	Metals, VOCs, SVOCs, PCRs and PCBs	Viaduct and railway station	Industrial

Site ID / Concerned Site (Affected Land Lot No. / Address) <sup>1</sup>	Current Land Use	Site Observation / Current Potentially Contaminating Activities	Corresponding Photographic Record Reference	Other Past Potential Contaminating Land Use / Activities	Corresponding Aerial Photo Reference in Annex A	Approx. Site Area (m <sup>2</sup> )	Any Potential Land Contamination Issues?	Potential COCs	Future Land Uses	RBRGs Land Use Scenario <sup>3</sup>
<b>TME-S2</b> Wu Shan Road Car Park (STT No. MX16007) and land in the vicinity	Open car park and vegetated land	An open car park is located in the south of the Project Area, which was largely concrete paved. No vehicle maintenance activities were observed at the site. The site also comprises vegetated land. No potentially contaminating activities were identified at the site during the site walkover.  Based on FSD/EPD information, there were no DG / chemical wastes / fire incident / spillage records for the site.	Photo 0966, 0970, 2506 and 2522 in <b>C1502/C/TME/ACM/M55/022</b>	Open storage (year 1993 to 2002)	<b>C1502/C/TME/ACM/M55/013 to C1502/C/TME/ACM/M55/016</b>	7,220	<b>Yes<sup>2</sup></b>	Metals, VOCs, SVOCs, and PCRs	Riverside open space and potential underground car park	Lower of Industrial or Public Park
<b>TME-S3</b> Tuen Mun Swimming Pool (GLA-TM 47)	Swimming pool, squash courts, car park and garden	The site mainly comprises swimming pool facilities (e.g. pools and changing rooms), a plant room (comprising water boilers, water pumps and tanks, a refuse store and chemical storage rooms for the storage of sodium chloride (common salt), sodium hypochlorite (bleach) and a small amount of alum), a fire service water tank, Tuen Mun Swimming Pool Squash Courts (comprising 2 courts and site offices), car park and a garden. As reported by the site representatives, only the chemicals stored in the chemical storage rooms are used in the plant room. No potentially contaminating activities were observed in these areas during the site walkover.  An electrical substation (No. 08271-1) (Site TME-S3) is located within the plant room in the south of the Tuen Mun Swimming Pool. The substation was concrete paved and housed a transformer (approx. 5m <sup>2</sup> ) containing transformer oil. The transformer was situated on raised concrete foundation in good condition with no oil stains observed.  Based on information from EPD, FSD and site representatives, there were no DG / chemical wastes / fire incident / spillage records for the site.	<b>C1502/C/TME/ACM/M55/019</b>	N/A	<b>C1502/C/TME/ACM/M55/013 to C1502/C/TME/ACM/M55/016</b>	35,660  Transformer: 5 m <sup>2</sup>	<b>Yes</b>  Concerned area: • Transformer (5 m <sup>2</sup> )  • No land contamination issues anticipated for the plant room given the chemicals identified (sodium chloride, sodium hypochlorite and alum) are not considered as land contaminants.	Metals, VOCs, SVOCs, PCRs and PCBs	Viaduct and railway station / Residential	Urban Residential
<b>TME-S4</b> Works site of Contract No. DC/2018/09 (Portion of GLA-TM 106)	Works site	A works site of <i>Contract No. DC/2018/09 Rehabilitation of Trunk Sewers in Tuen Mun</i> is located within Tuen Mun Park in the east of the Project Area.  The works site mainly comprises a works area for rehabilitation of underground trunk sewers in the north, a material storage area (for construction materials and equipment) and a chemical dosing unit in the south of the site. Apart from the works area, the remaining areas of the works site was part of the existing paved cycling track. The cycling track was noted to be in good condition with no stains / stressed vegetation observed. Based on site observations and as reported by the site representative, no vehicle refueling or vehicle / equipment maintenance activities are carried out on site.  Based on site observations and information provided by the site representatives, wastewater treatment chemicals including Clarifloc, polyaluminum chloride (PAC) and sodium bisulfite are stored in the chemical dosing unit and are used on site. These chemicals were stored in plastic drums with metal drip trays within the chemical dosing unit in the east of the works site. The metal drip trays and paved	Photo 2624, 6970, 7456, 7461 and 7463 in <b>C1502/C/TME/ACM/M55/017</b>	N/A	<b>C1502/C/TME/ACM/M55/016</b>	420  Diesel generator: 3 m <sup>2</sup>	<b>Yes</b>  Concerned area: • Diesel generator (3 m <sup>2</sup> )  • The wastewater treatment chemicals (Clarifloc, PAC and sodium bisulfite) are not considered as land contaminants.	Metals, VOCs, SVOCs, and PCRs	Cycling track / footpath	Lower of Industrial or Public Park



Site ID / Concerned Site (Affected Land Lot No. / Address) <sup>1</sup>	Current Land Use	Site Observation / Current Potentially Contaminating Activities	Corresponding Photographic Record Reference	Other Past Potential Contaminating Land Use / Activities	Corresponding Aerial Photo Reference in Annex A	Approx. Site Area (m <sup>2</sup> )	Any Potential Land Contamination Issues?	Potential COCs	Future Land Uses	RBRGs Land Use Scenario <sup>3</sup>
		<p>cycling track in the vicinity were in good condition with no signs of stains / spillage observed.</p> <p>A 60 L diesel generator was observed in the west of the works site. The generator was located on the existing raised planter of approximately 0.3 m above ground level along the Tuen Mun River Channel and was provided with a metal drip tray. The drip tray was observed to be intact and in good condition with no signs of oil stains / spillages in the vicinity of the generator. As reported by the site staff, diesel and lubricating oils are used for operation of the generator and are delivered to site as and when required for refueling of the generator. All lubricating oils and spent lubricating oils were reportedly stored off-site at another works site outside the Project Area. No chemical waste / chemical waste storage areas were observed on site during the site walkover.</p> <p>Based on EPD information, 1 valid CWP record registered for construction was identified for the site (Refer to CWP ID 4 in <b>Section 2.5.6</b>).</p> <p>Based on information from FSD, EPD and site representatives, there were no DG / fire incident / chemical spillage records for the site.</p>								
CIC Tuen Mun Training Ground (STT1004)	Training ground for construction industry	<p>The CIC Tuen Mun Training Ground is slightly encroached into the central portion of the Project Area, and mainly comprises site office / staff rooms and material storage area in the east and training ground in the remaining portions of the site. The encroached portion comprises of training ground only. The site was largely unpaved except for the eastern portion with no oil stains / stressed vegetation observed.</p> <p>As reported by the site representative, the site is largely used as a training ground for operation of load shifting machineries and vehicle refueling is carried out on site. No vehicle maintenance activities are reportedly carried out on site as vehicles to be repaired are sent to contractors off-site.</p> <p>A chemical and chemical waste storage area was located in the south east of the site outside the Project Area. The chemicals identified included 8 drums of diesel, 8 drums of hydraulic fluid and a small quantity of engine oil in plastic containers. Chemical waste identified included spent lubricating oil. The chemicals and chemical wastes were stored within a container on a raised concrete slab. No oil stains / stressed vegetation was observed in the area. As reported by the site representative, vehicle refueling is carried out immediately adjacent to the chemical and chemical waste storage area only.</p> <p>A chemical storage area was located in the north of the site outside the Project Area. The chemicals identified included engine oil, hydraulic fluid and a small quantity of paints and thinners. The chemicals were stored on shelves within a container on raised thick concrete slab. No oil stains / stressed vegetation was observed in the area.</p>	Photo 0916, 0926, 4831, 4834 and 5763 in <b>C1502/C/TME/ACM/M55/021</b>	N/A	<b>C1502/C/TME/ACM/M55/014 to C1502/C/TME/ACM/M55/016</b>	11,400 (Encroached Area: 1,830)	<b>No</b> All concerned areas are outside of Project Area	N/A	Residential / Sports ground	N/A

Site ID / Concerned Site (Affected Land Lot No. / Address) <sup>1</sup>	Current Land Use	Site Observation / Current Potentially Contaminating Activities	Corresponding Photographic Record Reference	Other Past Potential Contaminating Land Use / Activities	Corresponding Aerial Photo Reference in Annex A	Approx. Site Area (m <sup>2</sup> )	Any Potential Land Contamination Issues?	Potential COCs	Future Land Uses	RBRGs Land Use Scenario <sup>3</sup>
		<p>Based on EPD information, 1 valid and 1 invalid CWP record registered for training &amp; assessment of loadshifting machinery operation / training of construction trade skills were identified for the site (Refer to CWP ID 1 &amp; 7 in <b>Section 2.5.3</b>).</p> <p>Based on FSD/EPD information, there were no DG / fire incident / spillage records for the site.</p>								

Notes:

1. Refer to **Figure No. C1502/C/TME/ACM/M55/026 to 028** for locations of the sites.
2. Potential land contamination impact associated with Site TME-S2 to the Project is not anticipated if no excavation works would be proposed at the site, subject to confirmation of the engineering design plan in later stage of the Project.
3. Where a site would be developed into more than one land use in the future, the most stringent RBRGs has been adopted.  
 N/A: Not Applicable

### **3 SAMPLING AND TESTING PLAN FOR SITE INVESTIGATION**

#### **3.1 Site Investigation Location**

- 3.1.1 Based on the site appraisal above, intrusive site investigation (SI) works are considered necessary within the identified potentially contaminated sites within the Project Area.
- 3.1.2 A total of 49 sampling locations are proposed to study the vertical profile of possible contamination within the concerned areas. The proposed sampling locations followed the recommended grid sampling arrangement in Section 2.4.1 of EPD Practice Guide and have taken into account the sources of contamination (i.e. hotspots) identified during the site walkover. The sampling locations are illustrated in **Figure No. C1502/C/TME/ACM/M55/029 to 031** and detailed in **Table 3.1**. The exact sampling locations are subject to fine adjustment according to the actual site conditions and existence of underground structures/utilities as determined by the on-site land contamination specialist. The Chemicals of Concern (COCs) proposed for laboratory analysis included metals, petroleum carbon ranges (PCRs), volatile organic chemicals (VOCs), semi-volatile organic chemicals (sVOCs) and/or polychlorinated biphenyls (PCBs). The sampling and testing plan with rationale are summarized in **Table 3.1**.

**Table 3.1 Sampling and Testing Plan**

Site ID (Approx. Area)	Hotspot (Approx. Area)	Grid Size (m)	Proposed Number of Sampling Location	Rationale	Sampling Method	Sampling Matrix / Depth <sup>(1)</sup>	Testing Parameters <sup>(2)</sup>				
							VOC	SVOC	Metals	PCRs	PCBs
<b>TME-S1</b> Tuen Mun Community Green Station / Former Industrial Facility (2,760 m <sup>2</sup> )	Whole area of former industrial facility (2,760 m <sup>2</sup> )	14	<b>16</b>  Borehole ID: ENV-BH01 – BH16  (refer to <b>Figure No.</b> <b>C1502/C/TME/ACM/M55/</b> <b>029</b> for sampling locations)	Sampling to target the existing site. A grid sampling approach based on EIA recommendations and the Practice Guide with specified grid size was adopted for the sampling strategy.  Sampling location ENV-BH16 was proposed to target the former electrical substation (approx. 55 m <sup>2</sup> ).	Borehole to 2m below the ground-water table or 6m bgl	Soil  (i) 0.5m bgl; (ii) 1.5m bgl; (iii) 3.0m bgl; and (iv) above GW level if present or if no GW encountered, 6m bgl.	Full List	Full List	Full List	Full List	✓ (ENV- BH16 only)
						GW  If present <sup>(3)</sup>	Full List	Full List	Mercury only	Full List	✓ (ENV- BH16 only)
<b>TME-S2<sup>(4)</sup></b> Wu Shan Road Car Park (STT No. MX16007) (7,220 m <sup>2</sup> )	Whole area of former open storage (7,220 m <sup>2</sup> )	17	<b>31</b>  Borehole ID: ENV-BH18 – BH48  (refer to <b>Figure No.</b> <b>C1502/C/TME/ACM/M55/</b> <b>030</b> for sampling locations)	Sampling to target the existing site. A grid sampling approach based on the Practice Guide with specified grid size was adopted for the sampling strategy.	Borehole to 2m below the ground-water table or 6m bgl	Soil  (i) 0.5m bgl; (ii) 1.5m bgl; (iii) 3.0m bgl; and (iv) above GW level if present or if no GW encountered, 6m bgl.	Full List	Full List	Full List	Full List	-
						GW  If present <sup>(3)</sup>	Full List	Full List	Mercury only	Full List	-
<b>TME-S3</b> Tuen Mun Swimming Pool (35,660 m <sup>2</sup> )	1 transformer on concrete foundation (5 m <sup>2</sup> )	-	<b>1</b>  Borehole ID: ENV-BH17  (refer to <b>Figure No.</b> <b>C1502/C/TME/ACM/M55/</b> <b>029</b> for sampling location)	Sampling to target the transformer located in the electrical substation.	Borehole to 2m below the ground-water table or 6m bgl	Soil  (i) 0.5m bgl; (ii) 1.5m bgl; (iii) 3.0m bgl; and (iv) above GW level if present or if no GW encountered, 6m bgl.	Full List	Full List	Full List	Full List	✓
						GW  If present <sup>(3)</sup>	Full List	Full List	Mercury only	Full List	✓
<b>TME-S4</b> Works site of <i>Contract No.</i> <i>DC/2018/09</i> (420 m <sup>2</sup> )	1 diesel generator (3 m <sup>2</sup> )	-	<b>1</b>  Borehole ID: ENV-BH49  (refer to <b>Figure No.</b> <b>C1502/C/TME/ACM/M55/</b> <b>031</b> for sampling location)	Sampling to target the hotspot area at the existing diesel generator.	Borehole to 2m below the ground-water table or 6m bgl	Soil  (i) 0.5m bgl; (ii) 1.5m bgl; (iii) 3.0m bgl; and (iv) above GW level if present or if no GW encountered, 6m bgl.	Full List	Full List	Full List	Full List	-
						GW  If present <sup>(3)</sup>	Full List	Full List	Mercury only	Full List	-

Notes:

- (1) bgl = Below ground level; GW = groundwater
- (2) – Full list refers to the parameters as shown in Table 2.1 – RBRGs for Soil & Soil Saturation Limit and Table 2.2 – RBRGs for Groundwater and Solubility Limit under VOCs, SVOCs, Metals and PCRs in the Guidance Manual.  
– Volatile organic chemicals (VOCs) include BTEX (benzene, toluene, ethylbenzene, and total xylenes), MTBE (methyl tert-butyl ether), acetone, bromodichloromethane, 2-butanone, chloroform, methylene chloride, styrene, tetrachloroethene, and trichloroethene.  
– Semi-volatile organic chemicals (SVOCs) include polyaromatic hydrocarbons (PAHs) (acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene), bis-(2-ethylhexyl)phthalate, hexachlorobenzene, and phenol. Since RBRG value of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, bis-(2-Ethylhexyl)phthalate, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene and Phenol were not available for groundwater, the captioned chemicals parameters would not be tested in groundwater sample.  
– Metals include antimony, arsenic, barium, cadmium, chromium III, chromium VI, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, tin and zinc.  
– Petroleum carbon ranges (PCRs) include C6 – C8, C9 – C16 and C17 – C35.  
– PCBs - Polychlorinated biphenyls.
- (3) Samples will only be collected if groundwater is encountered during SI works.
- (4) No SI works is required if there would be no excavation works proposed at the site under the Project, subject to confirmation of the engineering design plan in later stage of the Project. The relevant design plans will be provided to EPD for review and agreement should the SI works would not be proceeded in the future.

### 3.2 Soil Sampling Method and Depth of Sampling

- 3.2.1 All soil boring / excavation and sampling should be supervised by a land contamination specialist.
- 3.2.2 Boreholes should be advanced by dry rotary drilling, i.e. without the use of flushing medium, to prevent cross-contamination during sampling. For safety reasons, an inspection pit should be excavated to 1.5m below ground level (m bgl) to confirm the absence of underground utilities at the proposed borehole location and disturbed soil samples, using stainless steel hand tools or other appropriate equipment, should be collected at depth of 0.5m bgl. Soil boring using drill rigs should then be performed from depth of 1.5m bgl to the maximum boring depth. Undisturbed U100/U76 soil samples should be collected at depths from 1.5m and onwards. Boreholes are proposed to be advanced to approximately 2m below the stabilized water table or if no groundwater were encountered, a depth of 6m bgl. If sign of contamination is identified below 6 m bgl during SI, additional samples will be taken at lower depth(s) as determined by the on-site land contamination specialist subject to the actual site condition and engineering constraints. On-site screening using photo-ionization detectors (PID) for measurement of VOC concentration in soil vapour will also be carried out to assist in the identification of potentially contaminated soil and to determine the need to collect extra samples for laboratory analysis.
- 3.2.3 At each sampling location/depth, sufficient quantity of soil (as specified by the laboratory) should be recovered to facilitate analyses of the specified suite of parameters. All soil samples should be uniquely labelled. Backup samples should be retained and stored at 0 - 4 °C in laboratory.

### 3.3 Strata Logging

- 3.3.1 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.

### 3.4 Groundwater Sampling and Free Product Measurement

- 3.4.1 Groundwater samples should be collected at each of the sampling location if groundwater were encountered.
- 3.4.2 At each borehole location, a groundwater sampling well should be installed unless agreed otherwise by the land contamination specialist. A typical design of a groundwater monitoring well is shown in **Annex E**. After installation of the monitoring wells, the depth to water table at all monitoring wells should be measured with an interface probe in order to assess groundwater gradients and predominant flow direction. Prior to sampling activities, wells should be fully developed to ensure formation water is flowing into and out of the wells. The wells should then be allowed to stand for a day to permit groundwater conditions to equilibrate.
- 3.4.3 Groundwater level and thickness of free product layer, if present, should be measured at each well before groundwater samples are taken. In the unlikely event that measurable thicknesses of free product were encountered, a sample should be collected for laboratory analysis to determine the composition.
- 3.4.4 Prior to groundwater sampling, the monitoring wells should be purged to collect representative fresh groundwater samples.

- 3.4.5 After purging, one groundwater sample should be collected at each well using Teflon bailer and decanted immediately into appropriate sample containers in a manner that minimises agitation and volatilization of VOCs from the samples for the purpose of storage and transportation. The sample containers should be supplied by the laboratory and should be new, clean and made of 'amber glass'. Groundwater samples should be placed in the glass containers with zero headspace and promptly sealed with a septum-lined cap. All samples should be uniquely labelled.
- 3.4.6 Immediately after collection, samples should be placed in ice chests, cooled and maintained at temperature of about 0-4°C until delivered to the analytical laboratory.

### 3.5 Sample Size and Decontamination Procedures

- 3.5.1 All down hole or digging equipment should be decontaminated between drilling, digging and sampling event to minimize the potential for cross contamination. The equipment (including drilling pit, digging tools and soil/groundwater samplers) should be decontaminated steam cleaning or high-pressure hot water jet, then washed by phosphate-free detergent and finally rinsed with distilled / deionized water.
- 3.5.2 Prior to sampling, the laboratory responsible for analysis should be consulted on the particular sample size and preservation procedures that are necessary for each chemical analysis.
- 3.5.3 The sample containers should be laboratory cleaned, sealable, water-tight, made of glass or other suitable materials with aluminum or Teflon-lined lids, so that the container surface will not react with the sample or adsorb contaminants. No headspace should be allowed in the containers which contain samples to be analyzed for VOCs, petroleum carbon ranges or other volatile chemicals.
- 3.5.4 The containers should be marked with the sampling location codes and the depths at which the samples were taken. If the contents are hazardous, this should be clearly marked on the container and precautions taken during transport. Samples should be stored at between 0 - 4 °C but never frozen. Samples should be delivered to the laboratory on the same day the sample being taken and analyzed within the respective holding time, but, in any case, not more than 10 days after samples being taken.

### 3.6 QA/QC Procedures

- 3.6.1 QA/QC samples should be collected in the following frequency during the SI works. Chain of Custody protocol should be adopted.
- 1 equipment blank per 20 samples for full suite analysis as shown in **Table 3.1**. Based on **Table 3.1**, approximately 196 soil samples and 49 groundwater samples may be taken and thus 10 equipment blanks for soil and 3 equipment blanks for groundwater maybe required for analysis;
  - 1 field blank per 20 samples for full suite analysis as shown in **Table 3.1**. Based on **Table 3.1**, approximately 196 soil samples and 49 groundwater samples may be taken and thus 10 field blanks for soil and 3 field blanks for groundwater maybe required for analysis;
  - 1 duplicate soil sample per 20 soil samples and 1 duplicate groundwater sample per 20 groundwater samples for corresponding parameters analysis as shown in **Table 3.1**. Based on **Table 3.1**, approximately 196 soil samples and 49 groundwater samples may be taken and thus 10 duplicate soil samples and 3 duplicate groundwater samples maybe required for analysis; and

- 1 trip blank sample per trip for analysis of VOCs. The total number of trip blanks would be dependent on the number of trips for sample delivery.

### **3.7 Health and Safety**

- 3.7.1 The specific safety measures to be taken depend on the nature and content of contamination, the site conditions and the regulations related to site safety requirements. Workmen Compensation Insurance and third party insurance must be provided for the SI works.
- 3.7.2 Extreme care should be exercised in the event that potentially toxic gases or other suspected hazardous materials are encountered. Any abnormal conditions found should be reported immediately to the safety officer and the land contamination specialist.
- 3.7.3 The SI contractor should establish and maintain a Health and Safety Plan before commencement of the SI that will include the following:
- (a) Instruction of works on work procedures, safe practices, emergency duties, and applicable regulations;
  - (b) Regularly scheduled meetings of the workers in which the possible hazards, problems of the job, and related safe practices are emphasized and discussed;
  - (c) Good housekeeping practices; and
  - (d) Availability of and instruction in the location, use and maintenance of personal protective equipment.
- 3.7.4 The SI contractor should maintain equipment and supplies reasonably required in an emergency, including lifesaving, evacuation, rescue and medical equipment in good working order and condition at all times. The SI contractor should use all reasonable means to control and prevent fires and explosions, injury to personnel and damage to equipment of property. Without limiting the foregoing, the SI contractor should:
- (a) Maintain proper safety devices, barriers to minimize hazards during performance of the work;
  - (b) Prohibit smoking and open flames and the carrying of matches and lighters;
  - (c) Develop and maintain a written emergency plan applicable to the Work and Site;
  - (d) Maintain equipment in good operating condition and have emergency and first aid equipment ready for immediate use, where applicable;
  - (e) Conduct equipment tests to ensure that equipment is properly placed and in good operating condition, and that workers are able to respond to emergency situations;
  - (f) Require all workers employed or retained by the Contractor, or a subcontractor, to at all time wear clothing suitable for existing work, weather and environmental conditions; and
  - (g) The personnel are required to wear respirator and gloves for vapour exposure protection, if necessary. Safety helmet and protective boots should be worn.

**4 LABORATORY ANALYSIS**

4.1.1 **Table 4.1** summarizes the parameters, the recommended reporting limits and reference methods for the laboratory analyses of soil and groundwater samples for the COCs under this land contamination assessment.

**Table 4.1 Parameters, Reporting Limits and Reference Methods for Laboratory Analysis**

Item	Parameter	Soil		Groundwater	
		Reporting Limit (mg/kg) or otherwise specified	Reference Method*	Reporting Limit (µg/L) or otherwise specified	Reference Method*
<b>SVOCs</b>					
1	Acenaphthene	0.5	USEPA 8270	2	USEPA 8270
2	Acenaphthylene	0.5		2	
3	Anthracene	0.5		2	
4	Benzo(a)anthracene	0.5		NA	
5	Benzo(a)pyrene	0.5		NA	
6	Benzo(b)fluoranthene	0.5		1	
7	Benzo(g,h,i)perylene	0.5		NA	
8	Benzo(k)fluoranthene	0.5		NA	
9	bis-(2-Ethylhexyl)phthalate	5		NA	
10	Chrysene	0.5		1	
11	Dibenzo(a,h)anthracene	0.5		NA	
12	Fluoranthene	0.5		2	
13	Fluorene	0.5		2	
14	Hexachlorobenzene	0.2		4	
15	Indeno(1,2,3-cd)pyrene	0.5		NA	
16	Naphthalene	0.5		2	
17	Phenanthrene	0.5		2	
18	Phenol	0.5		NA	
19	Pyrene	0.5		2	
<b>VOCs</b>					
20	Acetone	50	USEPA 8260	500	USEPA 8260
21	Bromodichloromethane	0.1		5	
22	2-Butanone	5		50	
23	Chloroform	0.04		5	
24	Methyl tert-Butyl Ether	0.5		5	
25	Methylene Chloride	0.5		50	
26	Styrene	0.5		5	
27	Tetrachloroethene	0.04		5	
28	Trichloroethene	0.1		5	
29	Benzene	0.2		5	
30	Toluene	0.5		5	
31	Ethylbenzene	0.5		5	
32	Xylenes (Total)	2		20	



Item	Parameter	Soil		Groundwater	
		Reporting Limit (mg/kg) or otherwise specified	Reference Method*	Reporting Limit (µg/L) or otherwise specified	Reference Method*
<b>Metals</b>					
33	Antimony	1	USEPA 6020	NA	NA
34	Arsenic	1		NA	
35	Barium	1		NA	
36	Cadmium	0.2		NA	
37	Chromium III <sup>^</sup>	1	By calculation	NA	
38	Chromium VI	1	APHA 3500Cr: D	NA	
39	Cobalt	1	USEPA 6020	NA	
40	Copper	1		NA	
41	Lead	1		NA	
42	Manganese	1		NA	
43	Mercury	0.05	USEPA 6020	0.5	USEPA 6020
44	Molybdenum	1	USEPA 6020	NA	NA
45	Nickel	1		NA	
46	Tin	1		NA	
47	Zinc	1		NA	
<b>Petroleum Carbon Ranges</b>					
48	C <sub>6</sub> - C <sub>8</sub>	5	USEPA 8015	20	USEPA 8015
49	C <sub>9</sub> - C <sub>16</sub>	200		500	
50	C <sub>17</sub> - C <sub>35</sub>	500		500	
<b>PCBs</b>					
51	PCBs	0.1	USEPA 8270	1	USEPA 8270

Notes:

NA = Not Applicable

<sup>^</sup> Chromium III is quantified by calculation based on Chromium VI and Total Chromium measured under HOKLAS accredited methods.

\* Alternative testing methods with accreditation by HOKLAS or its Mutual Recognition Arrangement partners are also accepted.

4.1.2 All laboratory testing methods for the above parameters should be accredited by the Hong Kong Laboratory Accreditation Scheme (HOKLAS) or one of its Mutual Recognition Arrangement partners.

## 5 EVALUATION OF POTENTIAL LAND CONTAMINATION IMPACT AND POSSIBLE REMEDIATION MEASURES

### 5.1 Evaluation of Potential Land Contamination Impact

- 5.1.1 Based on the site appraisal, a total of 4 facilities / areas were identified with potential land contamination concerns within the Project Area and intrusive SI works were considered necessary. However, as the concerned sites are still in operation, it would not be feasible to carry out the proposed SI works under the EIA Study.
- 5.1.2 The potential land contamination concerns for the concerned sites were associated with handling and storage of hazardous substances. Apart from the former open storage areas / suspected industrial facility (Site TME-S1 and TME-S2), the scale of operation of the remaining concerned area was considered small (approximately 3 to 5 m<sup>2</sup>). For the former open storage, the site appeared to be largely used for construction materials storage and it is likely that only a small portion of the site is used for the handling / storage of hazardous substances (if any). As reported by EPD and FSD, there were no records of spillages / leakages accidents of chemicals / dangerous goods within the Project Area. It is therefore considered that the contamination (if indeed present) would unlikely be extensive within the Project Area.
- 5.1.3 Land contamination assessment including intrusive SI works and, if required, remediation works would need to be carried out at a later stage of the Project (refer to **Section 6** below for details) and should follow EPD's Guidance Manual, Guidance Note and Practice Guide. Any soil/groundwater contamination would be identified and properly treated prior to the commencement of construction works under the Project. The potential COCs identified include metals, VOCs, SVOCs, PCRs and PCBs. As discussed in **Section 5.2** below, there are commercially available technologies that could tackle these COCs.
- 5.1.4 Given the above, land contamination impacts are considered not insurmountable to the future occupants if the recommended actions as outlined in **Section 6** were followed and contaminated soil and groundwater (if any) were properly treated using appropriate remediation methods and according to EPD's agreed Remediation Action Plan (RAP).

### 5.2 Possible Remediation Measures

- 5.2.1 The actual remediation methods, if required, will be confirmed after completion of the intrusive SI works and EPD's agreement on the Contamination Assessment Report (CAR) and Remediation Action Plan (RAP) at the later stage of the Project. The RAP will provide details of the remedial actions for any identified contaminated soil and groundwater.
- 5.2.2 Having said that, based on the nature of the site, the potential COCs may include metals, VOCs, SVOCs, PCRs and PCBs. For soil, there are a number of technologies commercially available to tackle these contaminants. Technologies that are commonly used in Hong Kong are biopiling and cement solidification/stabilization. These ex-situ methods were proven to be effective in treating the target COCs (cement solidification/stabilization on metals and biopiling on VOCs/PAHs/PCRs/PCBs) and the two methods are considered to be appropriate for the Project. For contaminated groundwater, the possible remediation techniques include air sparging, recovery trenches / wells, in-ground containment/capping and permeable reactive barriers. Details are shown in Table 4.1 and Table 4.2 of the Practice Guide.

**6 WAY FORWARD AND PROGRAMME SCHEDULE**

- 6.1.1 As the concerned sites are still in operation, it would not be feasible to carry out the proposed SI works under the EIA Study. Moreover, as the proposed development under the Project will not commence until 2023, there could be changes in the site operations or changes in land use within the Project Area which may cause further contamination issues. Therefore, site re-appraisal and submission of supplementary CAP(s) should be carried out for the whole Project Area at a later stage of the Project in order to address any new contamination issues caused by the (i) changes in operation of the identified potentially contaminated site and (ii) changes of land use within the Project site. The associated SI works and any necessary remediation action recommended in the supplementary CAP(s) will be carried out after the operation of concerned sites has ceased but prior to the commencement of construction works at the concerned sites.
- 6.1.2 The site re-appraisal and submission of supplementary CAP(s) should be carried out prior to the commencement of the SI works. Supplementary CAP(s), presenting findings of the review, the latest conditions of the Project Area and updated sampling strategy and testing protocol, where necessary, should be submitted to EPD for approval. The SI works should be carried out according to EPD’s agreed supplementary CAP(s). Following the completion of SI works and receipt of laboratory test results, CAR(s) should be prepared to present the findings of the SI works and to discuss the presence, nature and extent of contamination. If contamination is identified, RAP(s) which provides details of the remedial actions for the identified contaminated soil and / or groundwater should be submitted to EPD for approval.
- 6.1.3 Remediation action, if necessary, will be carried out according to EPD approved RAP(s) and Remediation Report(s) (RR(s)) will be submitted after completion of the remediation action. The RR(s) should be endorsed by EPD prior to the commencement of construction works at the respective identified contaminated areas (if any).
- 6.1.4 Given that the further land contamination assessment and, if necessary, remediation works could only be carried out after the sites are handed over from Lands Department, a tentative programme for land contamination assessment after hand over is shown in **Table 6.1**. It should be noted that the tentative schedule is subject to the land hand over programme to be agreed with Lands Department and the actual time span is subject to the actual site conditions.

**Table 6.1 Tentative Programme for Land Contamination Assessment**


<b>Task</b>	<b>Tentative programme</b>
Site re-appraisal, preparation and submission of supplementary CAP	1-2 months after land handed over to the MTRC
Approval of supplementary CAP	2 months after submission of supplementary CAP
SI works, laboratory tests, preparation and submission of CAR/RAP	4-6 months after approval of supplementary CAP
Approval of CAR/RAP	2 months after submission of CAR/RAP
Remediation works, preparation and submission of RR	Subject to results of the SI works

## **7 CONCLUSION**

- 7.1.1 This CAP covers the Project Area and is prepared for the EIA Study. A site appraisal, in the form of desktop review and site walkover, had been carried out to identify the past and current potentially contaminating land uses and hotspots within the Project Area. Based on the site appraisal, a total of 4 facilities / areas with potential land contamination concerns were identified within the Project Area.
- 7.1.2 A sampling and testing programme, targeting the hotspots identified within the Project Area had been proposed. A total of 49 locations were proposed for soil and groundwater sample collection. The collected samples will be tested for the COCs (i.e. metals, VOCs, SVOCs, PCRs and/or PCBs).
- 7.1.3 As the potentially contaminated sites are still in operation, the proposed SI works are considered not feasible to be carried out under the EIA Study. Moreover, there could be changes in the site operations or changes in land use within the Project Area which may cause further contamination issues. Therefore, site re-appraisal and supplementary CAP(s) should be conducted for the whole Project Area at a later stage of the Project in order to address any new contamination issues. The associated SI works and any necessary remediation action recommended in the supplementary CAP(s) will be carried out after site operation has ceased but prior to the commencement of construction works at the concerned site(s). The recommended further assessment and remediation works, including the submission of supplementary CAP(s), CAR(s)/RAP(s) and RR(s) would follow relevant Guidance Manual, Guidance Note and Practice Guide.
- 7.1.4 With the implementation of the recommended follow up works for the Project, any soil/groundwater contamination would be identified and properly treated prior to the construction works. No insurmountable land contamination impacts to the future occupants are therefore anticipated.

## Figures





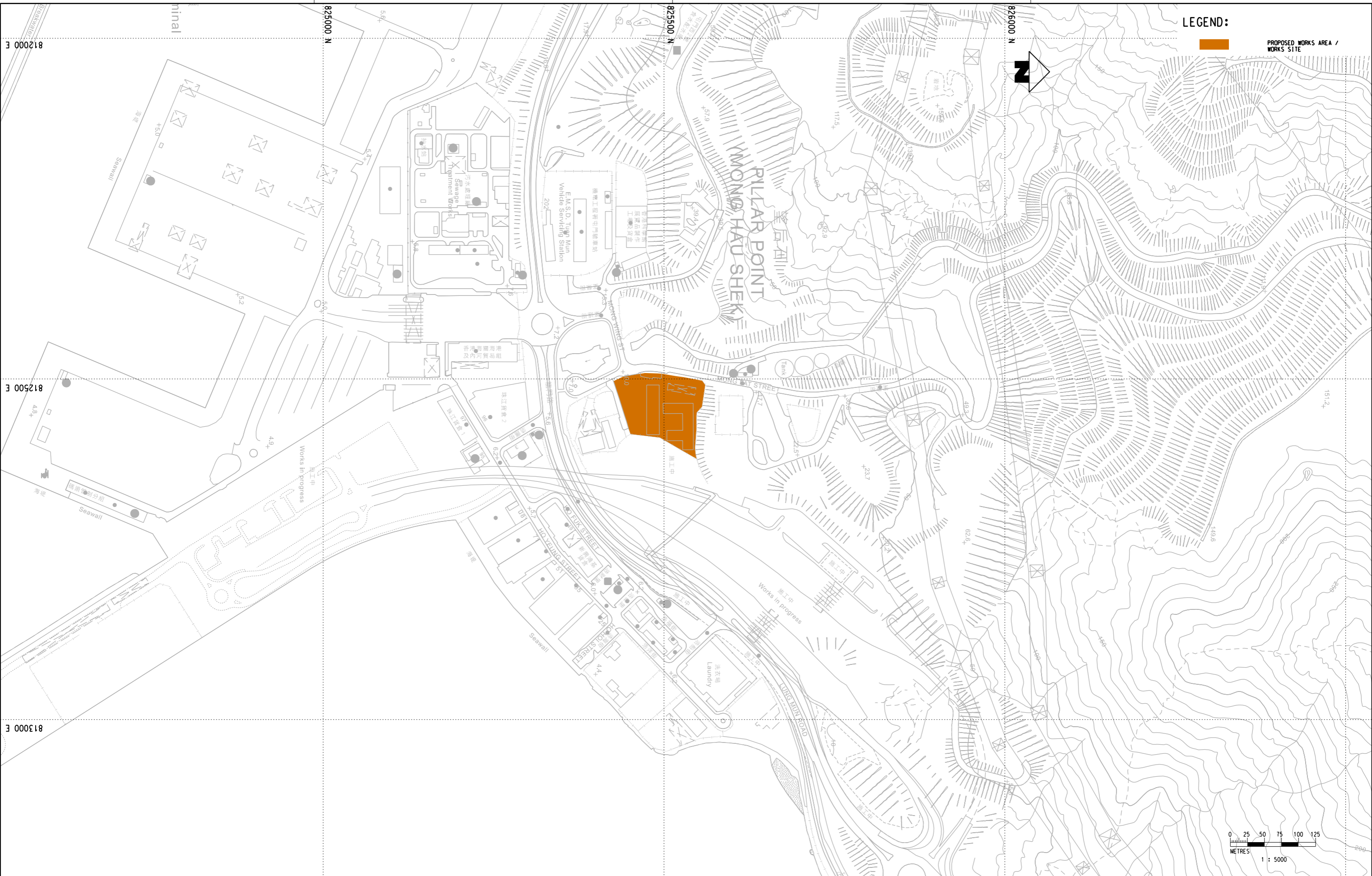
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PHOTO 7463: WORKS AREA OF WORKS SITE OF CONTRACT NO. DC/2018/09 (DATE TAKEN: 21 MAY 2021)



PHOTO 2624: GENERATOR (SITE TME-S4) AND GROUND CONDITION AROUND WORKS AREA OF CONTRACT NO. DC/2018/09 (DATE TAKEN: 21 MAY 2021)



PHOTO 7461: GENERATOR AT WORKS SITE OF CONTRACT NO. DC/2018/09 (SITE TME-S4) (DATE TAKEN: 21 MAY 2021)



PHOTO 7456: WORKS AREA OF CONTRACT NO. DC/2018/09 (DATE TAKEN: 21 MAY 2021)

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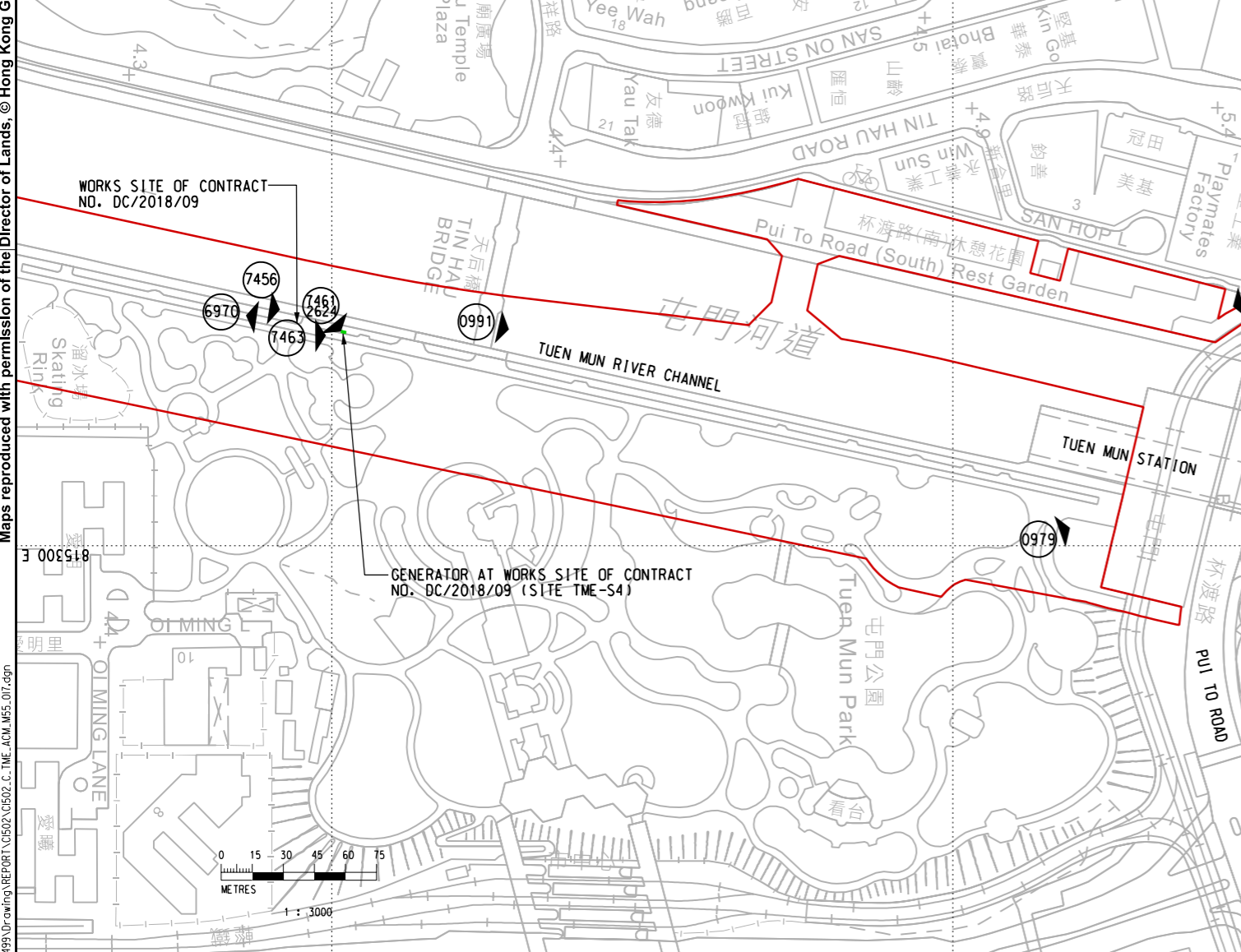


PHOTO 0991: TUEN MUN RIVER CHANNEL (DATE TAKEN: 25 JANUARY 2021)



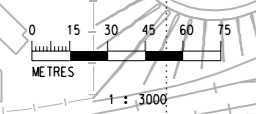
PHOTO 0984: PUI TO ROAD (SOUTH) REST GARDEN (DATE TAKEN: 25 JANUARY 2021)



PHOTO 6970: MATERIALS STORAGE AREA AND CHEMICAL DOSING UNIT AT WORKS SITE OF CONTRACT NO. DC/2018/09 (DATE TAKEN: 21 MAY 2021)



PHOTO 0979: TUEN MUN PARK (DATE TAKEN: 25 JANUARY 2021)



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PHOTO 0858: ELECTRICAL SUBSTATION IN TUEN MUN SWIMMING POOL (SITE TME-S3)  
 (DATE TAKEN: 25 JANUARY 2021)



PHOTO 4655: PLANT ROOM  
 (DATE TAKEN: 25 JANUARY 2021)



PHOTO 5894: TRANSFORMER IN ELECTRICAL SUBSTATION IN TUEN MUN SWIMMING POOL (SITE TME-S3)  
 (DATE TAKEN: 4 FEBRUARY 2021)



PHOTO 5698: PUBLIC CAR PARK IN TUEN MUN SWIMMING POOL  
 (DATE TAKEN: 25 JANUARY 2021)



PHOTO 4728: TUEN MUN SWIMMING POOL SQUASH COURTS  
 (DATE TAKEN: 25 JANUARY 2021)



PHOTO 5698: TUEN MUN SWIMMING POOL  
 (DATE TAKEN: 25 JANUARY 2021)



PHOTO 4676: STORAGE ROOM OF SODIUM CHLORIDE (SALT)  
 (DATE TAKEN: 25 JANUARY 2021)



PHOTO 4705: STORAGE ROOM OF SODIUM HYPOCHLORITE (BLEACH)  
 (DATE TAKEN: 25 JANUARY 2021)



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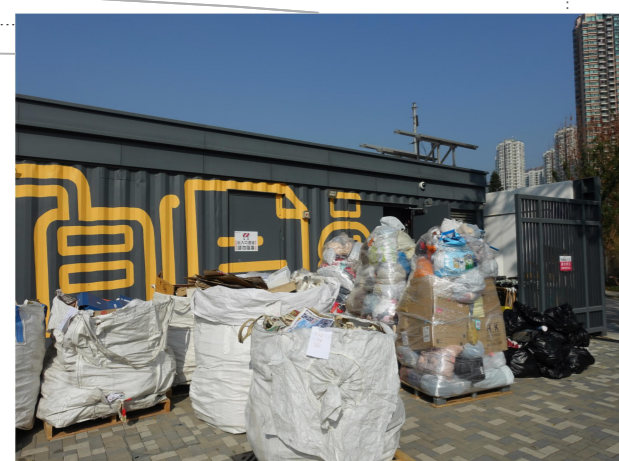


PHOTO 5081: TEMPORARY STORAGE YARD FOR THE RECYCLABLES OF TUEN MUN COMMUNITY GREEN STATION (SITE TME-S1)  
(DATE TAKEN: 25 JANUARY 2021)



PHOTO 0857: GARDEN OF TUEN MUN COMMUNITY GREEN STATION (SITE TME-S1)  
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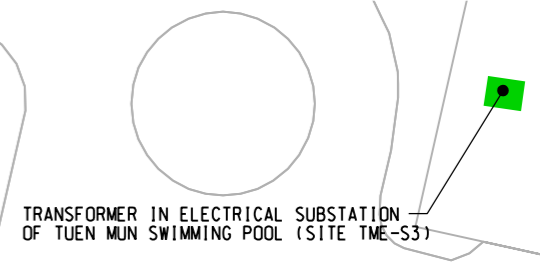
PHOTO 1022: HYDRAULIC WASTE BALER IN TUEN MUN COMMUNITY GREEN STATION (SITE TME-S1)  
(DATE TAKEN: 25 JANUARY 2021)



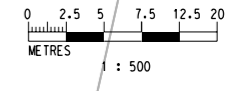
PHOTO 1023: TEMPORARY CHEMICAL WASTE STORAGE ROOM IN TUEN MUN COMMUNITY GREEN STATION (SITE TME-S1)  
(DATE TAKEN: 25 JANUARY 2021)



PHOTO 5655: OFFICE AND MULTI-PURPOSE ROOM OF TUEN MUN COMMUNITY GREEN STATION (SITE TME-S1)  
(DATE TAKEN: 25 JANUARY 2021)



TRANSFORMER IN ELECTRICAL SUBSTATION OF TUEN MUN SWIMMING POOL (SITE TME-S3)



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PHOTO 5739: TUEN YEE STREET CAR PARK (STT NO. MX18010) (DATE TAKEN: 25 JANUARY 2021)



PHOTO 0926: CHEMICAL STORAGE AREA IN CIC TUEN MUN TRAINING GROUND (DATE TAKEN: 25 JANUARY 2021)



PHOTO 5763: CHEMICAL WASTE STORAGE AREA IN CIC TUEN MUN TRAINING GROUND (DATE TAKEN: 25 JANUARY 2021)



PHOTO 0916: CHEMICAL STORAGE AREA IN CIC TUEN MUN TRAINING GROUND (DATE TAKEN: 25 JANUARY 2021)



PHOTO 4834: CIC TUEN MUN TRAINING GROUND (DATE TAKEN: 25 JANUARY 2021)



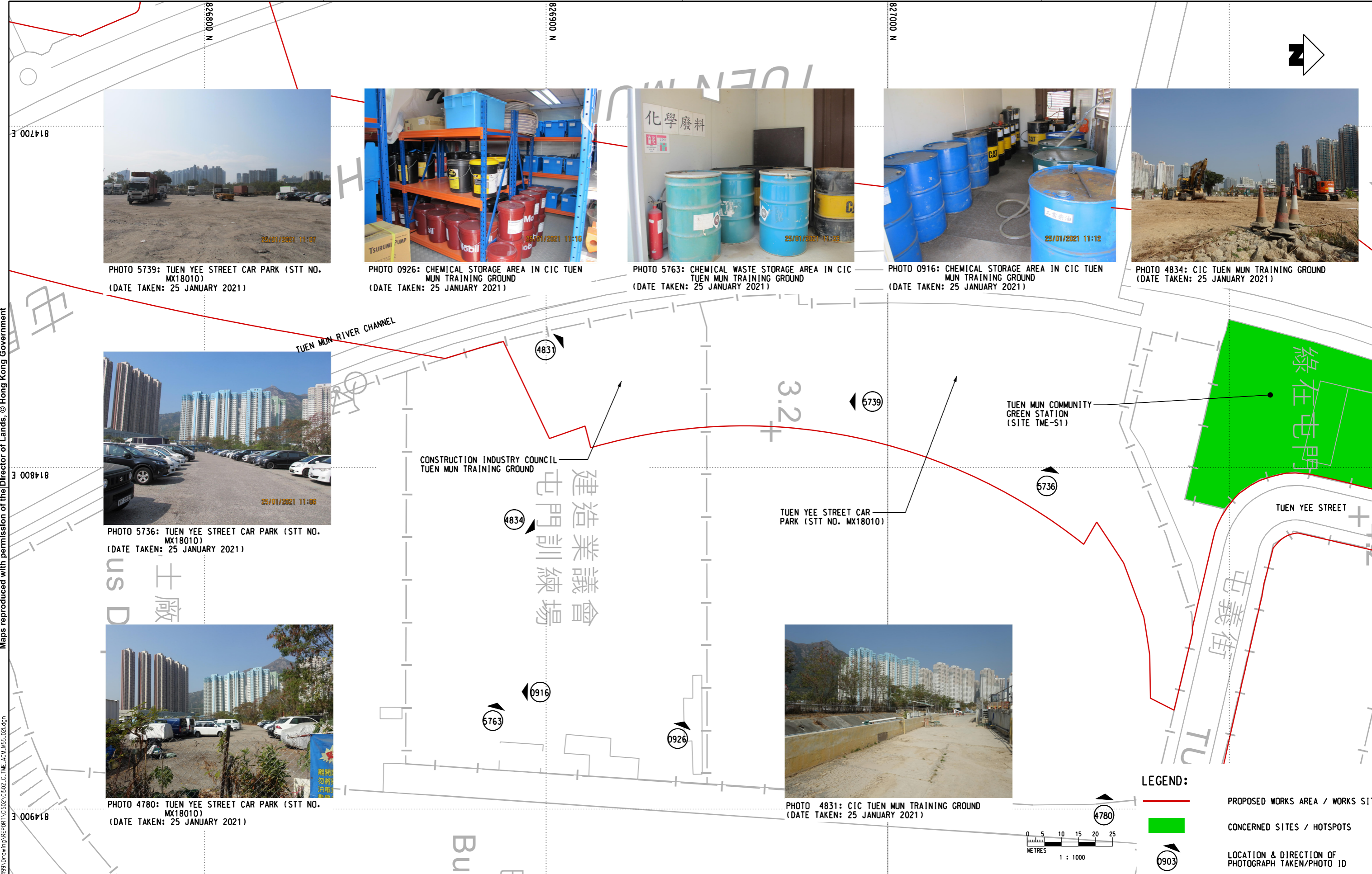
PHOTO 5736: TUEN YEE STREET CAR PARK (STT NO. MX18010) (DATE TAKEN: 25 JANUARY 2021)



PHOTO 4780: TUEN YEE STREET CAR PARK (STT NO. MX18010) (DATE TAKEN: 25 JANUARY 2021)

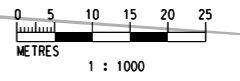


PHOTO 4831: CIC TUEN MUN TRAINING GROUND (DATE TAKEN: 25 JANUARY 2021)



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**MTR**

TUEN MUN SOUTH EXTENSION

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**C1502**

TUEN MUN SOUTH EXTENSION

PHOTOGRAPHIC RECORDS OF SITE WALKOVER

(CIC TUEN MUN TRAINING GROUND)

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PHOTO 2518: VACANT LAND (DATE TAKEN: 17 MAY 2021)



PHOTO 2154: WU SHAN ROAD CAR PARK (STT NO. MX16013) (DATE TAKEN: 12 MAY 2021)



PHOTO 0966: WU SHAN ROAD CAR PARK (STT NO. MX16007) (SITE TME-S2) (DATE TAKEN: 25 JANUARY 2021)



PHOTO 2165: WU SHAN ROAD CAR PARK (STT NO. MX16013) (DATE TAKEN: 12 MAY 2021)



PHOTO 2506: WU SHAN ROAD CAR PARK (STT NO. MX16007) (SITE TME-S2) (DATE TAKEN: 17 MAY 2021)



PHOTO 2520: ACCESS ROAD (DATE TAKEN: 17 MAY 2021)



PHOTO 2522: VEGETATED LAND (SITE-TME-S2) (DATE TAKEN: 17 MAY 2021)



PHOTO 0935: TUEN MUN ROAD SAFETY TOWN IN WU SHAN RECREATION PLAYGROUND (DATE TAKEN: 25 JANUARY 2021)



PHOTO 0970: VEGETATED LAND (SITE TME-S2) (DATE TAKEN: 25 JANUARY 2021)



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PLOT DRAW: P:\PROJECTS\60646699\CAD\_ADMIN\PL01\_DRIVER\A3\_COLOUR.dwg 9:35:03  
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DRAWN		 <b>MTR</b>	
DESIGNED			
CHECKED			
APPROVED			
DATE		ORIGINATOR	<b>AECOM</b>
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TITLE		<b>C1502</b> TUEN MUN SOUTH EXTENSION PHOTOGRAPHIC RECORDS OF SITE WALKOVER (WU SHAN ROAD)	
SCALE	1 : 3000 (A3)	FIGURE NO.	C1502/C/TME/ACM/M55/022
REV.	A		

LEGEND:

- PROPOSED WORKS AREA / WORKS SITE
- LOCATION & DIRECTION OF PHOTOGRAPH TAKEN/PHOTO ID
- CONCERNED SITES / HOTSPOTS



PHOTO 0942: TUEN MUN PROMENADE (DATE TAKEN: 25 JANUARY 2021)



PHOTO 0953: WU KING ESTATE (DATE TAKEN: 25 JANUARY 2021)



PHOTO 0939: TUEN MUN FERRY PIER PUBLIC TOILET (DATE TAKEN: 25 JANUARY 2021)



PHOTO 2143: ACCESS ROAD (DATE TAKEN: 12 MAY 2021)



PHOTO 0955: WU KING ROAD GARDEN (DATE TAKEN: 25 JANUARY 2021)

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REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN			<p>TUEN MUN SOUTH EXTENSION</p> <p><b>AECOM</b></p>
DESIGNED			
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APPROVED			
DATE		ORIGINATOR	
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TITLE	<p>C1502 TUEN MUN SOUTH EXTENSION PHOTOGRAPHIC RECORDS OF SITE WALKOVER (TUEN MUN PROMENADE)</p>		
SCALE	1 : 3000 (A3)	FIGURE NO.	C1502/C/TME/ACM/M55/023
REV.	A		





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P:\PROJECTS\6064699\CAD\_ADMIN\LOT\_DRIVER\A3\_COLOUR.plt 8:47:03  
 Dr Road J Fengji 2022/3/23  
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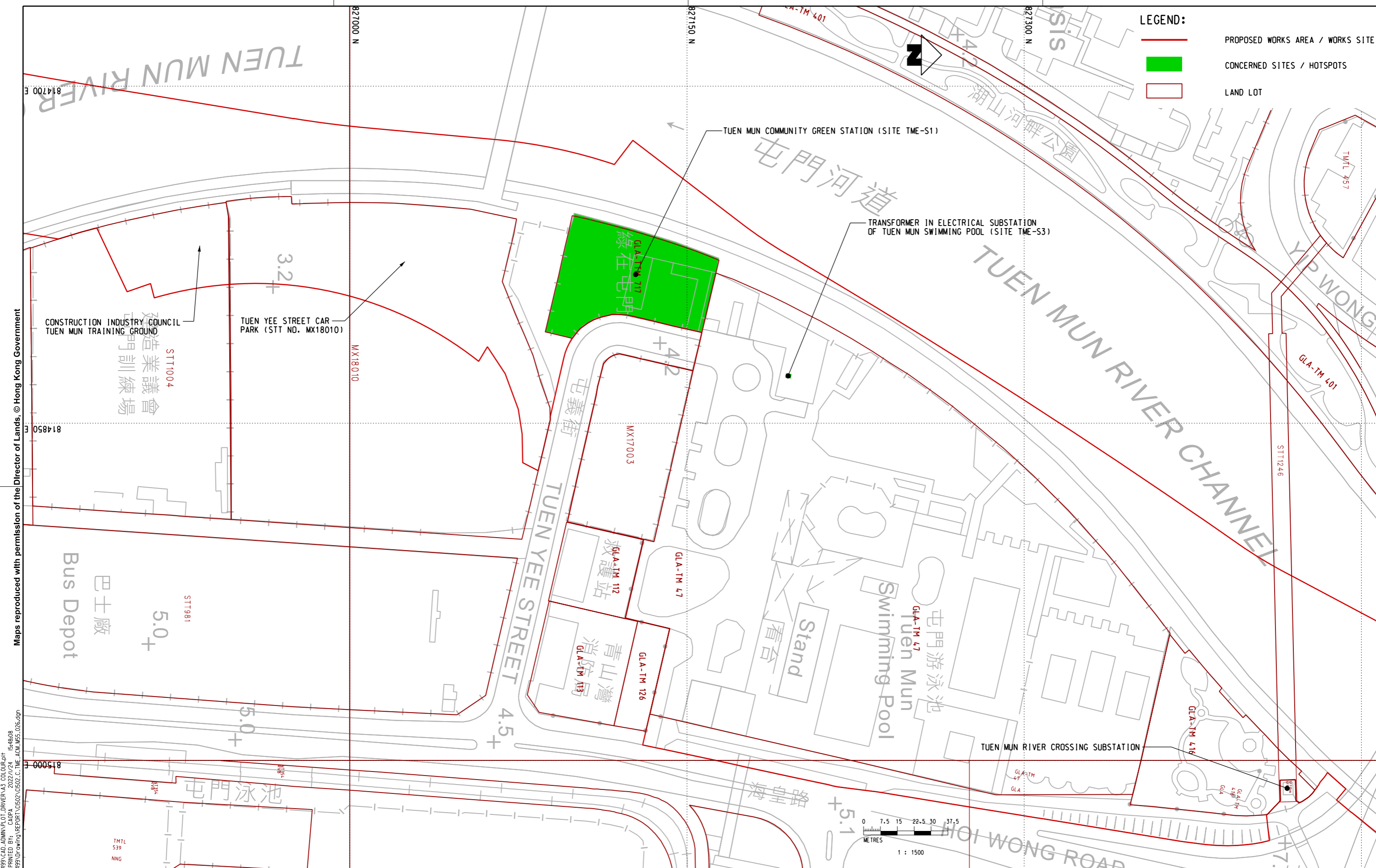
TUEN MUN SOUTH EXTENSION

ORIGINATOR

**AECOM**

CADD REF. C1502\_C\_TME\_ACM\_M55\_024.dgn

<b>TITLE</b> C1502 TUEN MUN SOUTH EXTENSION PHOTOGRAPHIC RECORDS OF SITE WALKOVER (OFFSITE WORKS AREA)		<b>SCALE</b> 1 : 1000 (A3)	<b>FIGURE NO.</b> C1502/C/TME/ACM/M55/024	<b>REV.</b> A
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- LEGEND:**
- PROPOSED WORKS AREA / WORKS SITE
  - CONCERNED SITES / HOTSPOTS
  - LAND LOT

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**MTR**

TUEN MUN SOUTH EXTENSION

**AECOM**

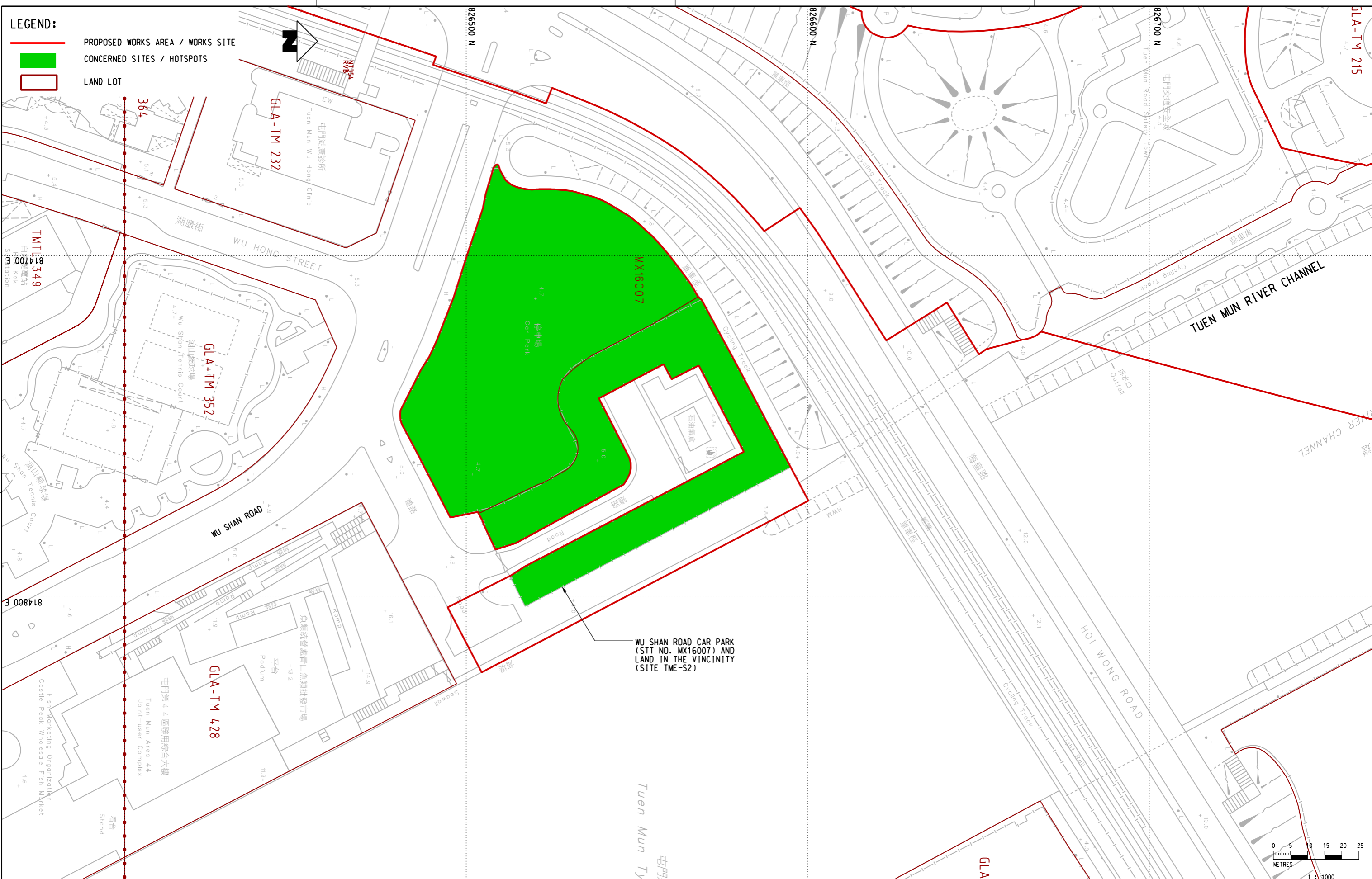
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SCALE	FIGURE NO.	REV.	
1 : 1500 (A3)	C1502/C/TME/ACM/M55/026	A	



- LEGEND:**
- PROPOSED WORKS AREA / WORKS SITE
  - CONCERNED SITES / HOTSPOTS
  - LAND LOT



WU SHAN ROAD CAR PARK (STT NO. MX16007) AND LAND IN THE VICINITY (SITE TME-S2)

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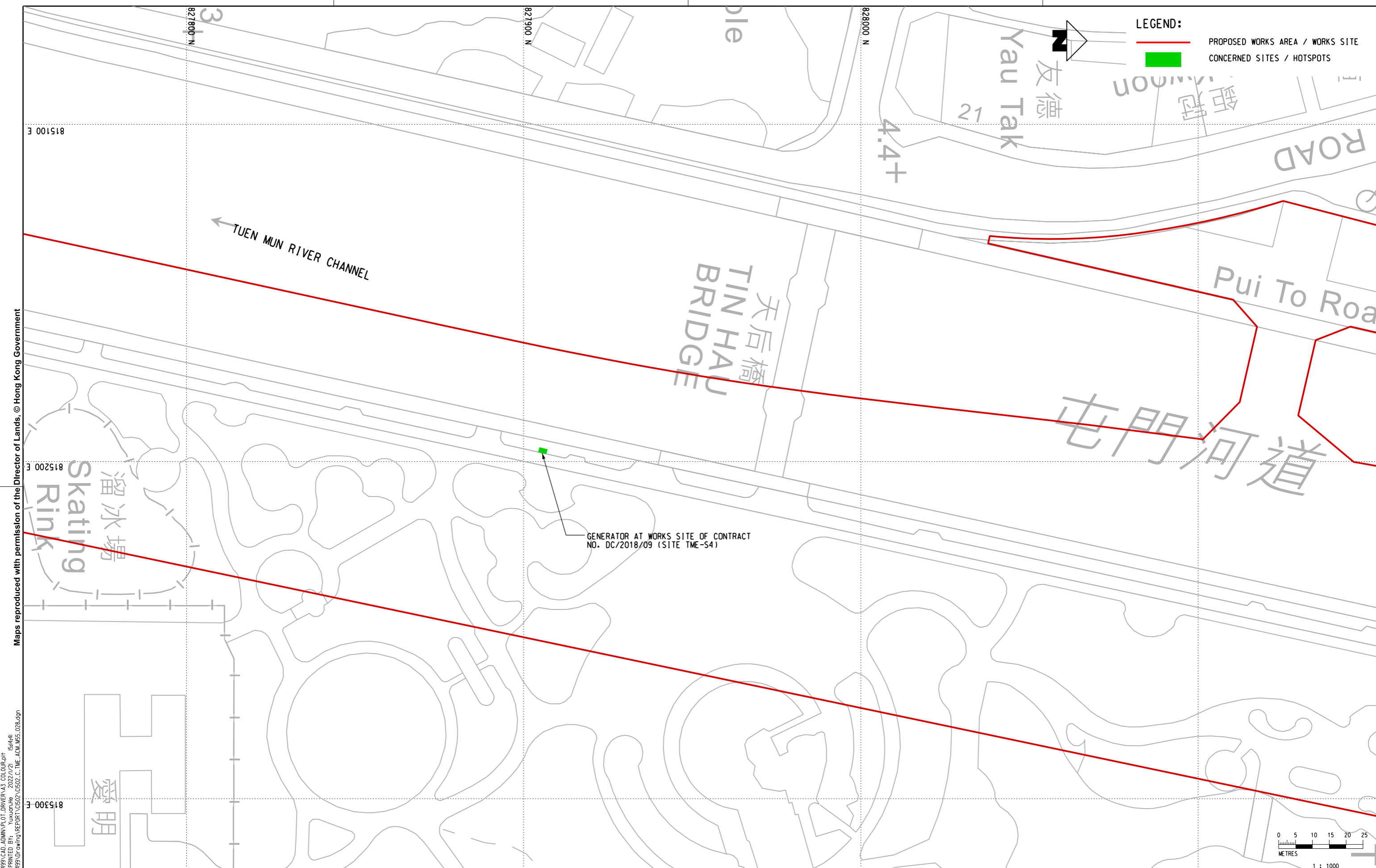
TUEN MUN SOUTH EXTENSION

**AECOM**

ORIGINATOR

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SCALE	FIGURE NO.	REV.	
1 : 1000 (A3)	C1502/C/TME/ACM/M55/027	A	



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TUEN MUN SOUTH EXTENSION

ORIGINATOR

**AECOM**

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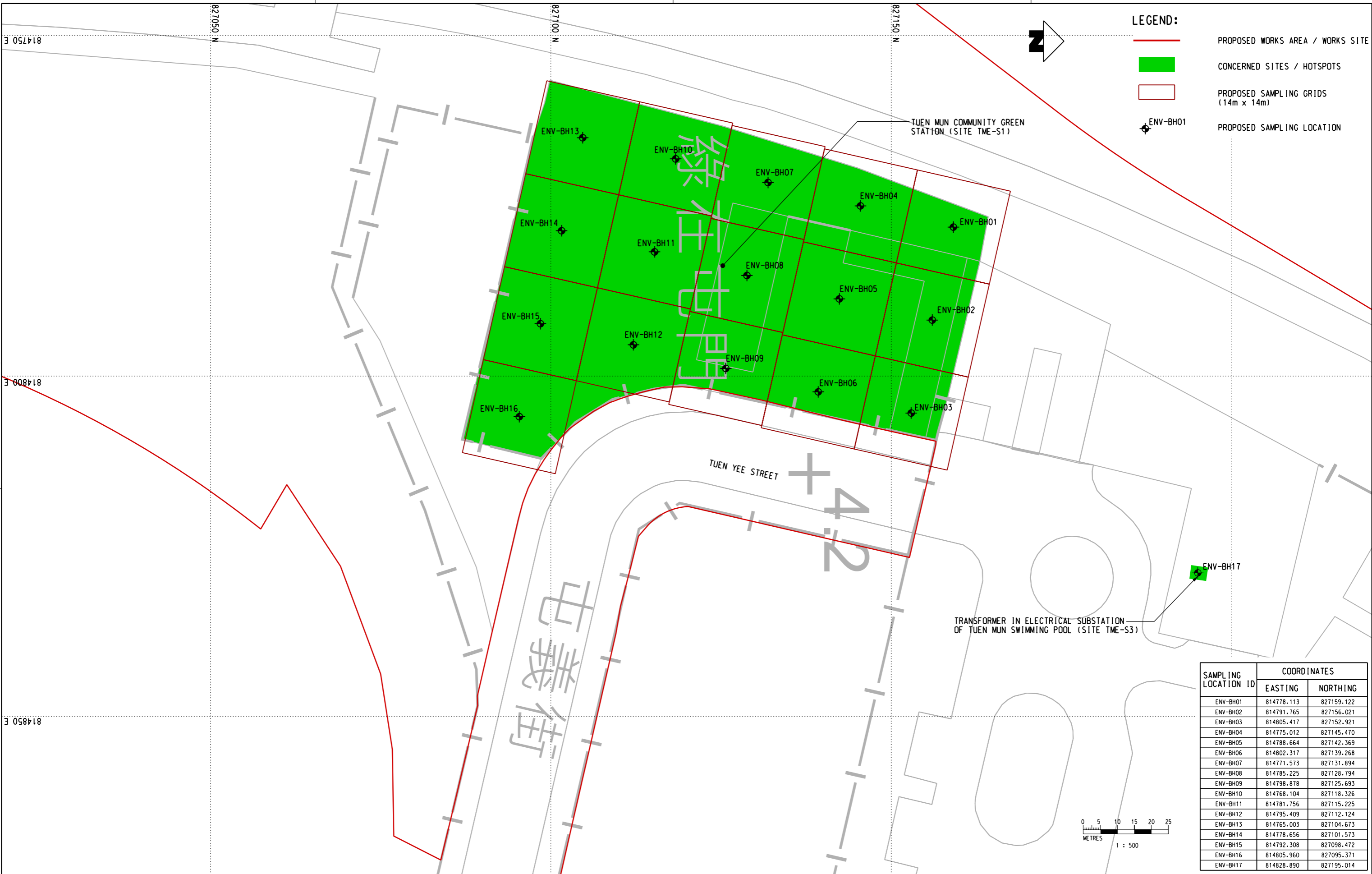
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**C1502**  
 TUEN MUN SOUTH EXTENSION  
 LOCATIONS OF CONCERNED SITES AND HOTSPOTS  
 (TUEN MUN PAK)

SCALE 1 : 1000 (A3)

FIGURE NO. C1502/C/TME/ACM/M55/028

REV. A



**LEGEND:**

- PROPOSED WORKS AREA / WORKS SITE
- CONCERNED SITES / HOTSPOTS
- PROPOSED SAMPLING GRIDS (14m x 14m)
- ◆ ENV-BH01 PROPOSED SAMPLING LOCATION

SAMPLING LOCATION ID	COORDINATES	
	EASTING	NORTHING
ENV-BH01	814778.113	827159.122
ENV-BH02	814791.765	827156.021
ENV-BH03	814805.417	827152.921
ENV-BH04	814775.012	827145.470
ENV-BH05	814788.664	827142.369
ENV-BH06	814802.317	827139.268
ENV-BH07	814771.573	827131.894
ENV-BH08	814785.225	827128.794
ENV-BH09	814798.878	827125.693
ENV-BH10	814768.104	827118.326
ENV-BH11	814781.756	827115.225
ENV-BH12	814795.409	827112.124
ENV-BH13	814765.003	827104.673
ENV-BH14	814778.656	827101.573
ENV-BH15	814792.308	827098.472
ENV-BH16	814805.960	827095.371
ENV-BH17	814828.890	827195.014

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

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TUEN MUN SOUTH EXTENSION

**AECOM**

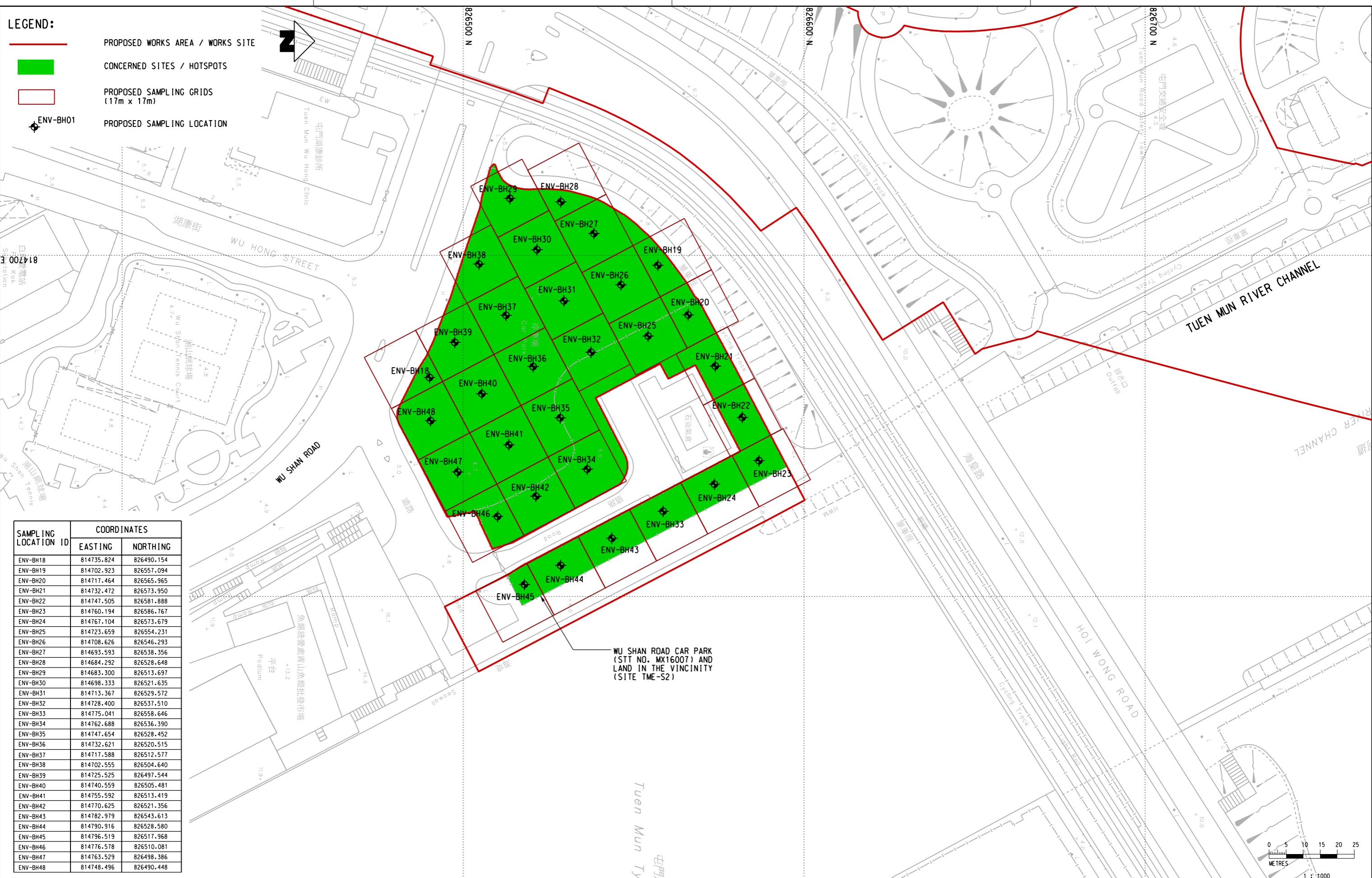
ORIGINATOR

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TUEN MUN SOUTH EXTENSION		CONCERNED SITES AND PROPOSED SAMPLING LOCATIONS (TUEN YEE STREET)	
SCALE	FIGURE NO.	REV.	
1 : 500 (A3)	C1502/C/TME/ACM/M55/029	A	

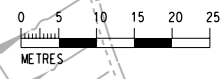
**LEGEND:**

- PROPOSED WORKS AREA / WORKS SITE
- CONCERNED SITES / HOTSPOTS
- PROPOSED SAMPLING GRIDS (17m x 17m)
- ENV-BH01 PROPOSED SAMPLING LOCATION



SAMPLING LOCATION ID	COORDINATES	
	EASTING	NORTHING
ENV-BH18	814735.824	826490.154
ENV-BH19	814702.923	826557.094
ENV-BH20	814717.464	826565.965
ENV-BH21	814732.472	826573.950
ENV-BH22	814747.505	826581.888
ENV-BH23	814760.194	826586.767
ENV-BH24	814767.104	826573.679
ENV-BH25	814723.659	826554.231
ENV-BH26	814708.626	826546.293
ENV-BH27	814693.593	826538.356
ENV-BH28	814684.292	826528.648
ENV-BH29	814683.300	826513.697
ENV-BH30	814698.333	826521.635
ENV-BH31	814713.367	826529.572
ENV-BH32	814728.400	826537.510
ENV-BH33	814775.041	826558.646
ENV-BH34	814762.688	826536.390
ENV-BH35	814747.654	826528.452
ENV-BH36	814732.621	826520.515
ENV-BH37	814717.588	826512.577
ENV-BH38	814702.555	826504.640
ENV-BH39	814725.525	826497.544
ENV-BH40	814740.559	826505.481
ENV-BH41	814755.592	826513.419
ENV-BH42	814770.625	826521.356
ENV-BH43	814782.979	826543.613
ENV-BH44	814790.916	826528.580
ENV-BH45	814796.519	826517.968
ENV-BH46	814776.578	826510.081
ENV-BH47	814763.529	826498.386
ENV-BH48	814748.496	826490.448

WU SHAN ROAD CAR PARK (STT NO. MX16007) AND LAND IN THE VICINITY (SITE TME-S2)



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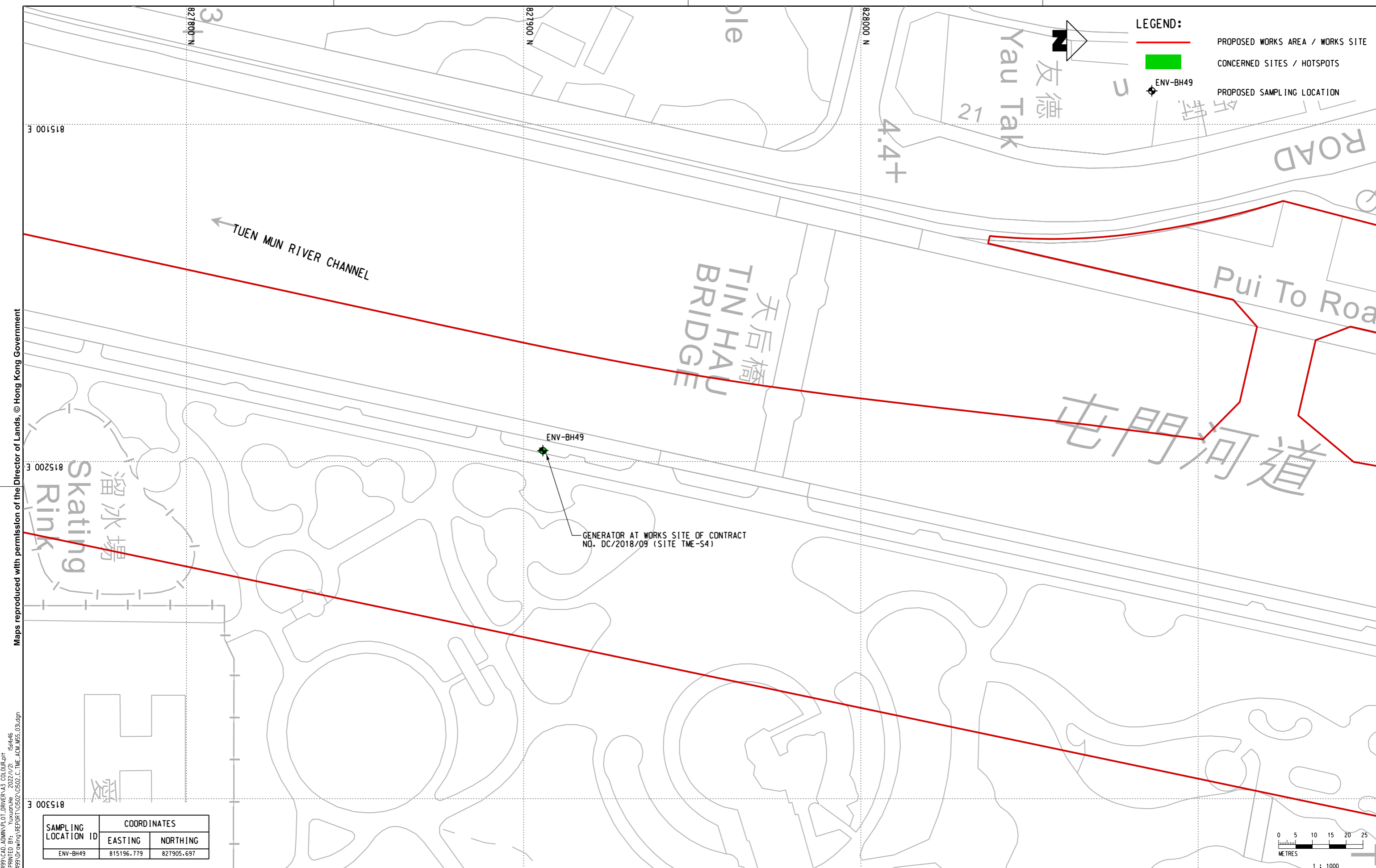
TUEN MUN SOUTH EXTENSION

**AECOM**

ORIGINATOR

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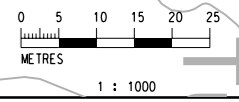
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TUEN MUN SOUTH EXTENSION CONCERNED SITES AND PROPOSED SAMPLING LOCATIONS (WU SHAN ROAD)			
SCALE	FIGURE NO.	REV.	
1 : 1000 (A3)	C1502/C/TME/ACM/M55/030	A	



**LEGEND:**

- PROPOSED WORKS AREA / WORKS SITE
- CONCERNED SITES / HOTSPOTS
- PROPOSED SAMPLING LOCATION

SAMPLING LOCATION ID	COORDINATES	
	EASTING	NORTHING
ENV-BH49	815196.779	827905.697



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**MTR**

TUEN MUN SOUTH EXTENSION

ORIGINATOR

**AECOM**

CADD REF. C1502\_C\_TME\_ACM\_M55\_031.dgn

TITLE

**C1502**  
 TUEN MUN SOUTH EXTENSION  
 CONCERNED SITES AND PROPOSED SAMPLING LOCATIONS  
 (TUEN MUN PAK)

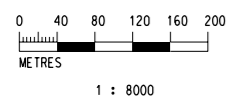
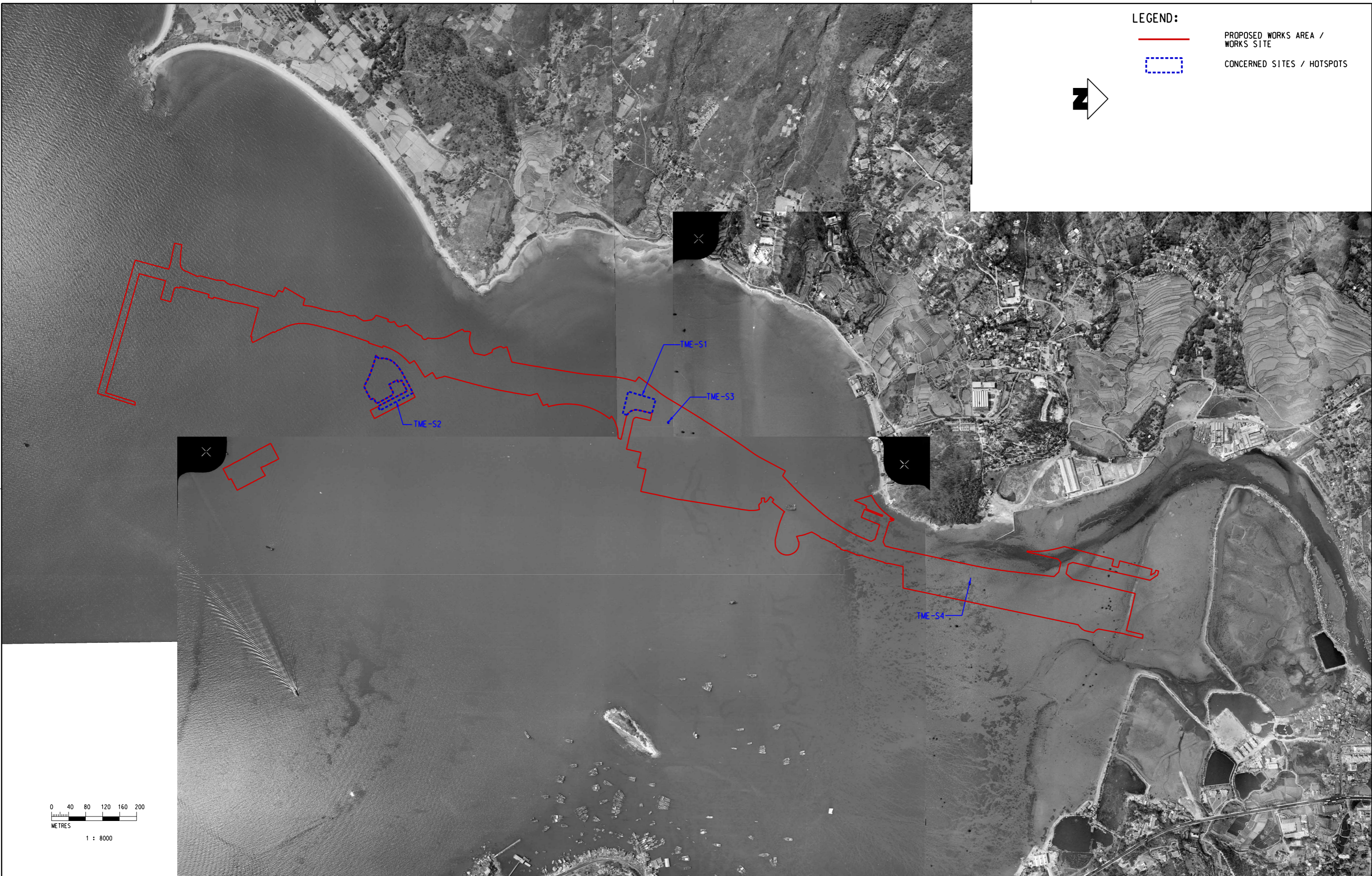
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FIGURE NO. C1502/C/TME/ACM/M55/031

REV. A

## **Annex A**

### **Relevant Historical Aerial Photographs**



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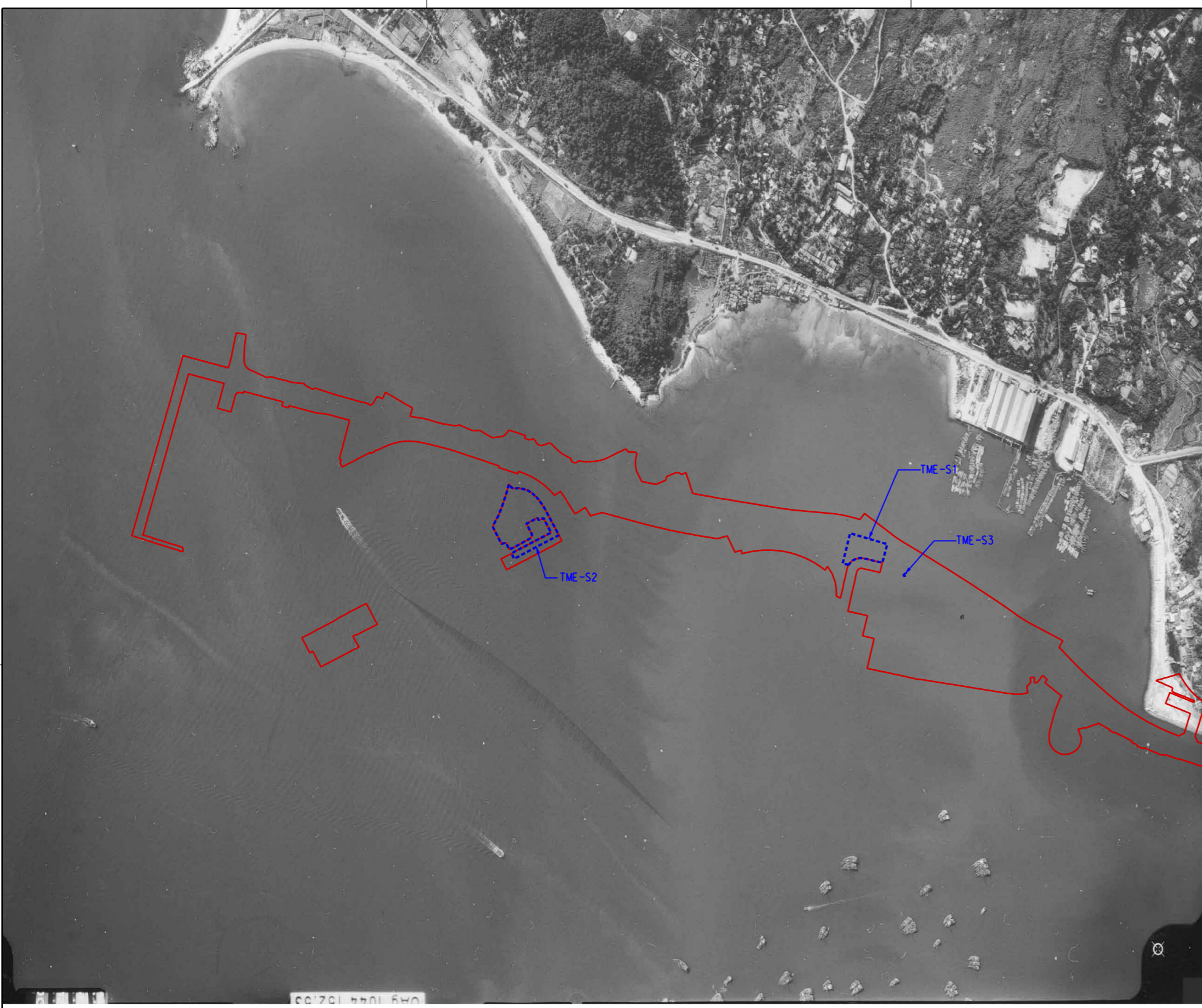
TUEN MUN SOUTH EXTENSION

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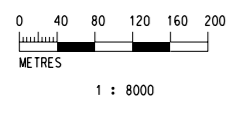
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SCALE	FIGURE NO.	REV.	
1 : 8000 (A3)	C1502/C/TME/ACM/M55/010	A	



**LEGEND:**  
 — PROPOSED WORKS AREA / WORKS SITE  
 - - - CONCERNED SITES / HOTSPOTS



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TUEN MUN SOUTH EXTENSION

ORIGINATOR

**AECOM**

CADD REF. C1502\_C\_TME\_ACM\_M55\_011.dgn



TITLE		C1502 TUEN MUN SOUTH EXTENSION AERIAL PHOTOGRAPH 1973	
SCALE	FIGURE NO.	REV.	
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 CONCERNED SITES / HOTSPOTS



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TUEN MUN SOUTH EXTENSION

ORIGINATOR

**AECOM**

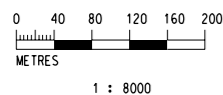
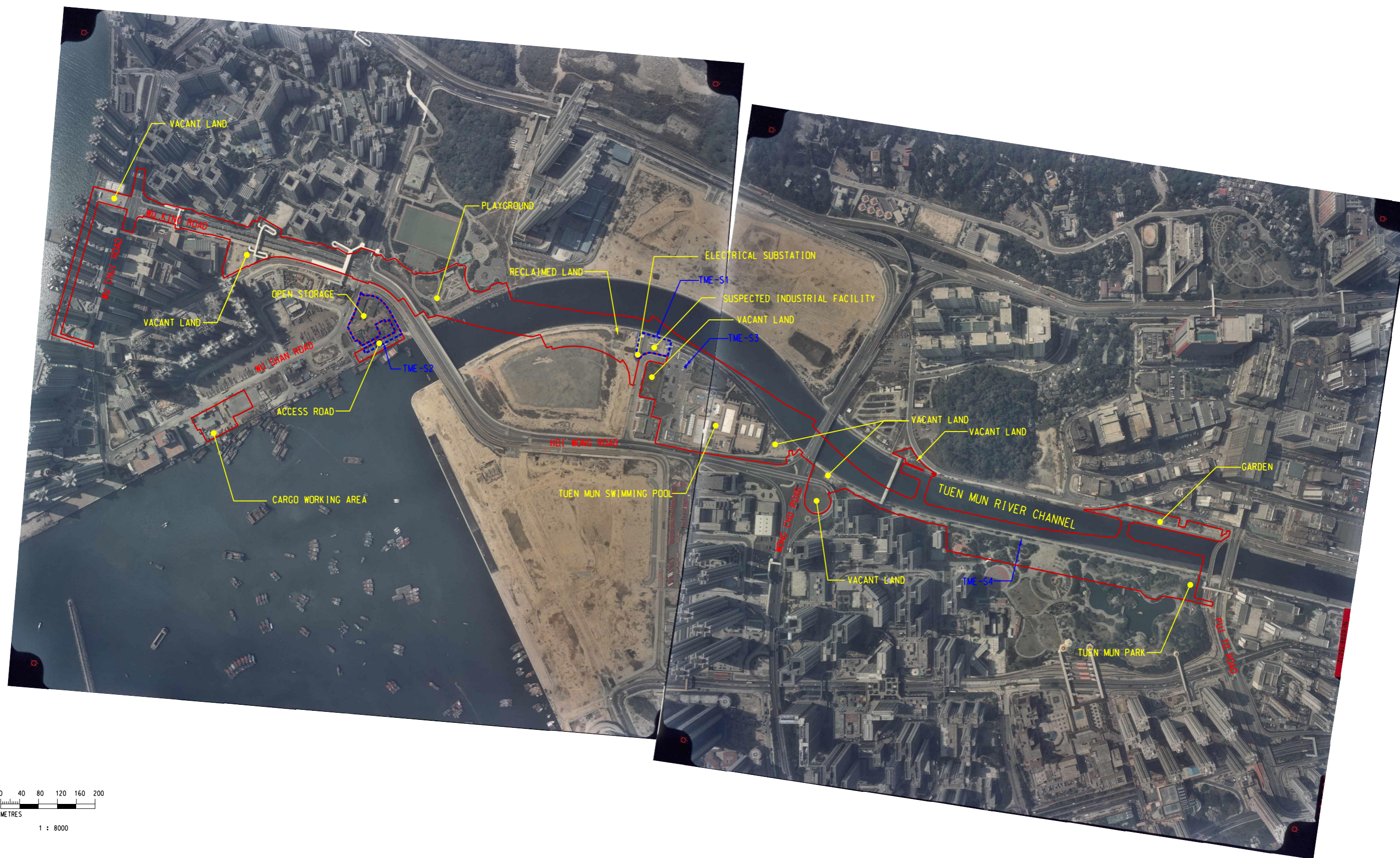
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PROPOSED WORKS AREA /  
WORKS SITE  
CONCERNED SITES / HOTSPOTS



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TUEN MUN SOUTH EXTENSION

ORIGINATOR

**AECOM**

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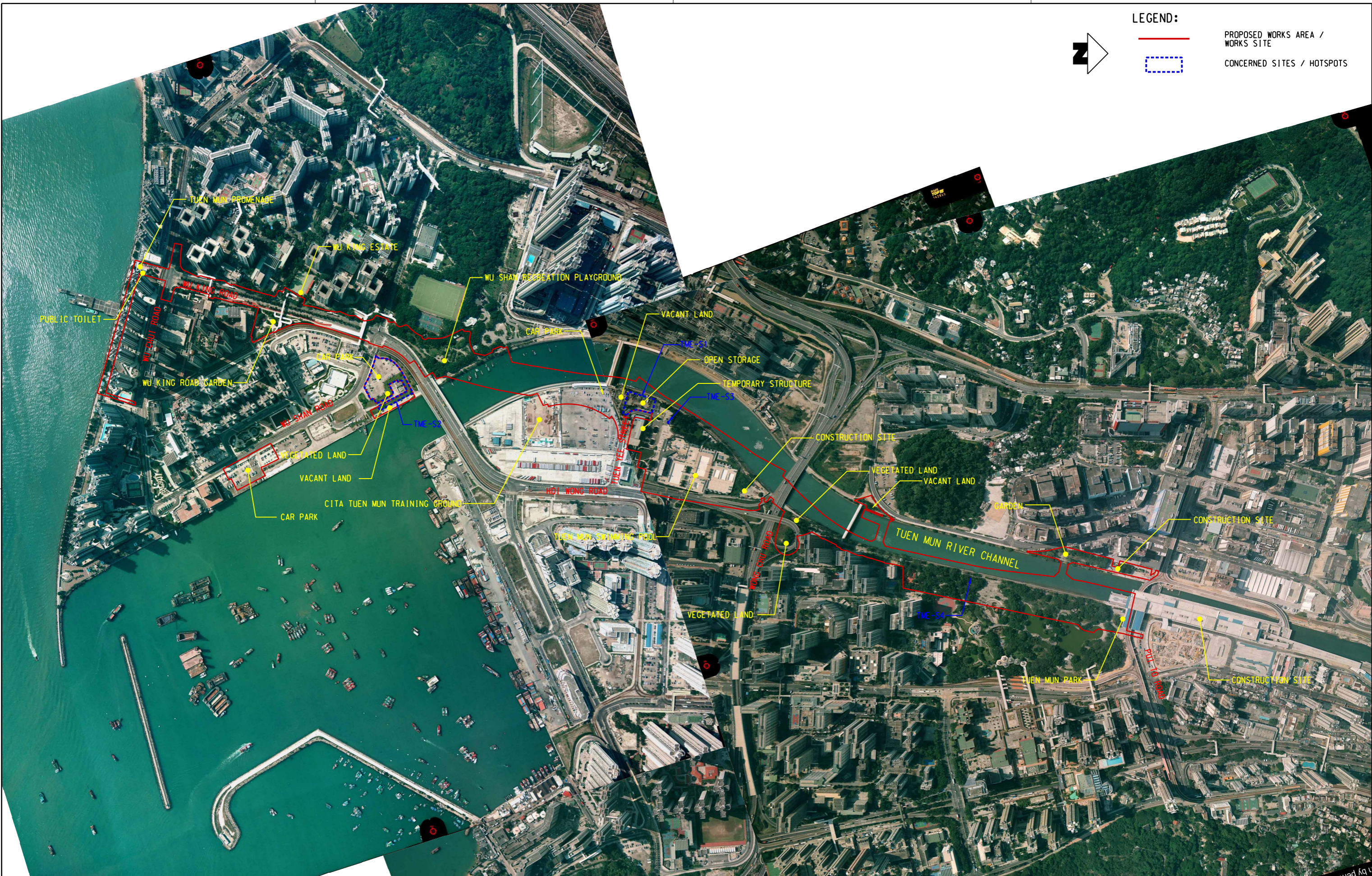
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REV.	A	

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PROPOSED WORKS AREA / WORKS SITE

CONCERNED SITES / HOTSPOTS



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**MTR**

TUEN MUN SOUTH EXTENSION

ORIGINATOR

**AECOM**

CADD REF. C1502\_C\_TME\_ACM\_M55\_014.dgn

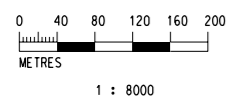
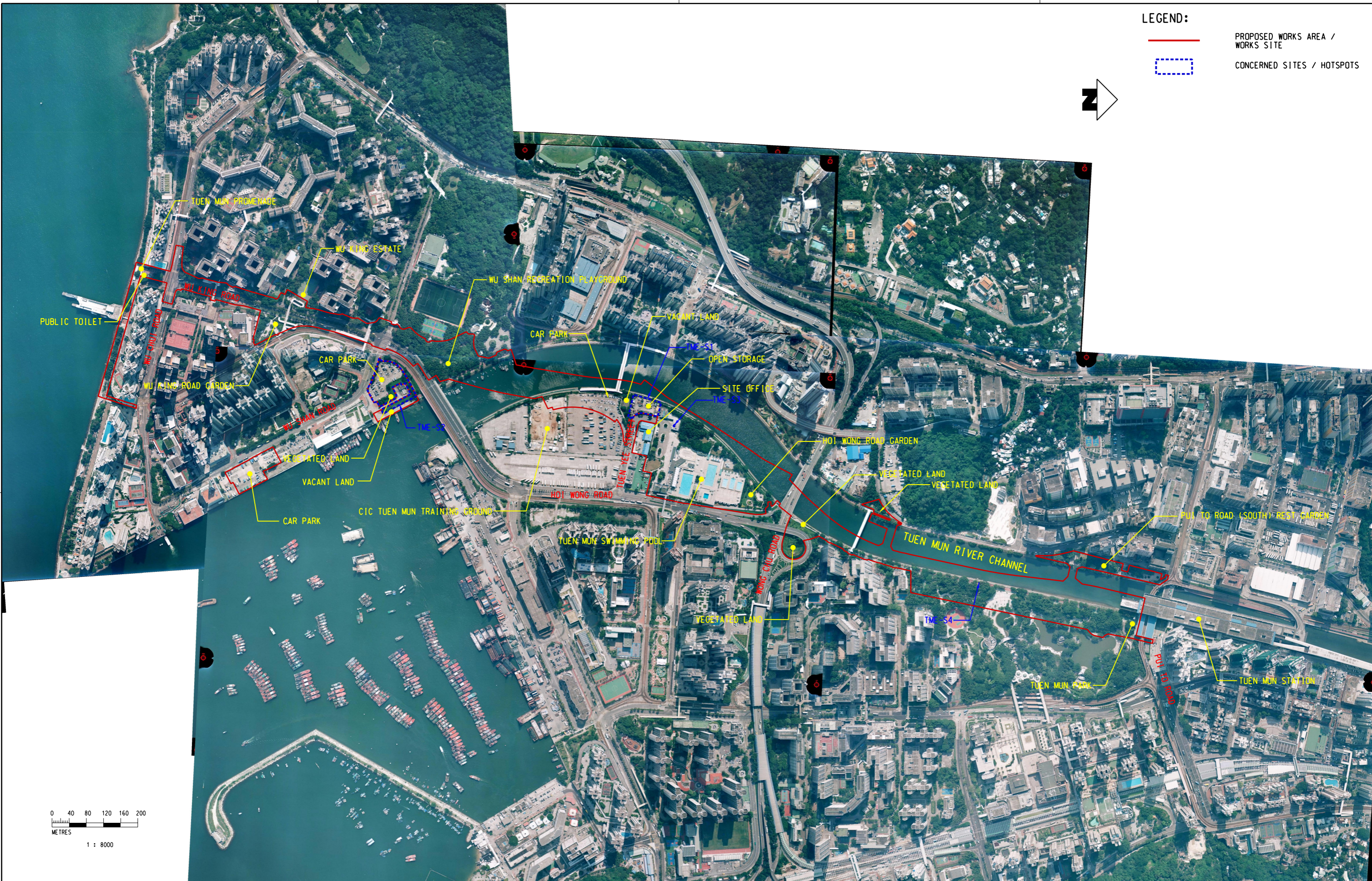
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FIGURE NO.	C1502/C/TME/ACM/M55/014
REV.	A

LEGEND:

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- CONCERNED SITES / HOTSPOTS



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REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

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DATE	

**MTR**  
 TUEN MUN SOUTH EXTENSION  
**AECOM**

ORIGINATOR

CADD REF. C1502\_C\_TME\_ACM\_M55\_015.dgn

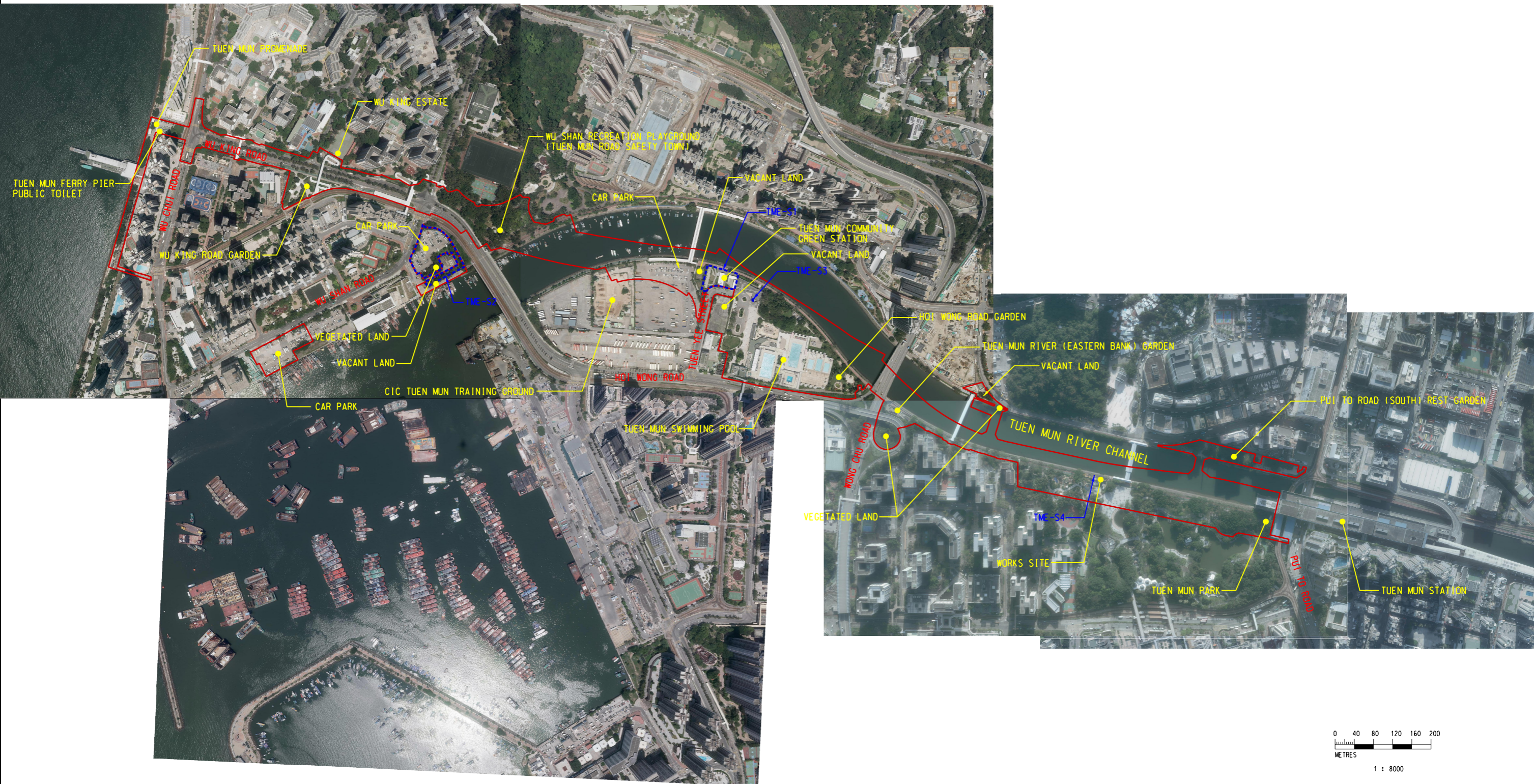
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SCALE	FIGURE NO.	REV.	
1 : 8000 (A3)	C1502/C/TME/ACM/M55/015	A	

LEGEND:

- PROPOSED WORKS AREA / WORKS SITE
- CONCERNED SITES / HOTSPOTS



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P:\PROJECTS\6064699\CAD\_ADMIN\PLT\_DRIVER\A3\_COLOUR.plt  
 PRINTED BY: rfvaco  
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 FILE NAME:

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	
DESIGNED	
CHECKED	
APPROVED	
DATE	

**MTR**  
 TUEN MUN SOUTH EXTENSION  
 ORIGINATOR  
**AECOM**

CADD REF. C1502\_C\_TME\_ACM\_M55\_016.dgn

TITLE		C1502 TUEN MUN SOUTH EXTENSION AERIAL PHOTOGRAPH 2020	
SCALE	FIGURE NO.	REV.	
1 : 8000 (A3)	C1502/C/TME/ACM/M55/016	A	

## **Annex B**

### **Site Walkover Checklists**

## **Annex B-1**

### **Site Walkover Checklist for Tuen Mun Community Green Station**

# Annex C1

## Site Walkover Checklist

DATE OF INSPECTION 25 January 2021

### GENERAL SITE DETAILS

SITE OWNER/CLIENT Yan Oi Tong

PROPERTY ADDRESS Tuen Mun Community Green Station,  
Area 16, 9 Tuen Yee Street, Tuen Mun (Lot. No GLA-TTM 717)

### PERSON CONDUCTING THE QUESTIONNAIRE

NAME Ms. Chloe Ng, Mr. Robert Yuen, Mr. Kin Au

POSITION Project / Graduate Environmental Consultant, AECOM

### AUTHORIZED OWNER/CLIENT REPRESENTATIVE (IF APPLICABLE)

NAME Mr. Chow

POSITION Project officer, Yan Oi Tong

TELEPHONE 2496 4288

### SITE ACTIVITIES

Briefly describe activities carried out on site, including types of products/chemicals/materials handled. Obtain a flow schematic if possible.

Number of employees: Full-time: 15

Part-time: 12

Temporary/Seasonal: N/A

Maximum no. of people on site at any time: Approx. 20

Typical hours of operation: 8 am – 8 pm

Number of shifts: N/A

Days per week: 7

Weeks per year: Depends

Scheduled plant shut-down: N/A



Detail the main sources of energy at the site:

Gas ~~Yes~~/No  
Electricity Yes/~~No~~  
Coal ~~Yes~~/No  
Oil ~~Yes~~/No  
Other ~~Yes~~/No

### *SITE DESCRIPTION*

This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.

What is the total site area: Approx. 0.3 hectares

What area of the site is covered by buildings (%): Approx. 15 %

Please list all current and previous owners/occupiers if possible. Government land;  
Yan Oi Tong (current operator)

Is a site plan available? If yes, please attach. Yes/~~No~~ Refer to Figure C1502/C/TME/ACM/M55/020 in CAP

Are there any other parties on site as tenants or sub-tenants? ~~Yes~~/No

If yes, identify those parties: \_\_\_\_\_

Describe surrounding land use (Residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry.

North: Tuen Mun Swimming Pool

South: Vacant land

East: Tuen Yee Street

West: Tuen Mun River

# Annex C1

## Site Walkover Checklist

Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).

Generally flat terrain.

State the size and location of the nearest residential communities.

Glorious Garden (approx. 150 m west of the site, area of about 3.7 ha).

Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands or sites of special scientific interest?

No.

### Questionnaire with Existing/Previous Site Owner or Occupier

	Yes/No	Notes
1. What are the main activities/operations at the above address?	--	Collection and sorting of recyclables
2. How long have you been occupying the site?	--	2 years, since 2018
3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)	--	Unknown
4. Prior to your occupancy, who occupied the site?	--	Unknown
5. What were the main activities/operations during their occupancy?	N/A	Unknown
6. Have there been any major changes in operations carried out at the site in the last 10 years?	N/A	Unknown
7. Have any polluting activities been carried out in the vicinity of the site in the past?	N/A	Unknown
8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?	N/A	Unknown
9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?	Yes	
10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)	No	
11. Are any chemicals used in your daily operations? (If yes, please provide details.)	Yes	Hydraulic oil is used for operation of the waste baler.
<ul style="list-style-type: none"> <li>Where do you store these chemicals?</li> </ul>	N/A	Hydraulic oil is stored in the hydraulic oil tank within the waste baler in the northwest of the warehouse.
12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)	No	
13. Has the facility produced a separate hazardous substance inventory?	No	
14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.)	No	

	Yes/No	Notes
15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bags, silos, cisterns, vaults and cylinders)?	N/A	Materials (e.g. recycle bins, bags) are received by trucks. Recyclables and chemical wastes (spent fluorescent lamp tubes and batteries) are brought by public visitors, temporarily stored in respective bins / bags and delivered off-site by trucks.
16. Do you have any underground storage tanks? (If yes, please provide details.)	N/A	Unknown
• How many underground storage tanks do you have on site?	N/A	
• What are the tanks constructed of?	N/A	
• What are the contents of these tanks?	N/A	
• Are the pipelines above or below ground?	N/A	
• If the pipelines are below ground, has any leak and integrity testing been performed?	N/A	
• Have there been any spills associated with these tanks?	N/A	
17. Are there any disused underground storage tanks?	N/A	Unknown
18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)	Yes	Daily
19. How are the wastes disposed of?	N/A	General wastes are collected and disposed to the landfill; Recyclables are collected by contractors; Chemical wastes (spent fluorescent lamp tubes and batteries) were collected and temporarily stored in the chemical waste storage area and collected by licensed collector regularly.
20. Have you ever received any notices of violation of environmental regulations or received public complaints? (If yes, please provide details.)	No	
21. Have any spills occurred on site? (If yes, please provide details.)	No	
• When did the spill occur?	N/A	
• What were the substances spilled?	N/A	
• What was the quantity of material spilled?	N/A	
• Did you notify the relevant departments of the spill?	N/A	
• What were the actions taken to clean up the spill?	N/A	
• What were the areas affected?	N/A	
22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks (If yes, please provide details.)	No	
23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?	No	
24. Are there any known contaminations on site? (If yes, please provide details.)	No	
25. Has the site ever been remediated? (If yes, please provide details.)	No	

# Annex C1

## Site Walkover Checklist

### Observations

	Yes/No	Notes
1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?	N/A	No chemical storage areas observed on site.
2. What are the conditions of the bund walls and floors?	N/A	No bund walls observed. The concrete paved floor was in good condition with no stains / spillage observed.
3. Are any surface water drains located near to drum storage and unloading areas?	No	
4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)	Yes	General waste and chemical waste (spent fluorescent lamp tubes and batteries).
5. Is there a storage site for the wastes?	Yes	Bins for non-recyclables were observed. Spent fluorescent lamp tubes and batteries were stored in the temporary chemical waste storage area.
6. Is there an on-site landfill?	No	
7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)	No	
8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)	No	
9. Are there any potential off-site sources of contamination?	No	
10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?	No	
11. Are there any sumps, effluent pits, interceptors or lagoons on site?	No	
12. Any noticeable odours during site walkover?	No	
13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives and polyurethane foam?	Yes	Hydraulic fluids (hydraulic oil)

## **Annex B-2**

### **Site Walkover Checklist for Tuen Mun Swimming Pool**

# Annex C1

## Site Walkover Checklist

DATE OF INSPECTION 25 January and 4 February 2021

### GENERAL SITE DETAILS

SITE OWNER/CLIENT Leisure and Cultural Services Department (LCSD)

PROPERTY ADDRESS Tuen Mun Swimming Pool,  
8 Hoi Wong Road, Tuen Mun

### PERSON CONDUCTING THE QUESTIONNAIRE

NAME Ms. Chloe Ng, Mr. Robert Yuen, Mr. Kin Au

POSITION Project / Graduate Environmental Consultant, AECOM

### AUTHORIZED OWNER/CLIENT REPRESENTATIVE (IF APPLICABLE)

NAME Ms. Lam / Mr. Luk

POSITION SDA, LCSD / Operations Team, CLP

TELEPHONE 2459 7607 / 2678 3259

### SITE ACTIVITIES

Briefly describe activities carried out on site, including types of products/chemicals/materials handled. Obtain a flow schematic if possible.

Number of employees: Full-time: 36

Part-time: N/A

Temporary/Seasonal: 20 (Summer only)

Maximum no. of people on site at any time: Approx. 56

Typical hours of operation: 6:30 am – 10 pm

Number of shifts: 2

Days per week: 7

Weeks per year: 52 (except Lunar New Year Holiday)

Scheduled plant shut-down: N/A



# Annex C1

## Site Walkover Checklist

Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).

Generally flat terrain.

State the size and location of the nearest residential communities.

Oceania Heights (approx. 50m east of the site, area of about 0.6 ha).

Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands or sites of special scientific interest?

No.

### Questionnaire with Existing/Previous Site Owner or Occupier

	Yes/No	Notes
1. What are the main activities/operations at the above address?	--	Swimming pool, squash courts and car park
2. How long have you been occupying the site?	--	35 years, since 1986
3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)	--	Unknown
4. Prior to your occupancy, who occupied the site?	--	Unknown
5. What were the main activities/operations during their occupancy?	N/A	
6. Have there been any major changes in operations carried out at the site in the last 10 years?	No	
7. Have any polluting activities been carried out in the vicinity of the site in the past?	No	
8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?	No	
9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?	Yes	
10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)	No	
11. Are any chemicals used in your daily operations? (If yes, please provide details.)	Yes	Sodium chloride, sodium hypochlorite and alum are used for disinfection of pool water; Transformer oil and batteries for operation of the transformer in the electrical substation.
• Where do you store these chemicals?	N/A	Respective store rooms in the southwest of the site; Substation
12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)	No	Resupplied monthly.
13. Has the facility produced a separate hazardous substance inventory?	No	
14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.)	No	



	Yes/No	Notes
15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bags, silos, cisterns, vaults and cylinders)?	N/A	Materials (including chemicals) were received by trucks and are stored in bags / drums / tanks.
16. Do you have any underground storage tanks? (If yes, please provide details.)	No	
• How many underground storage tanks do you have on site?	N/A	
• What are the tanks constructed of?	N/A	
• What are the contents of these tanks?	N/A	
• Are the pipelines above or below ground?	N/A	
• If the pipelines are below ground, has any leak and integrity testing been performed?	N/A	
• Have there been any spills associated with these tanks?	N/A	
17. Are there any disused underground storage tanks?	No	
18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)	No	
19. How are the wastes disposed of?	N/A	General wastes are collected and disposed to the landfill.
20. Have you ever received any notices of violation of environmental regulations or received public complaints? (If yes, please provide details.)	No	
21. Have any spills occurred on site? (If yes, please provide details.)	No	
• When did the spill occur?	N/A	
• What were the substances spilled?	N/A	
• What was the quantity of material spilled?	N/A	
• Did you notify the relevant departments of the spill?	N/A	
• What were the actions taken to clean up the spill?	N/A	
• What were the areas affected?	N/A	
22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks (If yes, please provide details.)	No	
23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?	No	
24. Are there any known contaminations on site? (If yes, please provide details.)	No	
25. Has the site ever been remediated? (If yes, please provide details.)	No	

# Annex C1

## Site Walkover Checklist

### Observations

	Yes/No	Notes
1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?	-	The store rooms are concrete paved.
2. What are the conditions of the bund walls and floors?	N/A	No bund walls observed. The concrete paved floors were in good condition.
3. Are any surface water drains located near to drum storage and unloading areas?	No	
4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)	Yes	General waste.
5. Is there a storage site for the wastes?	Yes	A refuse collection point is observed in the southwest of the site.
6. Is there an on-site landfill?	No	
7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)	No	
8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)	No	
9. Are there any potential off-site sources of contamination?	No	
10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?	Yes	Transformer
11. Are there any sumps, effluent pits, interceptors or lagoons on site?	No	
12. Any noticeable odours during site walkover?	No	
13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives and polyurethane foam?	No	

## **Annex B-3**

### **Site Walkover Checklist for Construction Industry Council Tuen Mun Training Ground**

# Annex C1

## Site Walkover Checklist

DATE OF INSPECTION 25 January 2021

### GENERAL SITE DETAILS

SITE OWNER/CLIENT Construction Industry Council (CIC)

PROPERTY ADDRESS Construction Industry Council Tuen Mun Training Ground,  
Area 16, Tuen Yee Street, Tuen Mun (STT 1004)

### PERSON CONDUCTING THE QUESTIONNAIRE

NAME Ms. Chloe Ng, Mr. Robert Yuen, Mr. Kin Au

POSITION Project / Graduate Environmental Consultant, AECOM

### AUTHORIZED OWNER/CLIENT REPRESENTATIVE (IF APPLICABLE)

NAME Mr. Suen

POSITION Instructor Assistant, Construction Industry Council

TELEPHONE 2100 9380

### SITE ACTIVITIES

Briefly describe activities carried out on site, including types of products/chemicals/materials handled. Obtain a flow schematic if possible.

Number of employees: Full-time: 5

Part-time: 1

Temporary/Seasonal: N/A

Maximum no. of people on site at any time: 7

Typical hours of operation: 7:30 am – 5 pm

Number of shifts: N/A

Days per week: 5.5

Weeks per year: 52 (except Public Holiday)

Scheduled plant shut-down: N/A

Detail the main sources of energy at the site:

Gas ~~Yes~~/No  
Electricity Yes/~~No~~  
Coal ~~Yes~~/No  
Oil Yes/~~No~~  
Other ~~Yes~~/No

### *SITE DESCRIPTION*

This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.

What is the total site area: Approx. 1.1 hectares

What area of the site is covered by buildings (%): Approx. 10 %

Please list all current and previous owners/occupiers if possible. Construction Industry Council  
(Current occupier); Construction Industry Training Authority (CITA) (Previous occupier)

Is a site plan available? If yes, please attach. Yes/~~No~~ Refer to Figure  
C1502/C/TME/ACM/M55/021  
in CAP

Are there any other parties on site as tenants or sub-tenants? ~~Yes~~/No

If yes, identify those parties: \_\_\_\_\_

Describe surrounding land use (Residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry.

North: Public car park

South: Citybus bus depot

East: KMB bus depot (Tuen Mun South Depot)

West: Tuen Mun River

# Annex C1

## Site Walkover Checklist

Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).

Generally flat terrain.

State the size and location of the nearest residential communities.

Nerine Cove (approx. 200m east of the site, area of about 1.7 ha).

Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands or sites of special scientific interest?

No.

### Questionnaire with Existing/Previous Site Owner or Occupier

	Yes/No	Notes
1. What are the main activities/operations at the above address?	--	Training ground for operation of loadshifting machinery.
2. How long have you been occupying the site?	--	Approx. 10 years
3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)		Unknown
4. Prior to your occupancy, who occupied the site?	--	Unknown
5. What were the main activities/operations during their occupancy?	N/A	
6. Have there been any major changes in operations carried out at the site in the last 10 years?	No	
7. Have any polluting activities been carried out in the vicinity of the site in the past?	No	
8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?	No	Vehicle refueling (diesel) are carried out on site immediately adjacent to the chemical and chemical waste storage area in the east of the site only. No vehicle maintenance activities are reportedly carried out on site as vehicles to be repaired are sent to contractors off-site.
9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?	No	
10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)	No	
11. Are any chemicals used in your daily operations? (If yes, please provide details.)	Yes	Lubricating oils, anti-corrosive paints, hydraulic fluids are used for the excavators. Diesel is used as fuel for excavators.
<ul style="list-style-type: none"> <li>Where do you store these chemicals?</li> </ul>	N/A	Diesel oil, lubricating oils and hydraulic fluids are stored within the chemical and chemical waste storage area in the east of the site; Lubricating oils, anti-corrosive paints and hydraulic fluids are also stored in the chemical storage area in the northeast of the site; Spent lubricating oil is stored in designated chemical waste storage area in the east of the site.

	Yes/No	Notes
12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)	No	
13. Has the facility produced a separate hazardous substance inventory?	No	
14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.)	No	
15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bags, silos, cisterns, vaults and cylinders)?	N/A	Materials (including chemicals) were received by trucks and stored in drums on site.
16. Do you have any underground storage tanks? (If yes, please provide details.)	No	
17. How many underground storage tanks do you have on site?	N/A	
18. What are the tanks constructed of?	N/A	
19. What are the contents of these tanks?	N/A	
20. Are the pipelines above or below ground?	N/A	
21. If the pipelines are below ground, has any leak and integrity testing been performed?	N/A	
22. Have there been any spills associated with these tanks?	N/A	
23. Are there any disused underground storage tanks?	No	
24. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)	No	
25. How are the wastes disposed of?	N/A	General wastes are collected and disposed to the landfill. Spent lubricating oils are transported off-site regularly by licensed collector.
26. Have you ever received any notices of violation of environmental regulations or received public complaints? (If yes, please provide details.)	Yes	Public complaints were received in 2017 regarding the runoff of mud water into Tuen Mun River.
27. Have any spills occurred on site? (If yes, please provide details.)	No	
28. When did the spill occur?	N/A	
29. What were the substances spilled?	N/A	
30. What was the quantity of material spilled?	N/A	
31. Did you notify the relevant departments of the spill?	N/A	
32. What were the actions taken to clean up the spill?	N/A	
33. What were the areas affected?	N/A	
34. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks (If yes, please provide details.)	No	
35. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?	No	
36. Are there any known contaminations on site? (If yes, please provide details.)	No	
37. Has the site ever been remediated? (If yes, please provide details.)	No	

# Annex C1

## Site Walkover Checklist

### Observations

	Yes/No	Notes
1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?	Yes	The chemical and chemical waste storage areas are concreted paved. Chemicals are stored within containers on raised concrete slabs.
2. What are the conditions of the bund walls and floors?	N/A	No bund walls observed. The concrete paved floors, slabs and containers were in good conditions.
3. Are any surface water drains located near to drum storage and unloading areas?	No	
4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)	Yes	Chemical waste (spent lubricating oils).
5. Is there a storage site for the wastes?	Yes	Spent lubricating oils are stored in designated chemical waste storage area in the east of the site. Waste bins for general refuse are observed.
6. Is there an on-site landfill?	No	
7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)	No	
8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)	No	
9. Are there any potential off-site sources of contamination?	No	
10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?	No	
11. Are there any sumps, effluent pits, interceptors or lagoons on site?	No	
12. Any noticeable odours during site walkover?	No	
13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives and polyurethane foam?	Yes	Fuels (diesel), lubricating oils, hydraulic fluids and anti-corrosive paints



## **Annex B-4**

### **Site Walkover Checklist for Works Site of *Contract No.* *DC/2018/09***

# Annex C1

## Site Walkover Checklist

DATE OF INSPECTION: 21 May 2021

### GENERAL SITE DETAILS

SITE OWNER/CLIENT Chun Wo Construction and Engineering Company

PROPERTY ADDRESS Works site of Contract No. DC/2018/09 (Portion of Lot. No. GLA-TM 106),  
Tuen Mun Park, Tuen Mun

### PERSON CONDUCTING THE QUESTIONNAIRE

NAME Ms. Chloe Ng, Mr. Robert Yuen, Mr. Kin Au

POSITION Project / Graduate Environmental Consultant, AECOM

### AUTHORIZED OWNER/CLIENT REPRESENTATIVE (IF APPLICABLE)

NAME Mr Lau

POSITION Environmental Officer, Chun Wo Construction and Engineering Company

TELEPHONE 9580 3350

### SITE ACTIVITIES

Briefly describe activities carried out on site, including types of products/chemicals/materials handled. Obtain a flow schematic if possible.

Number of employees: Full-time: 5

Part-time: N/A

Temporary/Seasonal: N/A

Maximum no. of people on site at any time: 5

Typical hours of operation: 8 am – 6 pm

Number of shifts: N/A

Days per week: 6 (Monday to Saturday)

Weeks per year: 52 except labour holidays

Scheduled plant shut-down: N/A

Detail the main sources of energy at the site:

Gas ~~Yes~~/No  
Electricity Yes/~~No~~ (diesel generator)  
Coal ~~Yes~~/No  
Oil Yes/~~No~~  
Other ~~Yes~~/No

### SITE DESCRIPTION

This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.

What is the total site area: 420 m<sup>2</sup>

What area of the site is covered by buildings (%): 0 %

Please list all current and previous owners/occupiers if possible. Government land,  
Chun Wo Construction and Engineering Company (contractor) and Binnies Hong Kong Limited

(consultant)

Is a site plan available? If yes, please attach. Yes/~~No~~ Refer to Figure  
C1502/C/TME/ACM/M55/017 in  
CAP

Are there any other parties on site as tenants or sub-tenants? ~~Yes~~/No

If yes, identify those parties: \_\_\_\_\_

Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry.

North: Tuen Mun Park (Open space)

South: Tuen Mun Park (Open space)

East: Tuen Mun Park (Open space)

West: Tuen Mun River Channel

# Annex C1

## Site Walkover Checklist

Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).

Generally flat terrain along modified river channel.

State the size and location of the nearest residential communities.

Yau Oi Estate (approx. 150 m southeast of the site, area of about 13 ha).

Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands or sites of special scientific interest?

N/A

### Questionnaire with Existing/Previous Site Owner or Occupier

	Yes/No	Notes
1. What are the main activities/operations at the above address?	N/A	Rehabilitation of trunk sewers under Contract No. DC/2018/09
2. How long have you been occupying the site?	N/A	2.5 years, since Dec 2018
3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)	No	
4. Prior to your occupancy, who occupied the site?	N/A	Government land
5. What were the main activities/operations during their occupancy?	N/A	Tuen Mun Park, footpath, cycling track.
6. Have there been any major changes in operations carried out at the site in the last 10 years?	Yes	The site has been occupied by the works area since Dec 2018.
7. Have any polluting activities been carried out in the vicinity of the site in the past?	No	
8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?	No	
9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?	Yes	
10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)	No	
11. Are any chemicals used in your daily operations? (If yes, please provide details.)	Yes	Clarifloc, polyaluminum chloride (PAC) and sodium bisulfite are used for wastewater treatment; Diesel and lubricating oils are used for operation of the generator on site.
<ul style="list-style-type: none"> <li>Where do you store these chemicals?</li> </ul>	N/A	Clarifloc, PAC and sodium bisulfite are stored in plastic drums within chemical dosing unit in the south of the site; Diesel and lubricating oil are stored within the generator.
12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)	No	Chemicals are refilled / delivered as and when required.
13. Has the facility produced a separate hazardous substance inventory?	No	
14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.)	No	

	Yes/No	Notes
15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bags, silos, cisterns, vaults and cylinders)?	N/A	Chemicals (Clarifloc, PAC and sodium bisulfite) are received by cart and stored in plastic drums. Lubricating oils and diesel are received by carts and delivered off-site immediately after use / refueling of generator. Construction materials are received by truck and stored in the materials storage area.
16. Do you have any underground storage tanks? (If yes, please provide details.)	No	
• How many underground storage tanks do you have on site?	N/A	
• What are the tanks constructed of?	N/A	
• What are the contents of these tanks?	N/A	
• Are the pipelines above or below ground?	N/A	
• If the pipelines are below ground, has any leak and integrity testing been performed?	N/A	
• Have there been any spills associated with these tanks?	N/A	
17. Are there any disused underground storage tanks?	No	
18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)	Yes	Checks are conducted daily.
19. How are the wastes disposed of?	N/A	Construction and demolition (C&D) wastes are collected by dump truck and transported to landfill. Chemical waste (spent lubricating oils) are transported off-site and stored at another works area for collection.
20. Have you ever received any notices of violation of environmental regulations or received public complaints? (If yes, please provide details.)	No	
21. Have any spills occurred on site? (If yes, please provide details.)	No	
• When did the spill occur?	N/A	
• What were the substances spilled?	N/A	
• What was the quantity of material spilled?	N/A	
• Did you notify the relevant departments of the spill?	N/A	
• What were the actions taken to clean up the spill?	N/A	
• What were the areas affected?	N/A	
22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks (If yes, please provide details.)	Yes	The site is undergoing rehabilitation of underground trunk sewers.
23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?	N/A	There are no disused underground tanks.
24. Are there any known contaminations on site? (If yes, please provide details.)	No	
25. Has the site ever been remediated? (If yes, please provide details.)	No	

# Annex C1

## Site Walkover Checklist

### Observations

	Yes/No	Notes
1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?	Yes	All chemical storage areas are provided with metal drip trays on paved cycling track. The generator is provided with metal drip tray on raised planter.
2. What are the conditions of the bund walls and floors?	N/A	The metal drip trays and paved cycling track are intact and in good condition with no stains and spillage observed.
3. Are any surface water drains located near to drum storage and unloading areas?	No	
4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)	Yes	C&D materials and chemical wastes (spent lubricating oils) are generated.
5. Is there a storage site for the wastes?	No	No waste storage site observed on site. Chemical wastes were transported off-site and stored at another works site outside the Project Area.
6. Is there an on-site landfill?	No	
7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)	No	
8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)	No	
9. Are there any potential off-site sources of contamination?	No	
10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?	No	
11. Are there any sumps, effluent pits, interceptors or lagoons on site?	No	
12. Any noticeable odours during site walkover?	No	
13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives and polyurethane foam?	Yes	Fuels (diesel) and lubricating oils are used on site.

## **Annex C**

### **Acquisition of Information from Government Departments**



AECOM  
12/F, Grand Central Plaza, Tower 2,  
138 Shatin Rural Committee Road,  
Shatin, Hong Kong  
香港新界沙田鄉事會路 138 號  
新城市中央廣場第 2 座 12 樓  
www.aecom.com

+852 3922 9000 tel  
+852 3922 9797 fax

Your Ref: -  
Our Ref: 60646499/C/chussi2101071 (2021000009E)

**By Post and Fax** (F: 2411 3073)

Environmental Protection Department  
Environmental Compliance Division  
Regional Office (West)  
8/F., Tsuen Wan Government Offices,  
38 Sai Lau Kok Road, Tsuen Wan,  
New Territories

7 January 2021

Dear Sir/Madam,

**Consultancy Agreement No. C1502 Environmental Impact Assessment Study for Tuen Ma Extension**

**Request for Information of Chemical Waste Producer and Chemical Spillage Accident**

AECOM Asia Co. Ltd has been commissioned by MTR Corporation Limited as the Consultant to undertake EIA study for the captioned project. Letter of Employment is attached for your reference.

According to the requirements of EIA Study Brief No. ESB-332/2020, land contamination assessment shall be conducted and the Concerned Area is indicated in the figure enclosed.

As part of the land contamination assessment and following the *Practice Guide for Investigation and Remediation of Contaminated Land* issued by EPD, we have to collect historical information regarding the past and present activities of the Concerned Area. In order to facilitate our assessment, we would like to request for the following information regarding the captioned Concerned Area:

1. Current and past (as early as the records are available) registered Chemical Waste Producer(s) within the Concerned Area (preferably with the registration date, status (moved out or active), nature and quantity of the chemical waste); and
2. Reported accidents of spillage / leakage of chemicals within the Concerned Area.

Please feel free to contact our Ms. Chloe Ng at 3922 9305 or Mr. Robert Yuen at 3922 9439 should you have any queries.

Thank you very much for your kind assistance.



Yours faithfully,  
**AECOM Asia Co. Ltd.**



Angela Tong  
Technical Director  
Environment, Hong Kong

Encl.

1. Letter of Employment
2. Concerned Area

AECOM Asia Co. Ltd.  
13/F Grand Central Plaza,  
Tower 2, 138 Shatin Rural,  
Committee Road, Shatin  
Hong Kong

Our ref: C1502-COR-LSRENVE-ENV-060004

24 November 2020

Attn.: Mr. Marcus Ip

Dear Marcus,

**Tuen Ma Extension**  
**Consultancy C1502 for Environmental Impact Assessment (EIA) Study**

This letter serves to certify that AECOM Asia Co. Ltd. is employed by MTR under the Consultancy C1502 to conduct an EIA study for the Tuen Ma Extension Project.

Please feel free to contact our Rebecca Leong at 2688 1136 should you require further information.

Yours sincerely,



Lisa Poon  
Lead Senior Environmental Engineer

LP/RJ/wc



Lot No.	Description
GLA-TM 19	Pui To Road (South) Rest Garden
GLA-TM 106	Tuen Mun Park
GLA-TM 512	Tuen Mun River (Eastern Bank) Garden
GLA-TM 416	Hoi Wong Road Garden
STT 1246	ESS in Hoi Wong Road Garden
GLA-TM 47	Tuen Mun Swimming Pool
GLA-TTM 717	Tuen Mun Community Green Station
MX 18 0 10	Car Park
STT1004	Construction Industry Council Tuen Mun Training Ground
GLA-TM 215	Wu Shan Recreation Playground
MX16007	Car Park
GLA-TM 327	Wu King Road Garden
GLA-TM 311	Tuen Mun Promenade
-	Wu King Road

**Legend**  
— Tentative TME Alignment  
■ Concerned Area

SK-004

## Ng, Lok Yi Chloe

---

**From:** kawaichan@epd.gov.hk  
**Sent:** Thursday, January 28, 2021 3:18 PM  
**To:** Ng, Lok Yi Chloe  
**Cc:** johnlee@epd.gov.hk  
**Subject:** [EXTERNAL] Fw: Consultancy Agreement No. C1502 Environmental Impact Assessment Study for Tuen Ma Extension - Request for Information of Chemical Waste Producer and Chemical Spillage Accident  
**Attachments:** Letter from AECOM.pdf

Dear Chloe,

I refer to your letter dated 7 January 2021 regarding the subject matters.

A registry of chemical waste producers is available in the Territorial Control Office of this department. Please contact Mr. LEUNG Chi-keung, Dennis at 2835 1017 for making an appointment to view the records.

As far as records of chemical spillage / leakage incidents, you may wish to check with Fire Services Department or other relevant parties / departments for such information as appropriate.

Please feel free to discuss if you need further information.

Regards,  
Isaac CHAN  
E(RW)12 / EPD  
Tel: 2417 6137

----- Forwarded by Ka Wai CHAN/EPD/HKSARG on 2021/01/28 下午 03:12 -----

From: "Ng, Lok Yi Chloe" <Chloe.Ng@aecom.com>  
To: "johnlee@epd.gov.hk" <johnlee@epd.gov.hk>  
Cc: "Yuen, Robert" <robert.yuen@aecom.com>, "Tong, Ka Ling Angela" <angela.tong@aecom.com>, "Tso, Shiu Heng Lawrence" <lawrence.tso@aecom.com>, "Chu, Sze Shing Isaac" <Isaac.Chu@aecom.com>  
Date: 08/01/2021 14:43  
Subject: Consultancy Agreement No. C1502 Environmental Impact Assessment Study for Tuen Ma Extension - Request for Information of Chemical Waste Producer and Chemical Spillage Accident

---

Dear Mr. Lee,

As per our telephone conversation today, please find attached site plan for our captioned enquiry for your use.

Thank you for your assistance.

Kind Regards,  
**Chloe Ng**, MCIWEM  
Project Environmental Consultant, Environment, Hong Kong  
D +852-3922-9305  
[chloe.ng@aecom.com](mailto:chloe.ng@aecom.com)

**AECOM**  
13/F, Grand Central Plaza, Tower 2

138 Shatin Rural Committee Road  
Shatin, Hong Kong  
[www.aecom.com/hk/](http://www.aecom.com/hk/)

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AECOM  
12/F, Grand Central Plaza, Tower 2,  
138 Shatin Rural Committee Road,  
Shatin, Hong Kong  
香港新界沙田鄉事會路 138 號  
新城市中央廣場第 2 座 12 樓  
www.aecom.com

+852 3922 9000 tel  
+852 3922 9797 fax

Your Ref: -  
Our Ref: 60646499/C/chussi2105131

**By Post and Fax** (F: 2411 3073)

Environmental Protection Department  
Environmental Compliance Division  
Regional Office (West)  
8/F., Tsuen Wan Government Offices,  
38 Sai Lau Kok Road, Tsuen Wan,  
New Territories

13 May 2021

Dear Sir/Madam,

**Consultancy Agreement No. C1502 Environmental Impact Assessment Study for Tuen Ma Extension**

**Request for Information of Chemical Waste Producer and Chemical Spillage Accident**

AECOM Asia Co. Ltd has been commissioned by MTR Corporation Limited as the Consultant to undertake EIA study for the captioned project. Letter of Employment is attached for your reference.

According to the requirements of EIA Study Brief No. ESB-332/2020, land contamination assessment shall be conducted. As part of the land contamination assessment and following the *Practice Guide for Investigation and Remediation of Contaminated Land* issued by EPD, we have to collect historical information regarding the past and present activities of the works site and works area.

Following to the reply we received from you via email on 28 January 2021, there are Additional Concerned Areas as indicated in the enclosed figure for supporting the construction of the Project. In order to facilitate our assessment, we would like to request for the following information regarding the captioned Additional Concerned Areas:

1. Current and past (as early as the records are available) registered Chemical Waste Producer(s) within the updated Concerned Area (preferably with the registration date, status (moved out or active), nature and quantity of the chemical waste); and
2. Reported accidents of spillage / leakage of chemicals within the updated Concerned Area.

Please feel free to contact our Ms. Chloe Ng at 3922 9305 or Mr. Robert Yuen at 3922 9439 should you have any queries.

Due to tight study programme, grateful if you could provide the information for our use by 24 May 2021. Thank you very much for your kind assistance.

Yours faithfully,  
**AECOM Asia Co. Ltd.**



Angela Tong  
Technical Director  
Environment, Hong Kong

Encl.

1. Letter of Employment
2. Additional Concerned Area

AECOM Asia Co. Ltd.  
13/F Grand Central Plaza,  
Tower 2, 138 Shatin Rural,  
Committee Road, Shatin  
Hong Kong

Our ref: C1502-COR-LSRENVE-ENV-060004

24 November 2020

Attn.: Mr. Marcus Ip

Dear Marcus,

**Tuen Ma Extension**  
**Consultancy C1502 for Environmental Impact Assessment (EIA) Study**

This letter serves to certify that AECOM Asia Co. Ltd. is employed by MTR under the Consultancy C1502 to conduct an EIA study for the Tuen Ma Extension Project.

Please feel free to contact our Rebecca Leong at 2688 1136 should you require further information.

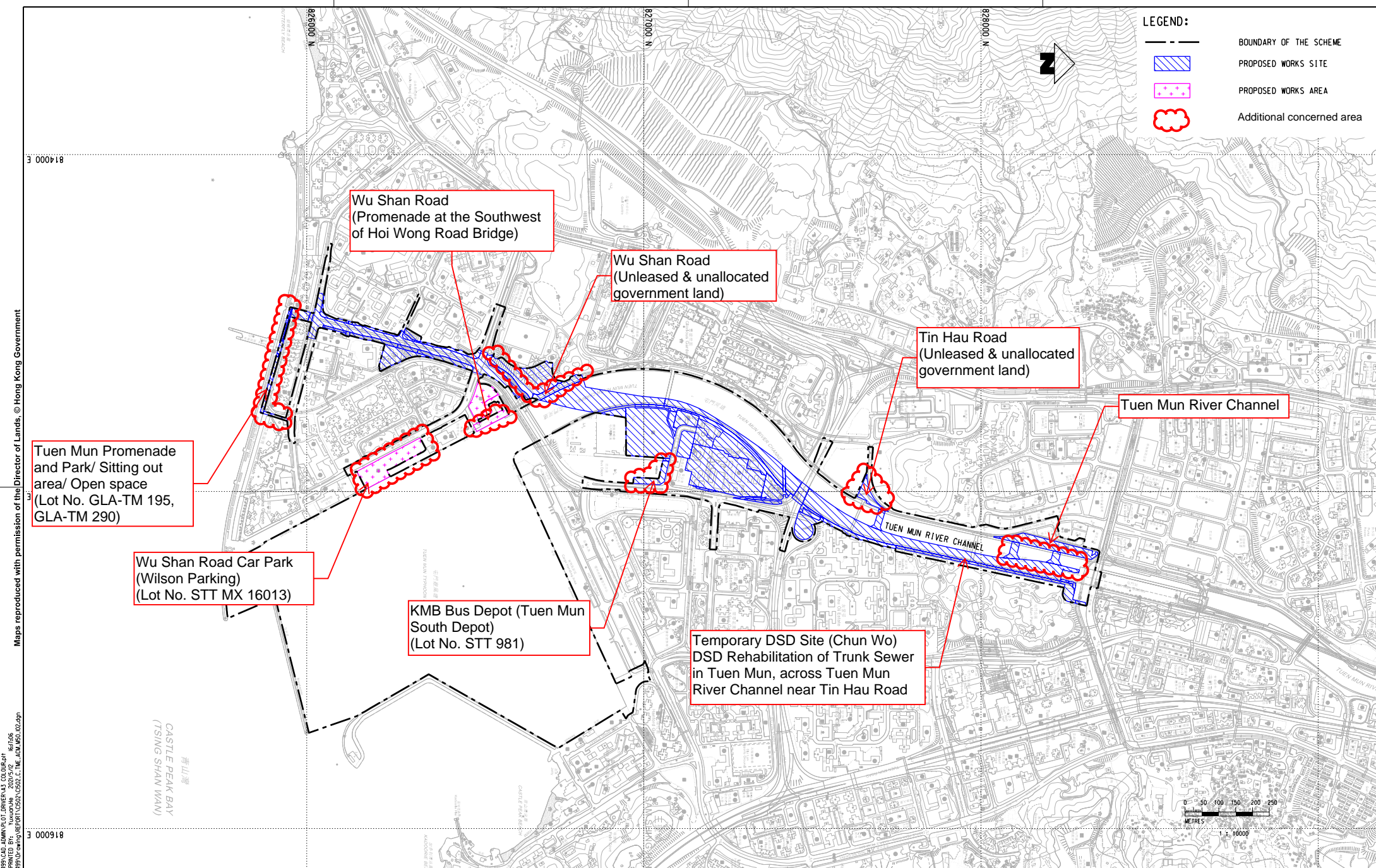
Yours sincerely,



Lisa Poon  
Lead Senior Environmental Engineer

LP/RJ/wc





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PROJECTS\6064689\CAD\_ADMIN\PLT\_DRAWING\3\_COLOUR.plt  
 PLOT DATE: 20/09/2010 10:58:51  
 FILENAME: C:\PROJECTS\6064689\PLT\_DRAWING\3\_COLOUR\3\_COLOUR.dwg

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	
DESIGNED	
CHECKED	
APPROVED	
DATE	

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**MTR**

TUEN MA EXTENSION

ORIGINATOR

**AECOM**

CADD REF. C1502\_C\_TME\_ACM\_M50\_102.dgn

TITLE	C1502 TUEN MA EXTENSION PROPOSED WORKS AREAS AND WORKS SITES
SCALE	1 : 10000 (A3)
FIGURE NO.	C1502/C/TME/ACM/M50/102
REV.	A

本署檔號  
OUR REF: (1) in EP710/E6/1 Pt.3  
來函檔號  
YOUR REF: 60646499/C/chussi2105131  
電話  
TEL. NO.: 2417 6120  
圖文傳真  
FAX NO.: 2415 7191  
網址  
HOMEPAGE: <http://www.epd.gov.hk>

**Environmental Protection Department  
Environmental Compliance Division  
Regional Office (West)**

8/F., Tsuen Wan Government Offices,  
38 Sai Lau Kok Road,  
Tsuen Wan, N.T.



環境保護署  
環保法規管理科  
區域辦事處(西)  
新界荃灣西樓角路 38 號  
荃灣政府合署八樓

**By Post and Fax (3922 9797)**

14 May 2021

AECOM Asia Co. Ltd.  
12/F, Grand Central Plaza, Tower 2,  
138 Shatin Rural Committee Road,  
Shatin, Hong Kong  
(Attn: Ms. Angela TONG)

Dear Ms. TONG,

**Consultancy Agreement No. C1502 Environmental Impact Assessment Study  
for Tuen Ma Extension  
Re: Request for Information of Chemical Waste Producer and Chemical Spillage Accident**

We refer to your letter dated 13 May 2021 regarding the subject matters.

A registry of chemical waste producers is available in the Territorial Control Office of this department. Please contact Mr. LEUNG Chi Keung at 2835 1017 for making an appointment to view the records.

As far as records of chemical spillage / leakage incidents, you may wish to check with Fire Services Department or other relevant parties / departments for such information as appropriate.

Should you have any query on the above matter, please contact the undersigned.

Yours sincerely,

(TSANG Kai-ho)

for Director of Environmental Protection



AECOM  
12/F, Grand Central Plaza, Tower 2,  
138 Shatin Rural Committee Road,  
Shatin, Hong Kong  
香港新界沙田鄉事會路 138 號  
新城市中央廣場第 2 座 12 樓  
www.aecom.com

+852 3922 9000 tel

+852 3922 9797 fax

Your Ref: -

Our Ref: 60646499/C/chussi2101072 (2021000010E)

**By Post and Fax** (F: 2367 3631)

Fire Services Department  
Licensing and Certification Command  
5/F, South Wing, Fire Services Headquarters Building,  
1 Hong Chong Road, Tsim Sha Tsui East,  
Kowloon, Hong Kong

7 January 2021

Dear Sir/Madam,

**Consultancy Agreement No. C1502 Environmental Impact Assessment (EIA) Study for Tuen Ma Extension**  
**Request for Information about Dangerous Goods Store and Incidents Records**

AECOM Asia Co. Ltd has been commissioned by MTR Corporation Limited as the Consultant to undertake EIA study for the captioned project. Letter of Employment is attached for your reference.

According to the requirements of EIA Study Brief No. ESB-332/2020, land contamination assessment shall be conducted and the Concerned Area is indicated in the figure enclosed.

As a part of the land contamination assessment and following the *Practice Guide for Investigation and Remediation of Contaminated Land* issued by EPD, we have to collect historical information regarding the past and present activities of the Concerned Area. In order to facilitate the EIA study, we would like to request for the following information regarding the enclosed Concerned Areas:

1. Records of current and past (as early as the records are available) registration of Dangerous Goods storage (with type of dangerous goods, storage method, quantity, licence no., date of issue and storage location) within the Concerned Area;
2. Any records of reported accidents of spillage/leakage of dangerous goods stored within the Concerned Area; and
3. Any records of fire incidents within the Concerned Area.

Please feel free to contact our Ms. Chloe Ng at 3922 9305 or Mr. Robert Yuen at 3922 9439 should you have any queries.

Thank you very much for your kind assistance.

Yours faithfully,  
**AECOM Asia Co. Ltd.**



Angela Tong  
Technical Director  
Environment, Hong Kong

Encl.

1. Letter of Employment
2. Concerned Area

AECOM Asia Co. Ltd.  
13/F Grand Central Plaza,  
Tower 2, 138 Shatin Rural,  
Committee Road, Shatin  
Hong Kong

Our ref: C1502-COR-LSRENVE-ENV-060004

24 November 2020

Attn.: Mr. Marcus Ip

Dear Marcus,

**Tuen Ma Extension**  
**Consultancy C1502 for Environmental Impact Assessment (EIA) Study**

This letter serves to certify that AECOM Asia Co. Ltd. is employed by MTR under the Consultancy C1502 to conduct an EIA study for the Tuen Ma Extension Project.

Please feel free to contact our Rebecca Leong at 2688 1136 should you require further information.

Yours sincerely,



Lisa Poon  
Lead Senior Environmental Engineer

LP/RJ/wc



Lot No.	Description
GLA-TM 19	Pui To Road (South) Rest Garden
GLA-TM 106	Tuen Mun Park
GLA-TM 512	Tuen Mun River (Eastern Bank) Garden
GLA-TM 416	Hoi Wong Road Garden
STT 1246	ESS in Hoi Wong Road Garden
GLA-TM 47	Tuen Mun Swimming Pool
GLA-TTM 717	Tuen Mun Community Green Station
MX 18 0 10	Car Park
STT1004	Construction Industry Council Tuen Mun Training Ground
GLA-TM 215	Wu Shan Recreation Playground
MX16007	Car Park
GLA-TM 327	Wu King Road Garden
GLA-TM 311	Tuen Mun Promenade
-	Wu King Road

**Legend**  
— Tentative TME Alignment  
■ Concerned Area

SK-004

消防處  
香港九龍尖沙咀東部康莊道1號  
消防處總部大廈



FIRE SERVICES DEPARTMENT  
FIRE SERVICES HEADQUARTERS BUILDING,  
No.1 Hong Chong Road,  
Tsim Sha Tsui East, Kowloon,  
Hong Kong.

本處檔號 OUR REF. : (173) in FSD GR 6-5/4 R Pt. 30  
來函檔號 YOUR REF. : 60646499/C/chussi2101072  
電子郵件 E-mail : hkfsdenq@hkfsd.gov.hk  
圖文傳真 FAX NO. : 2739 5879  
電話 TEL NO. : 2733 7741

14 January 2021

AECOM Asia Co. Ltd  
12/F, Grand Central Plaza, Tower 2,  
138 Shatin Rural Committee Road,  
Shatin, Hong Kong.  
**(Attn: Ms. Angela TONG, Technical Director)**

*By fax (3922 9797) only*

Dear Ms. TONG,

**Consultancy Agreement No. C1502 Environmental Impact Assessment  
(EIA) Study for Tuen Ma Extension  
Request for Information of Dangerous Goods & Incident Records**

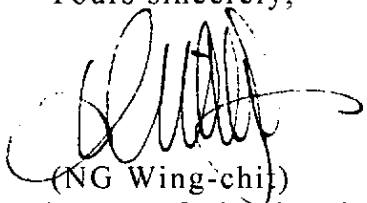
I refer to your letter of 7.1.2021 regarding the captioned subject.

Your case is being handled, and a reply will be furnished to you as soon as possible. Please be advised that due to time lapse, this Department can only provide the following information for your requested information:

- (i) Dangerous Goods Licence Record: from the year of 1990 to present moment.
- (ii) Incident Record: Past three years of fire and special services incidents.

Should you have further questions, please feel free to contact the undersigned.

Yours sincerely,

  
(NG Wing-chi)  
for Director of Fire Services

消防處  
香港九龍尖沙咀東部康莊道1號  
消防總部大廈



**FIRE SERVICES DEPARTMENT**  
**FIRE SERVICES HEADQUARTERS BUILDING,**  
No.1 Hong Chong Road,  
Tsim Sha Tsui East, Kowloon,  
Hong Kong.

本處檔號 OUR REF. : (48) in FSD GR 6-5/4 R Pt. 31  
來函檔號 YOUR REF. : 60646499/C/chussi2101072  
電子郵件 E-mail : hkfsdenq@hkfsd.gov.hk  
圖文傳真 FAX NO. : 2739 5879  
電話 TEL NO. : 2733 7741

1 February 2021

AECOM Asia Co. Ltd  
12/F, Grand Central Plaza, Tower 2,  
138 Shatin Rural Committee Road,  
Shatin, Hong Kong.  
**(Attn: Ms. Angela TONG, Technical Director)**

Dear Ms. TONG,

**Consultancy Agreement No. C1502 Environmental Impact Assessment  
(EIA) Study for Tuen Ma Extension**  
**Request for Information of Dangerous Goods & Incident Records**

I refer to your letter of 7.1.2021 regarding the captioned request and reply below in response to your questions:-

Please be advised that neither records of dangerous goods license, fire incidents nor incidents of spillage / leakage of dangerous goods were found in connection with the given conditions of your request at the subject location.

If you have further questions, please feel free to contact the undersigned.

Yours sincerely,

(NG Wing-chit)  
for Director of Fire Services





AECOM  
12/F, Grand Central Plaza, Tower 2,  
138 Shatin Rural Committee Road,  
Shatin, Hong Kong  
香港新界沙田鄉事會路 138 號  
新城市中央廣場第 2 座 12 樓  
www.aecom.com

+852 3922 9000 tel  
+852 3922 9797 fax

Your Ref: -  
Our Ref: 60646499/C/chussi2105132

**By Post and Fax** (F: 2367 3631)

Fire Services Department  
Licensing and Certification Command  
5/F, South Wing, Fire Services Headquarters Building,  
1 Hong Chong Road, Tsim Sha Tsui East,  
Kowloon, Hong Kong

13 May 2021

Dear Sir/Madam,

**Consultancy Agreement No. C1502 Environmental Impact Assessment (EIA) Study for Tuen Ma Extension**  
**Request for Information about Dangerous Goods Store and Incidents Records**

AECOM Asia Co. Ltd has been commissioned by MTR Corporation Limited as the Consultant to undertake EIA study for the captioned project. Letter of Employment is attached for your reference.

According to the requirements of EIA Study Brief No. ESB-332/2020, land contamination assessment shall be conducted. As a part of the land contamination assessment and following the *Practice Guide for Investigation and Remediation of Contaminated Land* issued by EPD, we have to collect historical information regarding the past and present activities of the works site and works area.

Following the information we received from you on 1 February 2021 (Letter Ref.: (48) in FSD GR 6-5/4 R Pt. 31), there are Additional Concerned Areas as indicated in the enclosed figure for supporting the construction of the Project. In order to facilitate the EIA study, we would like to request for the following information regarding the enclosed Additional Concerned Areas:

1. Records of current and past (as early as the records are available) registration of Dangerous Goods storage (with type of dangerous goods, storage method, quantity, licence no., date of issue and storage location) within the Concerned Area;
2. Any records of reported accidents of spillage/leakage of dangerous goods stored within the Concerned Area; and
3. Any records of fire incidents within the Concerned Area.

Please feel free to contact our Ms. Chloe Ng at 3922 9305 or Mr. Robert Yuen at 3922 9439 should you have any queries.

Due to tight study programme, grateful if you could provide the information for our use by 24 May 2021. Thank you very much for your kind assistance.

Yours faithfully,  
**AECOM Asia Co. Ltd.**



Angela Tong  
Technical Director  
Environment, Hong Kong

Encl.

1. Letter of Employment
2. Additional Concerned Area

AECOM Asia Co. Ltd.  
13/F Grand Central Plaza,  
Tower 2, 138 Shatin Rural,  
Committee Road, Shatin  
Hong Kong

Our ref: C1502-COR-LSRENVE-ENV-060004

24 November 2020

Attn.: Mr. Marcus Ip

Dear Marcus,

**Tuen Ma Extension**  
**Consultancy C1502 for Environmental Impact Assessment (EIA) Study**

This letter serves to certify that AECOM Asia Co. Ltd. is employed by MTR under the Consultancy C1502 to conduct an EIA study for the Tuen Ma Extension Project.

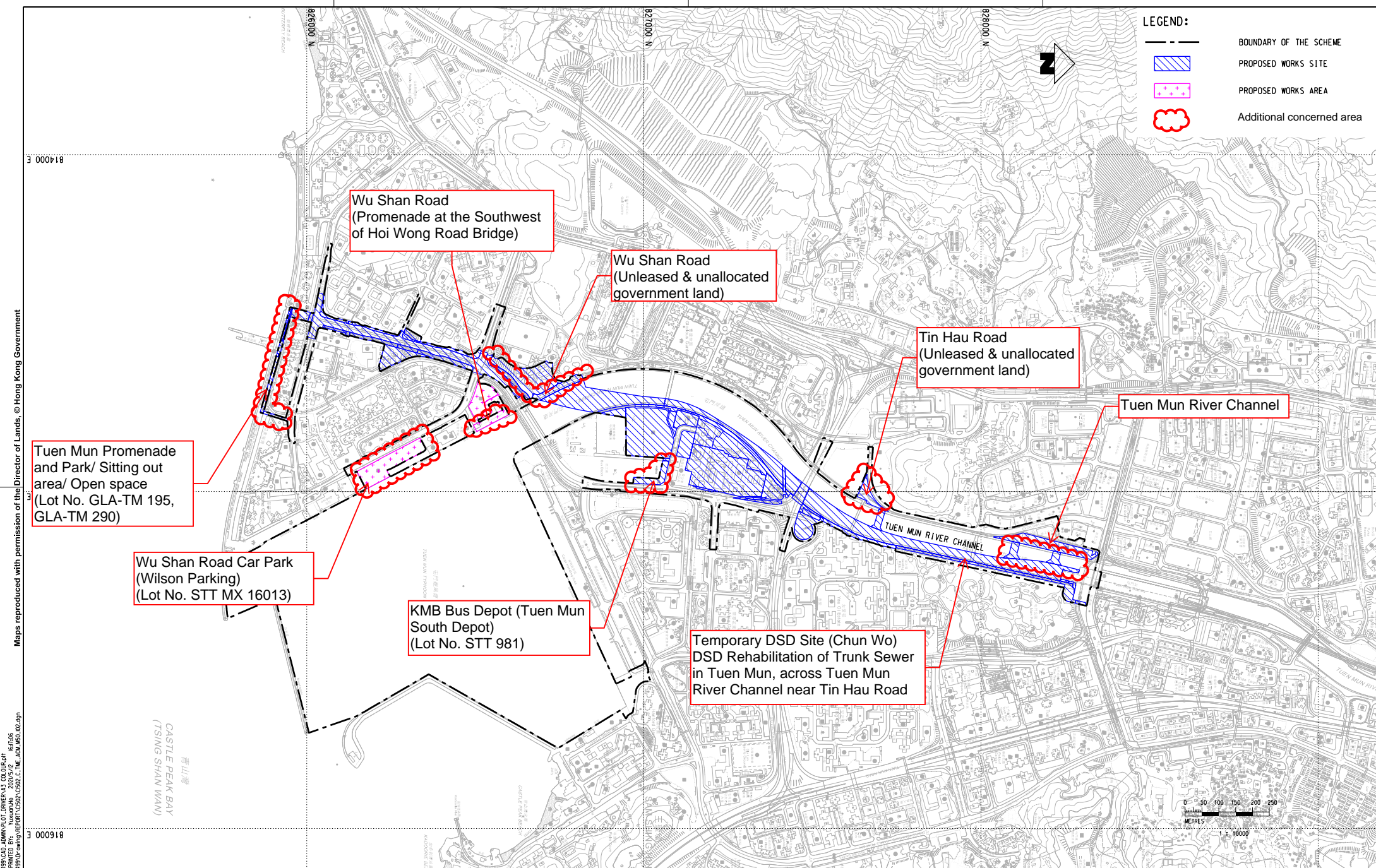
Please feel free to contact our Rebecca Leong at 2688 1136 should you require further information.

Yours sincerely,



Lisa Poon  
Lead Senior Environmental Engineer

LP/RJ/wc



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 P:\PROJECTS\6064669\ACM\_ADMIN\REPORT\12502\_V3502\_C\_THE\_ACM\M50\_102.dwg  
 PLOT DATE: 11/01/2011 10:00:00 AM  
 FILENAME:

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

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DATE	

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TUEN MA EXTENSION

**AECOM**

ORIGINATOR

CADD REF. C1502\_C\_TME\_ACM\_M50\_102.dgn

TITLE <b>C1502</b> <b>TUEN MA EXTENSION</b> <b>PROPOSED WORKS AREAS AND WORKS SITES</b>	
SCALE 1 : 10000 (A3)	FIGURE NO. C1502/C/TME/ACM/M50/102
	REV. A

消防處

香港九龍尖沙咀東部康莊道1號  
消防處總部大廈



FIRE SERVICES DEPARTMENT  
FIRE SERVICES HEADQUARTERS BUILDING,  
No.1 Hong Chong Road,  
Tsim Sha Tsui East, Kowloon,  
Hong Kong.

本處檔號 OUR REF. : (43) in FSD GR 6-5/4 R Pt. 34  
來函檔號 YOUR REF. : 60646499/C/chussi2105132  
電子郵件 E-mail : hkfsdenq@hkfsd.gov.hk  
圖文傳真 FAX NO. : 2739 5879  
電話 TEL NO. : 2733 7741

7 June 2021

AECOM Asia Co. Ltd  
12/F, Grand Central Plaza, Tower 2,  
138 Shatin Rural Committee Road,  
Shatin, Hong Kong.  
**(Attn: Ms. Angela TONG, Technical Director)**

Dear Ms. TONG,

**Consultancy Agreement No. C1502 Environmental Impact Assessment  
(EIA) Study for Tuen Ma Extension  
Request for Information of Dangerous Goods & Incident Records**

I refer to your letter of 13.5.2021 regarding the captioned request and reply below in response to your questions:-

1. According to our record, from the year of 1990 to present moment, dangerous goods licenses have been issued by this department to the subject address, with details as shown in **Appendix A**.
2. A total of **one** incident record was found at the subject location. Please refer to **Appendix B** for details.

If you have further questions, please feel free to contact the undersigned.

Yours sincerely,

(NG Wing-chit)  
for Director of Fire Services

**Consultancy Agreement No. C1502**  
**Environmental Impact Assessment (EIA) Study for Tuen Ma Extension**  
**Request for Information of Dangerous Goods & Incident Records**

No.	Date	Type of Incident	Address
1.	25.4.2019	Vessel <i>Fire</i>	Tuen Mun Typhoon Shelter Seafront near No. 101 Wu Shan Road

**Consultancy Agreement No. C1502 Environmental Impact Assessment (EIA) Study  
for Tuen Ma Extension  
Request for Information of Dangerous Goods & Incident Records**

<b><u>Item</u></b>	<b><u>Type of DG</u></b>	<b><u>Quantity</u></b>	<b><u>Storage Method</u></b>
1.	Acetylene	18 Cylinders x 48L	Inside an approved DG Store  at open ground
2.	Oxygen	18 Cylinders x 47L	

## Au, Kin

---

**From:** ado\_mg\_1@hkfsd.gov.hk  
**Sent:** Friday, June 18, 2021 2:58 PM  
**To:** Au, Kin  
**Subject:** [EXTERNAL] Re: FW: Consultancy Agreement No. C1502 Environmental Impact Assessment (EIA) Study for Tuen Ma Extension - Request for Information about Dangerous Goods Store and Incidents Records

Dear Mr. AU,

Below please find the requested information for your reference:

<u>Item</u>	<u>Type of DG</u>	<u>Quantity</u>	<u>Storage Method</u>
1.	Acetylene	18 Cylinders x 48L	Construction Site of Contract No.: DC/2018/09 Rehabilitation of Trunk Sewers in Turn Mum, Tin Hau Road.
2.	Oxygen	18 Cylinders x 47L	

Regards,

(NG Wing-chit)  
Assistant Divisional Officer  
(Management Group)1  
Fire Services Department  
Office: 2733 7741  
Fax: 2739 5879

From: "Au, Kin" <kin.au@aecom.com>  
To: "ado\_mg\_1@hkfsd.gov.hk" <ado\_mg\_1@hkfsd.gov.hk>  
Cc: "hkfsdenq@hkfsd.gov.hk" <hkfsdenq@hkfsd.gov.hk>, "Ng, Lok Yi Chloe" <Chloe.Ng@aecom.com>, "Fung, Ka Yee Karen" <Karen.Fung@aecom.com>, "Yuen, Robert" <robert.yuen@aecom.com>  
Date: 17/06/2021 17:32  
Subject: FW: Consultancy Agreement No. C1502 Environmental Impact Assessment (EIA) Study for Tuen Ma Extension - Request for Information about Dangerous Goods Store and Incidents Records

---

Dear Mr. Ng,

I refer to your letter dated 7 June 2021 (ref.: (43) in FSD GR 6-5/4 R Pt.34) regarding our captioned information request. Regarding to the DG licenses information (Appendix A), it is noted that the provided information did not include the storage address. Therefore, I am writing to request for the storage location (i.e. address / land lot no) where the dangerous goods are stored. Attached the letter for your reference.

<u>Item</u>	<u>Type of DG</u>	<u>Quantity</u>	<u>Storage Method</u>
1.	Acetylene	18 Cylinders x 48L	Inside an approved DG
2.	Oxygen	18 Cylinders x 47L	Store at open ground

Should you have any queries, please do not hesitate to contact our Ms. Chloe Ng at 3922 9305 or Mr. Kin Au at 3922 9507. Thank you very much for your kind assistance.



Regards,

**Kin Au**

Graduate Environmental Consultant, Environment, Hong Kong  
D +852-3922-9507  
[kin.au@aecom.com](mailto:kin.au@aecom.com)

**AECOM**

13/F Grand Central Plaza, Tower 2,  
138 Shatin Rural Committee Road,  
Shatin, Hong Kong  
[www.aecom.com/hk/](http://www.aecom.com/hk/)

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reference again.

Should you have any queries, please do not hesitate to contact our Ms. Chloe Ng at 3922 9305 or Mr. Robert Yuen at 3922 9439. Thank you very much for your kind assistance.

Regards,

**Karen Fung**

Project Environmental Consultant, Environment, Hong Kong  
D +852-3922-9414  
[karen.fung@aecom.com](mailto:karen.fung@aecom.com)

**AECOM**

13/F, Tower 2, Grand Central Plaza  
138 Shatin Rural Committee Road  
Shatin, New Territories, Hong Kong  
[www.aecom.com/hk/](http://www.aecom.com/hk/)

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**From:** Fung, Ka Yee Karen <Karen.Fung@aecom.com>

**Sent:** Tuesday, June 15, 2021 6:12 PM

**To:** ado\_mg\_1@hkfsd.gov.hk

**Cc:** Tong, Ka Ling Angela <angela.tong@aecom.com>; Chu, Sze Shing Isaac <Isaac.Chu@aecom.com>; Tso, Shiu Heng Lawrence <lawrence.tso@aecom.com>; Ng, Lok Yi Chloe <Chloe.Ng@aecom.com>; Yuen, Robert <robert.yuen@aecom.com>; Au, Kin <kin.au@aecom.com>

**Subject:** Consultancy Agreement No. C1502 Environmental Impact Assessment (EIA) Study for Tuen Ma Extension - Request for Information about Dangerous Goods Store and Incidents Records

Dear Mr. Ng,

I refer to your letter dated 20 May 2021 (ref.: (125) in FSD GR 6-5/4 R Pt.33) regarding our captioned information request. Due to tight study programme, grateful if you could help to follow up and provide us the information by 18 Jun 2021. Attached please find the letter of employment for your

[attachment "20210617 FSD reply.pdf" deleted by ADO  
MG1/FSD/HKSARG]



## **Annex D**

### **RBRGs for Soil and Groundwater, Soil Saturation Limit and Solubility Limit**

**Table 2.1  
Risk-Based Remediation Goals (RBRGs) for Soil & Soil Saturation Limit**

Chemical	Risk-Based Remediation Goals for Soil				Soil Saturation Limit (C <sub>sat</sub> ) (mg/kg)
	Urban Residential (mg/kg)	Rural Residential (mg/kg)	Industrial (mg/kg)	Public Parks (mg/kg)	
<b>VOCs</b>					
Acetone	9.59E+03	4.26E+03	1.00E+04*	1.00E+04*	***
Benzene	7.04E-01	2.79E-01	9.21E+00	4.22E+01	3.36E+02
Bromodichloromethane	3.17E-01	1.29E-01	2.85E+00	1.34E+01	1.03E+03
2-Butanone	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+04*	***
Chloroform	1.32E-01	5.29E-02	1.54E+00	2.53E+02	1.10E+03
Ethylbenzene	7.09E+02	2.98E+02	8.24E+03	1.00E+04*	1.38E+02
Methyl tert-Butyl Ether	6.88E+00	2.80E+00	7.01E+01	5.05E+02	2.38E+03
Methylene Chloride	1.30E+00	5.29E-01	1.39E+01	1.28E+02	9.21E+02
Styrene	3.22E+03	1.54E+03	1.00E+04*	1.00E+04*	4.97E+02
Tetrachloroethene	1.01E-01	4.44E-02	7.77E-01	1.84E+00	9.71E+01
Toluene	1.44E+03	7.05E+02	1.00E+04*	1.00E+04*	2.35E+02
Trichloroethene	5.23E-01	2.11E-01	5.68E+00	6.94E+01	4.88E+02
Xylenes (Total)	9.50E+01	3.68E+01	1.23E+03	1.00E+04*	1.50E+02
<b>SVOCs</b>					
Acenaphthene	3.51E+03	3.28E+03	1.00E+04*	1.00E+04*	6.02E+01
Acenaphthylene	2.34E+03	1.51E+03	1.00E+04*	1.00E+04*	1.98E+01
Anthracene	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+04*	2.56E+00
Benzo(a)anthracene	1.20E+01	1.14E+01	9.18E+01	3.83E+01	
Benzo(a)pyrene	1.20E+00	1.14E+00	9.18E+00	3.83E+00	
Benzo(b)fluoranthene	9.88E+00	1.01E+01	1.78E+01	2.04E+01	
Benzo(g,h,i)perylene	1.80E+03	1.71E+03	1.00E+04*	5.74E+03	
Benzo(k)fluoranthene	1.20E+02	1.14E+02	9.18E+02	3.83E+02	
bis-(2-Ethylhexyl)phthalate	3.00E+01	2.80E+01	9.18E+01	9.42E+01	
Chrysene	8.71E+02	9.19E+02	1.14E+03	1.54E+03	
Dibenzo(a,h)anthracene	1.20E+00	1.14E+00	9.18E+00	3.83E+00	
Fluoranthene	2.40E+03	2.27E+03	1.00E+04*	7.62E+03	
Fluorene	2.38E+03	2.25E+03	1.00E+04*	7.45E+03	5.47E+01
Hexachlorobenzene	2.43E-01	2.20E-01	5.82E-01	7.13E-01	
Indeno(1,2,3-cd)pyrene	1.20E+01	1.14E+01	9.18E+01	3.83E+01	
Naphthalene	1.82E+02	8.56E+01	4.53E+02	9.14E+02	1.25E+02
Phenanthrene	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+04*	2.80E+01
Phenol	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+04*	7.26E+03
Pyrene	1.80E+03	1.71E+03	1.00E+04*	5.72E+03	
<b>Metals</b>					
Antimony	2.95E+01	2.91E+01	2.61E+02	9.79E+01	
Arsenic	2.21E+01	2.18E+01	1.96E+02	7.35E+01	
Barium	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+04*	
Cadmium	7.38E+01	7.28E+01	6.53E+02	2.45E+02	
Chromium III	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+04*	
Chromium VI	2.21E+02	2.18E+02	1.96E+03	7.35E+02	
Cobalt	1.48E+03	1.46E+03	1.00E+04*	4.90E+03	
Copper	2.95E+03	2.91E+03	1.00E+04*	9.79E+03	
Lead	2.58E+02	2.55E+02	2.29E+03	8.57E+02	
Manganese	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+04*	
Mercury	1.10E+01	6.52E+00	3.84E+01	4.56E+01	
Molybdenum	3.69E+02	3.64E+02	3.26E+03	1.22E+03	
Nickel	1.48E+03	1.46E+03	1.00E+04*	4.90E+03	
Tin	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+04*	
Zinc	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+04*	
<b>Dioxins / PCBs</b>					
Dioxins (I-TEQ)	1.00E-03	1.00E-03	5.00E-03	1.00E-03	
PCBs	2.36E-01	2.26E-01	7.48E-01	7.56E-01	
<b>Petroleum Carbon Ranges</b>					
C6 - C8	1.41E+03	5.45E+02	1.00E+04*	1.00E+04*	1.00E+03
C9 - C16	2.24E+03	1.33E+03	1.00E+04*	1.00E+04*	3.00E+03
C17 - C35	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+04*	5.00E+03
<b>Other Inorganic Compounds</b>					
Cyanide, free	1.48E+03	1.46E+03	1.00E+04*	4.90E+03	
<b>Organometallics</b>					
TBTO	2.21E+01	2.18E+01	1.96E+02	7.35E+01	

**Notes:**

- (1) For Dioxins, the cleanup levels in USEPA Office of Solid Waste and Emergency Response (OSWER) Directive of 1998 have been adopted. The OSWER Directive value of 1 ppb for residential use has been applied to the scenarios of "Urban Residential", "Rural Residential", and "Public Parks", while the low end of the range of values for industrial, 5 ppb, has been applied to the scenario of "Industrial".
- (2) Soil saturation limits for petroleum carbon ranges taken from the Canada-Wide Standards for Petroleum Hydrocarbons in Soil, CCME 2000.
- (3) \* indicates a 'ceiling limit' concentration.
- (4) \*\*\* indicates that the C<sub>sat</sub> value exceeds the 'ceiling limit' therefore the RBRG applies.

**Table 2.2  
Risk-Based Remediation Goals (RBRGs) for Groundwater and Solubility Limit**

Chemical	Risk-Based Remediation Goals for Groundwater			Solubility Limit (mg/L)
	Urban Residential (mg/L)	Rural Residential (mg/L)	Industrial (mg/L)	
<b>VOCs</b>				
Acetone	1.00E+04*	1.00E+04*	1.00E+04*	***
Benzene	3.86E+00	1.49E+00	5.40E+01	1.75E+03
Bromodichloromethane	2.22E+00	8.71E-01	2.62E+01	6.74E+03
2-Butanone	1.00E+04*	1.00E+04*	1.00E+04*	***
Chloroform	9.56E-01	3.82E-01	1.13E+01	7.92E+03
Ethylbenzene	1.02E+03	3.91E+02	1.00E+04*	1.69E+02
Methyl tert-Butyl Ether	1.53E+02	6.11E+01	1.81E+03	***
Methylene Chloride	1.90E+01	7.59E+00	2.24E+02	***
Styrene	3.02E+03	1.16E+03	1.00E+04*	3.10E+02
Tetrachloroethene	2.50E-01	9.96E-02	2.95E+00	2.00E+02
Toluene	5.11E+03	1.97E+03	1.00E+04*	5.26E+02
Trichloroethene	1.21E+00	4.81E-01	1.42E+01	1.10E+03
Xylenes (Total)	1.12E+02	4.33E+01	1.57E+03	1.75E+02
<b>SVOCs</b>				
Acenaphthene	1.00E+04*	7.09E+03	1.00E+04*	4.24E+00
Acenaphthylene	1.41E+03	5.42E+02	1.00E+04*	3.93E+00
Anthracene	1.00E+04*	1.00E+04*	1.00E+04*	4.34E-02
Benzo(a)anthracene				
Benzo(a)pyrene				
Benzo(b)fluoranthene	5.39E-01	2.03E-01	7.53E+00	1.50E-03
Benzo(g,h,i)perylene				
Benzo(k)fluoranthene				
bis-(2-Ethylhexyl)phthalate				
Chrysene	5.81E+01	2.19E+01	8.12E+02	1.60E-03
Dibenzo(a,h)anthracene				
Fluoranthene	1.00E+04*	1.00E+04*	1.00E+04*	2.06E-01
Fluorene	1.00E+04*	1.00E+04*	1.00E+04*	1.98E+00
Hexachlorobenzene	5.89E-02	2.34E-02	6.95E-01	6.20E+00
Indeno(1,2,3-cd)pyrene				
Naphthalene	6.17E+01	2.37E+01	8.62E+02	3.10E+01
Phenanthrene	1.00E+04*	1.00E+04*	1.00E+04*	1.00E+00
Phenol				
Pyrene	1.00E+04*	1.00E+04*	1.00E+04*	1.35E-01
<b>Metals</b>				
Antimony				
Arsenic				
Barium				
Cadmium				
Chromium III				
Chromium VI				
Cobalt				
Copper				
Lead				
Manganese				
Mercury	4.86E-01	1.84E-01	6.79E+00	
Molybdenum				
Nickel				
Tin				
Zinc				
<b>Dioxins / PCBs</b>				
Dioxins (I-TEQ)				
PCBs	4.33E-01	1.71E-01	5.11E+00	3.10E-02
<b>Petroleum Carbon Ranges</b>				
C6 - C8	8.22E+01	3.17E+01	1.15E+03	5.23E+00
C9 - C16	7.14E+02	2.76E+02	9.98E+03	2.80E+00
C17 - C35	1.28E+01	4.93E+00	1.78E+02	2.80E+00
<b>Other Inorganic Compounds</b>				
Cyanide, free				
<b>Organometallics</b>				
TBTO				

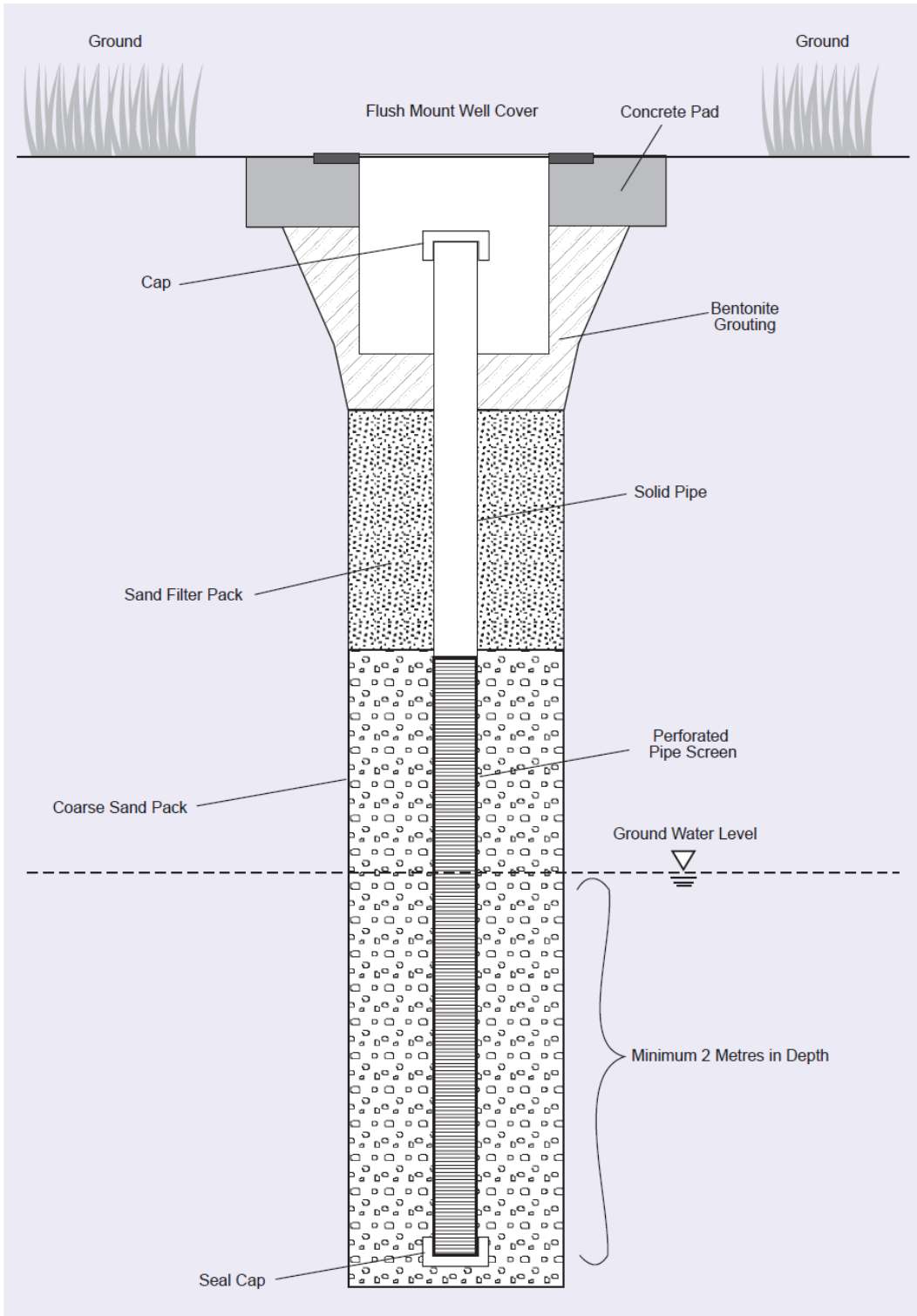
**Notes:**

- (1) Blank indicates that RBRG could not be calculated because the toxicity or physical/chemical values were unavailable, or the condition of Henry's Law Constant > 1.00E-05 was not met for the inhalation pathway.
- (2) Water solubilities for Petroleum Carbon Range aliphatic C9-C16 and greater than C16 generally are considered to be effectively zero and therefore the aromatic solubility for C9-C16 is used.
- (3) \* indicates a 'ceiling limit' concentration.
- (4) \*\*\* indicates that the solubility limit exceeds the 'ceiling limit' therefore the RBRG applies.

## **Annex E**

### **Typical Design of a Groundwater Monitoring Well**

# Typical Design of a Groundwater Monitoring Well



Source: Practice Guide for Investigation and Remediation of Contaminated Land, EPD, Aug. 2011