MTR Corporation Limited

Shatin to Central Link (SCL) Consultancy Agreement No NEX/2206

Environmental Impact Assessment (EIA) Study for Tai Wai to Hung Hom Section

Sediment Sampling and Testing Plan

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Sediment Testing and Sampling Plan

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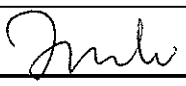
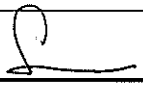
		Signature			

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1 Introduction

1.1 Background

The Shatin to Central Link (SCL) is one of the ten large-scale infrastructure projects announced by the Chief Executive in his 2007-2008 Policy Address, targeting commencement of construction by 2010. It forms a strategic rail corridor from Shatin to Central which will bring about various benefits to the community, including:

- Redistribution of railway passenger flows to relieve the existing railway lines in urban Kowloon and on Hong Kong Island;
- Providing public transport service for Kai Tak Development;
- Relieving of road-based public transport in the existing developed areas, and alleviation of the traffic congestion and environmental nuisance on existing road networks, including the demand on the Hung Hom Cross Harbour Tunnel; and
- Stimulation of the redevelopment of the To Kwa Wan and Kowloon City area.

There are two sections of SCL, namely the Tai Wai to Hung Hom Section and the Cross Harbour Section. This study covers the Tai Wai to Hung Hom section only. The EIA for the SCL Cross Harbour Section would be conducted under separate consultancy.

1.2 Alignment and General Design

1.2.1 General Alignment

The SCL Tai Wai to Hung Hom Section is an approximately 11km long extension of the Ma On Shan Line (MOL) from Tai Wai through new stations at Hin Keng (HIK), Diamond Hill (DIH), Kai Tak (KTA), Sung Wong Toi (SWT), Lok Man (LOM), Ho Man Tin (HMT) and connects the West Rail Line at Hung Hom (HUH). Most of the sections would be underground except for a section at Hin Keng, and another section at Hung Hom. The underground sections of the alignment would be constructed by various construction methods including drill-and-blast, cut-&-cover, bored tunnelling, compressed air shield and shotcrete support method. Open cut methods will be employed for the tunnel portals at Hin Keng and Diamond Hill, and most of the stations and ventilation building structures etc.

DIH will become an interchange station with the existing Kwun Tong Line (KTL). The SCL Tai Wai to Hung Hom Section will interchange with the Kwun Tong Line Extension (KTE) and the SCL Cross Harbour Section at HMT and HUH respectively.

A new train stabling siding will be located at the Diamond Hill CDA site (i.e. ex-Tai Hom Village) to provide stabling facilities and to allow effective train launching to meet the service requirements.

The SCL Tai Wai to Hung Hom Section will also form an important part of the proposed Kai Tak Development, providing mass transit service not only to the proposed new commercial and residential developments in the area, but also the Multi-Purpose Stadium Complex and other leisure facilities planned at Kai Tak.

The proposed tentative alignment is shown in **Figure 1.1** and the tentative locations of off-site works areas (e.g. storage, barging points, magazine sites etc) are shown in **Figure 1.2**.

A board description of different sections of the alignment is given below.

Section	Description of Tentative Alignment
Tai Wai to Diamond Hill	• The SCL departs from the existing MOL overrun track at south of Tai Wai Maintenance Centre. The at-grade section near the Tai Wai Maintenance Centre would be within the existing maintenance centre. • Leaving the Tai Wai Maintenance Centre, the track would maintain on embankment and then change to a viaduct before connecting to HIK Station which is an elevated station. • The alignment then heads towards the HIK portal near at east of Hin Keng Estate. Once into the portal, the alignment runs under the Lion Rock. There would not be any at-grade construction activities within the Lion Rock Country Park and all the tunnel construction activities would be within the granite layer. • Within the Lion Rock Country Park, the alignment runs towards Chuk Yuen and Wong Tai Sin. Due to various constraints, the alignment would need to pass below some existing buildings (e.g. Wong Tai Sin Divisional Fire Station and its associated buildings) in Chuk Yuen and Wong Tai Sin areas. • The SCL would interface with the existing Kwun Tong Line (KTL) at DIH Station located directly below Lung Cheung Road. Passengers would be able to interchange with KTL at this station. • A train stabling sidings would be constructed in the former Tai Hom Village, which adjoins the DIH Station to the south.
Diamond Hill to Sung Wong Toi	• After leaving the DIH Station, the SCL runs below the Tate's Cairn Viaduct and crosses Prince Edward Road East to reach KTA Station within the Kai Tak Development area. • There are currently neither commercial nor residential developments within the Kai Tak Development area. There are however future commercial and residential premises in the vicinity. • The alignment runs towards southwest and joins the SWT Station near Sung Wong Toi Garden.
Sung Wong Toi to Hung Hom	• The alignment runs below Ma Tau Chung Road towards west and reaches LOM Station. • The areas along Ma Tau Chung Road consist of high density of multi-storey buildings, including residential, commercial and industrial buildings. While new developments over the last 5 years have been identified, some of the existing buildings along the alignment were developed over 60 years ago in the post-war era. • After leaving LOM Station, the alignment crosses below East Kowloon Way viaduct, passes Ko Shan Theatre and joins HMT Station at the intersection of Fat Kwong Street and Shun Yung Street. The HMT Station would be designed by another consultancy and its associated environmental impacts would be addressed in the respective KTE EIA Report. • HMT Station is also an interchange station at which passengers can interchange between SCL and KTE.

Section	Description of Tentative Alignment
	• After leaving HMT Station, the alignment runs below the Winslow Street underpass and the Chatham Road embankment before entering into the existing Hung Hom Station area. • The tracks for SCL within the Hung Hom Station area would be at-grade and would eventually join the existing KSL tunnel portal near to the junction of Salisbury Road and Science Museum Road. • The SCL Tai Wai to Hung Hom would interface with the SCL Cross Harbour Section at HUH Station. Passengers would be able to interchange at this station. • The HUH Station would be entirely under the existing deck of the Hung Hom Station.

1.2.2 Summary of Design

Table 1.1 Summary of design of SCL Tai Wai to Hung Hom section

Type	Location	Design
Alignment Sections	Tai Wai Maintenance Centre	At-grade
	Tai Wai Maintenance Centre to HIK	Embankment + Viaduct
	HIK to HIK Portal	Viaduct
	HIK Portal to DIH	Tunnel
	DIH to KTA	Tunnel
	KTA to SWT	Tunnel
	SWT to LOM	Tunnel
	LOM to HMT	Tunnel
	HMT to HUH	Tunnel + at-grade section
	HUH to KSL Tunnel	At-grade section
Stations	HIK	Elevated station
	DIH	Underground station
	DIH Stabling Sidings	Semi-underground
	KTA	Underground station
	SWT	Underground station
	LOM	Underground station
	HMT	Underground station (by others) [1]
	HUH Station	At-grade station
Ventilation Building	At Ma Chai Hang	Above-grade structure

Note [1] : The station structure of HMT would be designed and constructed under the KTE. The associated environmental impacts would also be included in their respective EIAs.

1.3 Implementation Programme

According to the latest information, it is the target to commence construction by Year 2010 and it would take 4-5 years to complete the construction work. This would be subject to changes during the on-going design process.

1.4 EIA Study Brief

The Project is a Designated Project under Schedule 2, Part I, Categories A2, A4, A7 and A8 of the Environmental Impact Assessment Ordinance (EIAO). An application (No. ESB-191/2008) for an Environmental Impact Assessment (EIA) Study Brief under Section 5(1)(a) of the EIAO was submitted by the Applicant on 18 June 2008 with a project profile (No. PP-356/2008) (the Project Profile). Pursuant to Section 5(7)(a) of the EIAO, the Director of Environmental Protection issued an EIA Study Brief (ref: EIA Study Brief No: ESB-191/2008 dated 14 July 2008 to the Project Proponent to carry out an EIA Study.

According to Clause 3.4.2 of the EIA Study Brief, waste management implications of the Project should be assessed during construction and operational phases.

1.5 Concurrent Projects

Any cumulative impacts from concurrent projects would need to be considered in the EIA. Liaison will be made with the respective project proponents. A tentative list of possible concurrent projects is given below. This would however need to be updated during the EIA process.

Item	Project	EIAO Reference	Project Proponent
1	Kwun Tong Line Extension (KTE)	ESB-188/2008	MTR
2	Shatin to Central Link - Cross Harbour Section (Phase I - Mong Kok East to Hung Hom)	ESB-192/2008	MTR
3	Shatin to Central Link - Cross Harbour Section (Phase II - Hung Hom to Admiralty)	ESB-193/2008	MTR
4	Decommissioning of the Former Kai Tak Airport other than the North Apron	ESB-160/2006	CEDD
5	Central Kowloon Route	ESB-156/2006	HyD
6	Kai Tak Development	ESB-152/2006	CEDD

1.6 Scope of Sediment Sampling and Testing Plan

This Sediment Sampling and Testing Plan (SSTP) is prepared in accordance with Clause 6.2.2 (a) and 6.2.6 of the Scope of Services, which consist of the following:

(a) Propose location of sediment quality sampling; and

(b) Testing specification for sediment samples.

This plan has been prepared in accordance with the Environment, Transport and Works Bureau Technical Circular (Works) No. 34/2002 Management of Dredged/Excavated Sediment, for submission to EPD for approval. Upon completion of testing and sampling process, a Sediment Quality Report will be produced and submitted to EPD by the responsible party.

2 Construction Method

2.1 Tentative Alignment Sections

The SCL Tai Wai to Hung Hom Section would be constructed mostly in tunnel except for a viaduct section in Tai Wai and an at-grade section in Hung Hom. The preliminary design is still being conducted at the time of preparing this SSTP and hence the construction methodology is still yet to be finalised.

However, a tentative concept for the preliminary construction methodology is given below for initial information and would be subject to changes during the on-going design process. **Figures 2.1.1 to 2.1.8** show the tentative construction methods, locations of ventilation shafts, TBM launching chambers, tunnel work shafts etc.

A summary of tentative construction methods is shown in **Table 2.1** below. **Figures 2.2.1 to 2.2.8** show the locations and demarcations of all the at-grade temporary works areas. Barging areas are separately shown as off-site works areas in **Section 2.5**.

Table 2.1 Tentative construction methods for different alignment sections

Section	Form	Tentative Construction Method
Tai Wai to HIK Station and Hin Keng Portal	Embankment + Viaduct	**Typical viaduct construction:** • The substructure could be in a form of column pier with pier head. • The box girder viaduct would be constructed by cast in-situ method supported on traditional falsework.
Hin Keng Portal to Chuk Yuen	Tunnel	**Drill-&-blast tunnelling:** • A small section of mixed ground tunneling would be constructed at Hin Keng Portal. The construction would avoid the Tei Lung Hau freshwater stream. • The long tunnel between Hin Keng Portal to Chuk Yuen (within the Lion Rock Country Park) will mainly be constructed by drill-and-blast method. • A ventilation shaft site will be located at the Ma Chai Hang Recreation Park. (NB: There is no at-grade construction activity within the Lion Rock Country Park. All the construction works within the Lion Rock Country Park would be within the granite layer.)
Chuk Yuen to Po Kong Village	Tunnel	**Bored tunnelling:** • A TBM launching chamber is planned near the Po Kong Village Road interchange. The retrieval chamber is located near the Ventilation Building at Chuk Yuen. • There would not be any at-grade construction activities within this section except for the ground treatment works as necessary.
Po Kong Village to DIH Station	Tunnel	**Cut-&-Cover tunnelling:** • The tunnels between Po Kong Village Road and DIH Station would be constructed using open cut methods, together with the new Kwun Tong Line tunnels. • Due to restrictions on the installation of pipe pile temporary supports within 3m protection zone of the existing Kwun Tong Line tunnels, extensive areas of open cut are required, with ground treatment and battered slopes at either end to avoid end walls that would clash with the existing tunnels.

Section	Form	Tentative Construction Method
DIH Station to KTA Station	Tunnel	**Combination of cut-and-cover and bored tunnelling:** • The tunnels beneath DIH Station and roundabout junction with Hammer Hill Road would be constructed with cut-&-cover method. • For the tunnel section between Hammer Hill Road and Choi Hung Bus Terminus, bored tunnelling will be adopted. The TBM launching chamber would be located near to the Choi Hung Bus Terminus. • The tunnel section crossing Prince Edward Road East would be constructed using cut-&-cover method. • From Prince Edward Road East to KTA Station, a 400m of tunnel would be constructed by cut-&-cover method within the former Kai Tak Airport site. The excavation will encompass both the running tunnels and the train stabling sidings.
KTA Station to SWT Station	Tunnel	**Cut-&-cover tunnelling:** • The tunnels would be entirely within the Kai Tak Area. • The local section that may interface with the Longji Bridge would be provided with sufficient horizontal pipe piling.
SWT Station to LOM Station	Tunnel	**Bored tunnelling:** • The tunnels between the south end of SWT Station and the north end of LOM Station are located within the dense urban environment around Ma Tau Wai Road, and at the former Kai Tak airfield. • TBM launching shaft is planned at the southern end of SWT Station and the retrieval shaft at the northern end of LOM Station. • There would not be any at-grade construction activities within this section except for the ground treatment works as necessary.
LOM Station to HMT Station	Tunnel	**Combination of cut-&-cover and drill-&-blast tunnelling:** • The cut-&-cover (C&C) method will be employed for the section between work shaft in Shansi Street to the south end of LOM Station. • The 500m section of tunnel between Shansi Street shaft and HMT Station would be constructed as two single track horse-shoe tunnels, using the drill-&-blast method. • A work shaft is proposed to be constructed at the Shansi Street public car park to provide access to tunnelling works towards HMT and LOM Stations.
HMT Station to HUH Station	Tunnel + At - grade	**Cut-&-cover for tunnel:** • This section near Winslow Street would be constructed as two single track tunnels using the C&C method.
HUH Station and South of HUH Station	At-grade	**Typical construction for at-grade track**

2.2 Stations and Entrances

All stations would be underground, except for HIK Station and HUH Station, Their tentative construction methodologies are summarized below.

Table 2.2 Tentative construction methods for stations and entrances

Stations and Entrances	Tentative Construction Methodologies
HIK Station	*Elevated Station:* • The station foundation would employ bored piling and the superstructure will be constructed by in-situ concreting.
HUH Station	*At-Grade Station:* • This station would be completely under the existing podium deck of the Hung Hom Station. Typical concreting works would be required.
Other stations including: • DIH Station • DIH Stabling Sidings • KTA Station • SWT Station • LOM Station	*Underground Stations:* • The station foundation would employ either bored piles or D-walls and the underground structure will be constructed by in-situ concreting.

Note: The construction for HMT Station is by others

2.3 Ventilation Buildings

There is only 1 ventilation building in SCL Tai Wai to Hung Hom Section. It is located at Ma Chai Hang. The ventilation building is above-grade and would be constructed by typical building construction methodologies. Key stages of the construction for ventilation building include the following:

- Foundation construction (typically by bored piling); and
- Superstructures (typically by in-situ concreting).

2.4 Portals

There are 2 portals for the SCL Tai Wai to Hung Hom Section, one at Hin Keng and one at Hung Hom. Their construction methodologies are summarized below:

Table 2.3 Tentative construction method for portals

Portals	Tentative Construction Methodologies
Hin Keng	• To be determined by Engineer
Hung Hom	• In-situ casting

2.5 Off-Site Temporary Works Areas

In addition to the temporary works areas in the vicinity of the tunnel and station structures, there are some off-site temporary works areas to facilitate the construction process. These off-site temporary works areas are summarized below:

Table 2.4 Tentative uses for off-site temporary works areas

Off-Site Works Area	Proposed Uses
Shek Mun, Shatin	• General storage, offices
Hoi Sham Park (South)	• Barging activities (sediment removal required)

Off-Site Works Area	Proposed Uses
Kai Tak Runway	• Barging activities (sediment removal required)
Finger Pier at Hung Hom	• Barging activities (sediment removal not required), shared use with Kwun Tong Line Extension (KTE)
Nam Cheong	• Barging activities (sediment removal not required), shared use with Express Railway Link (XRL)
TKO 137	• Magazine site
Shui Chuen O, Shatin	• Magazine site

It should be noted that, other than the minor sediment removal works for the barging facilities at Hoi Sham Park (South) and Kai Tak Runway, all the off-site works areas have been previously employed as temporary works areas under other infrastructure projects. It is not required to increase the footprints of these off-site temporary works areas.

2.5.1 Barging Points

Spoils and inert C&D materials will be generated from excavation of SCL. These materials will be transported to fill bank by barge. Barging points at Kai Tak Runway, Hoi Sham Park (South), Finger Pier at Hung Hom (shared with Kwun Tong Line Extension) and Nam Cheong (shared use with Express Railway Link) have been proposed for SCL projects.

The lands of all the barging points have already been formed. To ensure that the barges could be accommodated, minor sediment removal down to -5 mPD would be required along seabed of Hoi Sham Park (South) and Kai Tak Runway.

Sediment removal would not be required for the barging points at Finger Pier at Hung Hom and Nam Cheong.

3 Legislative Requirements

3.1 Legislation and Guidelines

Relevant legislation and guidelines for disposal of contaminated sediments at marine disposal sites are listed below.

- Dumping at Sea Ordinance (Cap.466);
- Environment, Transport and Works Bureau Technical Circular (Works) (ETWB TC(W)) No. 34/2002 Management of Dredged / Excavated Sediment; and
- Works Bureau Technical Circular (WBTC) No. 12/2000 Fill Management.

The Dumping at Sea Ordinance (DASO) is the principal statutory legislation to control dumping of sediment at sea. It safeguards the water quality and ecology of Hong Kong waters.

ETWB TC(W) No. 34/2002 sets out the procedure for seeking approval to dredge/excavate sediment and the management framework for marine disposal of such sediment. It covers the approval of dredging/ excavation proposals and marine disposal of dredged/ excavated sediment. It does not cover the use of dredged/excavated sediment to form land, but such dredging and reclamation works must satisfy the requirements of the EIAO. Applications for approval of dredging/ excavation proposals and allocation of marine disposal space shall be made to the Secretary of Marine Fill Committee (MFC). The allocation of sediment disposal space at sea will not be considered until the need for removal of the sediment has been satisfactorily demonstrated. The rationale for sediment removal must therefore be provided to the Secretary of MFC for agreement.

ETWB TC(W) No. 34/2002 also provides guidelines for the classification of sediment based on their contaminant levels. Sediment quality criteria for classification include:

- Metals (cadmium, chromium, copper, mercury, nickel, lead, silver and zinc);
- Metalloid (arsenic); and
- Organic micro-pollutants (PAHs, PCBs and TBT).

Based on the criteria, the sediment is classified into Category L (low contamination level), Category M (medium contamination level) or Category H (high contamination level). This technical circular also stipulates a three-tiered screening for sediment assessment for determining the disposal options.

WBTC No. 12/2000 defines the responsibilities of MFC and Public Fill Committee (PFC). It also sets out the terms of reference and membership of the two committees and provides explanation on the management of fill resources, construction and demolition material, and dredged/excavated sediment disposal.

It should be noted that this plan has been prepared to cover the requirements under the Environmental Impact Assessment Ordinance (EIAO) and the requirement for Dumping Permit application under the control of Dumping at Sea Ordinance (DASO). Separate approvals from different divisions of EPD should be obtained for fulfilling EIAO requirement as well as DASO permit application respectively.

3.2 Methodology for Sediment Quality Assessment

The management framework of dredged/excavated sediment in Hong Kong is implemented under a three-tiered approach as illustrated in **Appendix A** in accordance with the ETWB TC(W) No. 34/2002, which also sets out the guidelines for the assessment, sampling, testing and classification of sediment as summarised in **Table 3.1.**

Table 3.1: Sediment quality criteria for classification of sediment under ETWB TC(W) No. 34/2002

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

(1) The contaminant level is considered to have exceeded the UCEL if it is greater than the value shown.

The sediment is classified into 3 categories based on its contaminant levels:

Category L — Sediment with all contaminant levels not exceeding the Lower Chemical Exceedance Level (LCEL). The material must be dredged, transported and disposed of in a manner which minimises the loss of contaminants either into solution or by resuspension.

Category M — Sediment with any one or more contaminant levels exceeding the Lower Chemical Exceedance Level (LCEL) and none exceeding the Upper Chemical Exceedance Level (UCEL). The material must be dredged and transported with care, and must be effectively isolated from the environment upon the final disposal unless appropriate biological tests demonstrate that the material will not adversely affect the marine environment.

Category H — Sediment with any one or more contaminant levels exceeding the Upper Chemical Exceedance Level (UCEL). The material must be dredged and transported with great care, and must be effectively isolated from the environment upon the final disposal.

Tier I Screening is a desktop screening process to review the available information and determine whether the sediment of concern belong to Category L material is suitable for open sea disposal. If there is insufficient information to arrive at such conclusion, Tier II chemical screening shall be proceeded accordingly.

Tier II Screening is a chemical screening process to categorise sediment based on its chemical contaminant levels and to determine whether the sediment is suitable for open sea disposal without further testing. Upon Type II screening, the sediment shall be classified as Category L, M or H material. There are three types of disposal options: namely Types 1 for open sea disposal, Type 2 for confined marine disposal and Type 3 for special treatment/disposal respectively. Category L material is suitable for open sea disposal, but Categories M and H will require Tier III screening to further determine the disposal option.

Tier III Screening is a biological screening process to identify the most appropriate disposal option for Category M (either Type 1 or 2) and certain Category H sediment (either Type 2 or 3). Sediment classified as Category M shall be subjected to the following three toxicity tests:

Toxicity Test	**Species**	**Test Method**
10-day burrowing amphipod toxicity test	*Ampelisca abdita*	USEPA (1994)/PSEP(1995)
	Leptocheirus plumulosus	ESEPA(1994),
	Eohaustorius estuarius	USEPA(1994)/PSEP(1995)
20-day burrowing polychaete toxicity test	*Neanthes arenaceodentata*	PSEP(1995);
48-96 hour larvae (bivalve or echinoderm) toxicity test	Bivalve: *Mytilus* spp	PSEP(1995)
	Crassostrea gigas	PSEP(1995)
	Echinoderm: *Dendraster excentricus*	PSEP(1995)
	Strongylocentrotus spp	PSEP(1995)

Table 3.2 summarises the details of the test endpoints and failure criteria of the three toxicity tests. Sediment classified as Category H and with one or more contaminant levels exceeding 10 times LCEL shall also be subjected to the above three toxicity tests but in a diluted manner (dilution test). In case failure of biological test on Categories M material, Type 2 disposal shall be required. Similarly, Type 3 disposal shall be required for Category H material if biological test is failed.

Table 3.2: Test endpoints and decision criteria for tier III biological screening under ETWB TC(W) No. 34/2002

Toxicity Test	**Endpoints Measured**	**Test Methods**	**Failure Criteria**
10-day amphipod	Survival	USEPA Standard Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods	Mean survival in test sediment is significantly different ($p \leq 0.05$)[(1)] from mean survival in reference sediment **and** mean survival in test sediment <80% of mean survival in reference sediment.
20-day polychaete worm	Dry Weight[(2)]	PSEP Standard Recommended Guidelines for Conducting Laboratory Bioassays on the Pudget	Mean dry weight in test sediment is significantly different ($p \leq 0.05$)[(1)] from mean dry weight in reference sediment

Toxicity Test	Endpoints Measured	Test Methods	Failure Criteria
		Sound Sediments – Juvenile Polychaete Sediment Bioassay, 1995	**and** mean dry weight in test sediment <90% of mean dry weight in reference sediment.
48-96 hour larvae (bivalve or echinoderm)	Normality Survival(3)	PSEP Standard Recommended Guidelines for Conducting Laboratory Bioassays on the Pudget Sound Sediments – Bivalve Larvae Sediment Bioassay, 1995	Mean normality survival in test sediment is significantly different ($p \leq 0.05$)(1) from mean normality survival in reference sediment **and** mean normality survival in test sediment <80% of mean normality survival in reference sediment.

(1) Statistically significant differences should be determined using appropriate two-sample comparisons (e.g., *t*-tests) at a probability of $p \leq 0.05$;
(2) Dry weight means total dry weight after deducting dead and missing worms;
(3) Normality survival integrates the normality and survival end points, and measures survival of only the normal larvae relative to the starting number.

4 Proposed Marine Sediment Quality Sampling

4.1 Review of Historical Maps and Aerial Photos

A selection of historical maps and aerial photos has been collated and reviewed. The reclamation history of the study areas is summarized as below:

Year	Reclamation
1888 - 1924	Land reclamation to the east of hilly terrain of Kowloon Peninsula was developed as Chatham Road South and land for the ex-KCR railway. Land reclamation along seacoast of Hung Hom was developed as dockyards.
	Land reclamation along seacoast of To Kwa Wan.
	Land reclamation of San Po Kong and Kai Tak Airport.
1925 - 1945	Land reclamation along seacoast of Kowloon City for extension of Kai Tak Airport.
1946 - 1967	Land reclamation of Tsim Sha Tsui East and ex-KCR Hung Hom Station, To Kwa Wan (Hoi Sam Park), Kai Tak Runway and along seacoast of Kwun Tong/ Ngau Tau Kok.
1968 - 1976	Reclamation for Kai Tak Runway Extension.
1977 - 1984	Land reclamation of Kowloon Bay and further reclamation in To Kwa Wan.
1985 - 2000	Land reclamation of Hung Hom Bay.

The historical map and aerial photos review have taken the barging points located at Hoi Sham Park (South) and Kai Tak Runway into account as sediment dredging would be required for these 2 sites.

There is no sediment quality concern for other 2 barging points located at Hung Hom finger pier and Nam Cheong as sediment dredging would not be requited for these 2 sites.

Sediment quality is not a concern for the land-base off-site works area at newly formed Shui Chuen O site. Although the off-site works areas at Shek Mun and TKO 137 were filled land, they have no sediment quality concern as no excavation would be required at these 2 sites.

Appendix B and **Appendix C** show the historical maps and aerial photos along historical coastline respectively**.** The reclamation history plan of the study area, including the 2 barging points requiring dredging, is given in **Appendix D**.

4.2 Review of Existing Sediment Quality Data

4.2.1 Geological Profiles

Review of historical landuses identified that the area between Kai Tak and Hung Hom is reclaimed land, and the SCL runs along the historical coastline. The area to the north of Kai Tak was mountain and inland area. Geological profiles shown in **Appendix E** suggested that marine deposits are located in Kai Tak and Hung Hom.

The SCL alignment along Diamond Hill, Hin Keng and Tai Wai will either sit on fill, alluvium or granite layer. Marine deposits are not identified in the historical mountain and inland areas.

4.2.2 Preliminary Site Investigation by KCRC

Based on the review of the EIA Study for the *Shatin to Central Link – Optimsed Conforming Scheme – East West Railway Corridor and North South Railway Corridor* (2004), sediment sampling and testing had been conducted along the existing alignment from area near Kai Tak, To Kwa Wan and Hung Hom. The analytical results indicated that both Category L and Category H sediments could be found and would require Type 1 and 2 disposal arrangements. Identified contaminants include arsenic, mercury and zinc.

4.3 Proposed Sediment Sampling Plan and Testing Requirements

After reviewing the existing information available, it is proposed to conduct sampling for sediments and water. The SCL – Tai Wai to Hung Hom section will not involve any reclamation and marine works. The barging points at Hoi Sham Park (South) and Waterfront Area under Tsing Ma Bridge at Tsing Yi, however, would require sediment removal. The sampling plan is given in **Tables 4.1** and **4.2** with the sampling locations shown in **Figures 4.1.1 - 4.1.5**.

Marine Base Sediment

A sediment sampling programme will be undertaken to determine the quality of sediment, and the volume of different categories of sediment of the dredged and excavated. The locations of the vibrocore sediments are selected with a view to obtain information for the marine works. Sampling of marine sediment is developed in accordance with ETWB TC(W) No 34/2002. Based on the review of 2007 Marine Water Quality in Hong Kong, sediment sampling and testing has been conducted at Victoria Harbour (VS3), and Category H sediments could be found. Given that the expected contamination level is high, a 50x50m sampling grid is recommended. The dredging areas for barging points at Hoi Sum Park (South) and Kai Tak Runway are 7,760m^2 (6,160m^2 + 1,600m^2) and 46,160m^2 respectively. Therefore, 4 and 19 evenly distributed sampling points in the dredging areas of Hoi sum Park (South) and Kai Tak Runway respectively, are proposed. The marine-based sediment samples will be collected at the top of the dredging layer (seabed) and then at 0.9m, 1.9m, 2.9m below the seabed, thereafter 3m depth intervals. The depth of sediment sampling shall be terminated at base of marine deposits or base of excavation (-5mPD), whichever is shallower.

Table 4.1 Marine sediment sampling plan

Location	Drillhole No.	Coordinate		Depth of marine sediment
		Easting	Northing	
Hoi Sham Park (South) (Fig. 4.1.1)	2209/SCL/HSP001	837846	819418	Base of marine deposits or base of excavation (-5mPD) whichever is shallower
	2209/SCL/HSP002	837873	819442	
	2209/SCL/HSP003	837910	819441	
	2209/SCL/HSP004	837927	819349	
Kai Tak Runway (Fig. 4.1.2)	2209/SCL/KT001	838508	819873	
	2209/SCL/KT002	838545	819839	
	2209/SCL/KT003	838581	819805	
	2209/SCL/KT004	838617	819770	
	2209/SCL/KT005	838653	819736	
	2209/SCL/KT006	838690	819702	
	2209/SCL/KT007	838726	819667	
	2209/SCL/KT008	838762	819633	
	2209/SCL/KT009	838474	819837	
	2209/SCL/KT010	838510	819803	
	2209/SCL/KT011	838551	819773	

Location	Drillhole No.	Coordinate		Depth of marine sediment
		Easting	Northing	
	2209/SCL/KT012	838588	819739	
	2209/SCL/KT013	838624	819705	
	2209/SCL/KT014	838641	819651	
	2209/SCL/KT015	838683	819657	
	2209/SCL/KT016	838721	819625	
	2209/SCL/KT017	838430	819796	
	2209/SCL/KT018	838471	819777	
	2209/SCL/KT019	838450	819737	

Land Base Sediment Sampling

The geological profile in **Appendix E** shows that only some sections contains marine deposit layer, drillholes are therefore proposed to carry out at those sections. The locations of the drillhole are selected with a view to obtain contaminant levels of land-based sediment, and identify disposal/ treatment scheme. The sampling pattern will satisfy the ETWB TC(W) No 34/2002 guidelines.

A total of 18 drillholes is proposed for sediment sampling and testing, along the alignment containing marine deposit layer at approximately 100m interval.

Table 4.2 Land sediment sampling plan

Drillhole Location	Drillhole No.	Coordinate		Depth of Marine Sediment (m bgl)
		Easting	Northing	
Hung Hom (Fig. 4.1.5)	2209/SCL/EDH120(P)	836804.80	818766.51	12-16
	2209/SCL/EDH179	836784.12	818703.37	12-16
	2209/SCL/EDH123	836780.97	817931.08	1-8
Kai Tak (Fig. 4.1.3 & Fig 4.1.4)	2209/SCL/EDH063	839018.01	821693.27	3-4
	2209/SCL/EDH064(P)	838951.63	821637.26	3-5
	2209/SCL/EDH066	838861.23	821523.76	5-7
	2209/SCL/EDH131	838775.82	821484.12	3-7
	2209/SCL/EDH069	838674.95	821367.07	6-9
	2209/SCL/EDH071	838615.47	821277.89	5-9
	2209/SCL/EDH135	838514.44	821160.13	6-11
	2209/SCL/EDH138	838475.66	821161.82	6-11
	2209/SCL/EDH171	838397.11	821056.15	6-10
	2209/SCL/EDH174	837808.00	820783.00	8-10
	2209/SCL/EDH173	837902.00	820832.00	8-11
	2209/SCL/EDH172	837998.00	820883.00	6-12
	2209/SCL/EDH137	838091.00	820934.00	6-12
	2209/SCL/EDH136	838185.52	820928.66	6-10
	2209/SCL/EDH075(P)	838283.58	821038.46	6-10

The land-based marine sediment samples will be collected at the top of the sediment layer and then at 0.9m, 1.9m, 2.9m and 3m depth intervals down to the base of the marine sediments. The depth of sediment sampling shall be terminated at base of marine deposits or base of excavation, whichever is shallower.

During borehole drilling, the contractor's resident SI specialists will be responsible for identifying and collecting any additional samples of marine sediments, based on changes in soil characteristics, visual appearance etc.

Sediment quality will be assessed through laboratory analyses of sediment samples for the chemical and/or biological parameters. Reference Sediment Sample will be used as a control sample for comparison, collected by grab sampler at Port Shelter (E850234, N820057).

Chemical tests to be carried out with their accepted methodologies and reporting limit are given in **Table 4.3**.

All sediment samples will be stored at 4^{o}C during transportation and at the laboratory prior to testing. The sampling bottle and pre-treatment methods will follow the recommendation stipulated in ETWB TC(W) No. 34/2002 Management of Dredged/ Excavated Sediment. Sediment samples will be extracted in the laboratory and placed in the appropriate containers immediately after sampling. All samples will be double-bagged and labelled internally and external with indelible ink.

Samples will be extracted and analysed within 2 weeks to ensure a Tier III biological testing programme (where required) can be developed and commenced within 8 weeks from the date of sampling.

The sub-samples for biological testing will be stored in the same manner as described above (including for ancillary parameters). The composite samples for biological testing (where required) will comprise of composite samples prepared from up to 5 sub-samples of the same category (i.e. sediment classified under the ETWB TC(W) No. 34/2002 as Category M or H), which are continuous in vertical or horizontal profile. Should biological screening tests be required, they should be conducted in accordance with the testing requirements shown in **Table 3.2.**

Table 4.3: Chemical screening parameters for sediment quality

Parameters	Instrumentation	Analytical Method	Reporting Limit
Cadmium (Cd)	ICP-MS	USEPA 6020A	0.2 mg/kg
Chromium (Cr)	ICP-MS	USEPA 6020A	1 mg/kg
Copper (Cu)	ICP-MS	USEPA 6020A	1 mg/kg
Mercury (Hg)	ICP-MS	USEPA 6020A	0.05 mg/kg
Nickel (Ni)	ICP-MS	USEPA 6020A	1 mg/kg
Lead (Pb)	ICP-MS	USEPA 6020A	1 mg/kg
Silver (Ag)	ICP-MS	USEPA 6020A	0.1 mg/kg
Zinc (Zn)	ICP-MS	USEPA 6020A	1 mg/kg
Arsenic (As)	ICP-MS	USEPA 6020A	1 mg/kg
PAHs (Low MW)	GC-MSD	USEPA 8270C	550 µg/kg
PAHs (High MW)	GC-MSD	USEPA 8270C	1700 µg/kg
Total PCBs	GC-MSD	USEPA 8082	2 µg/kg
Tributyltin* (TBT)	GC-MSD	UNEP/IOC/IAEA	0.005 µg/L

* in pore water

4.4 QA / QC Requirements

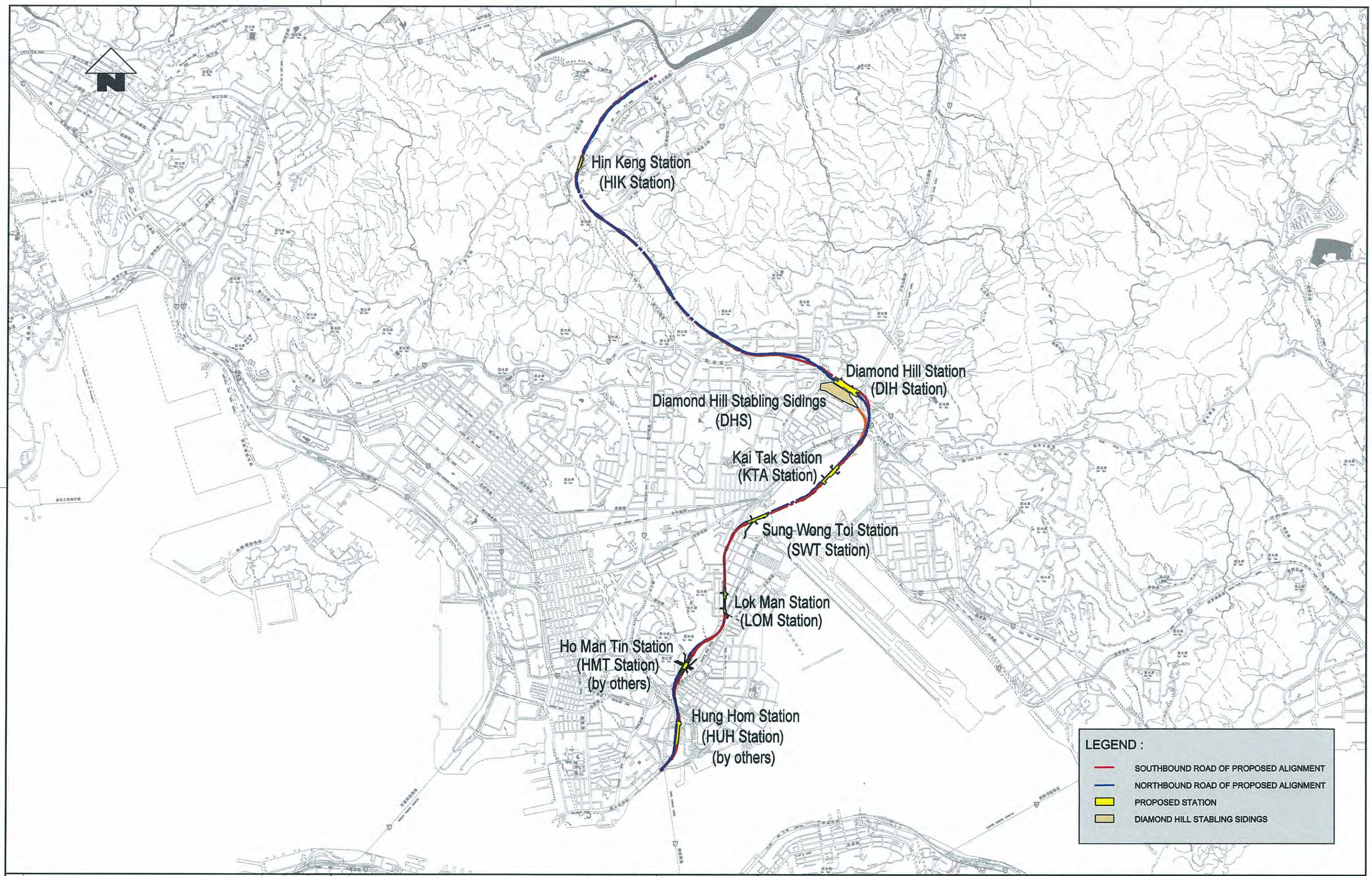
Field logs and site diary will be maintained for all on-site sampling works with date, equipment used, site activities and observations, undertaken as far as possible. Any deviation from the standard procedures and reasons will be recorded in the logs.

Laboratory QA/QC requirements, including analyses by HOKLAS accredited laboratory, certified reference materials, spike recovery, blank samples, duplicate samples (for every 20 samples), negative/positive control for biological test, etc. will be strictly complied.

4.5 Sediment Quality Report

Once the chemical and biological testing results are available, a Sediment Quality Report would be prepared to summarise all the findings for submission to EPD and other government departments for comments.

Figures



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TITLE
NEX/2206 - TAW TO HUH SECTION
Proposed Alignment

SCALE 1 : 40000 (A3)

DRAWING NO. Figure 1.1

REV. C

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Storage Area at Shek Mun

Magazine Site at Shui Chuen O

Barging Facility at Nam Cheong

Barging Facility at Kai Tak Runway

Barging Facility at Hoi Sham Park (South)

Barging Facility at Finger Pier

Magazine Site at TKO 137

LEGEND :

- STORAGE AREA
- BARGING FACILITIES
- MAGAZINE SITE

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TITLE

NEX/2206 - TAW TO HUH SECTION
Locations of Off-Site Works Areas

SCALE 1 : 60000 (A3)

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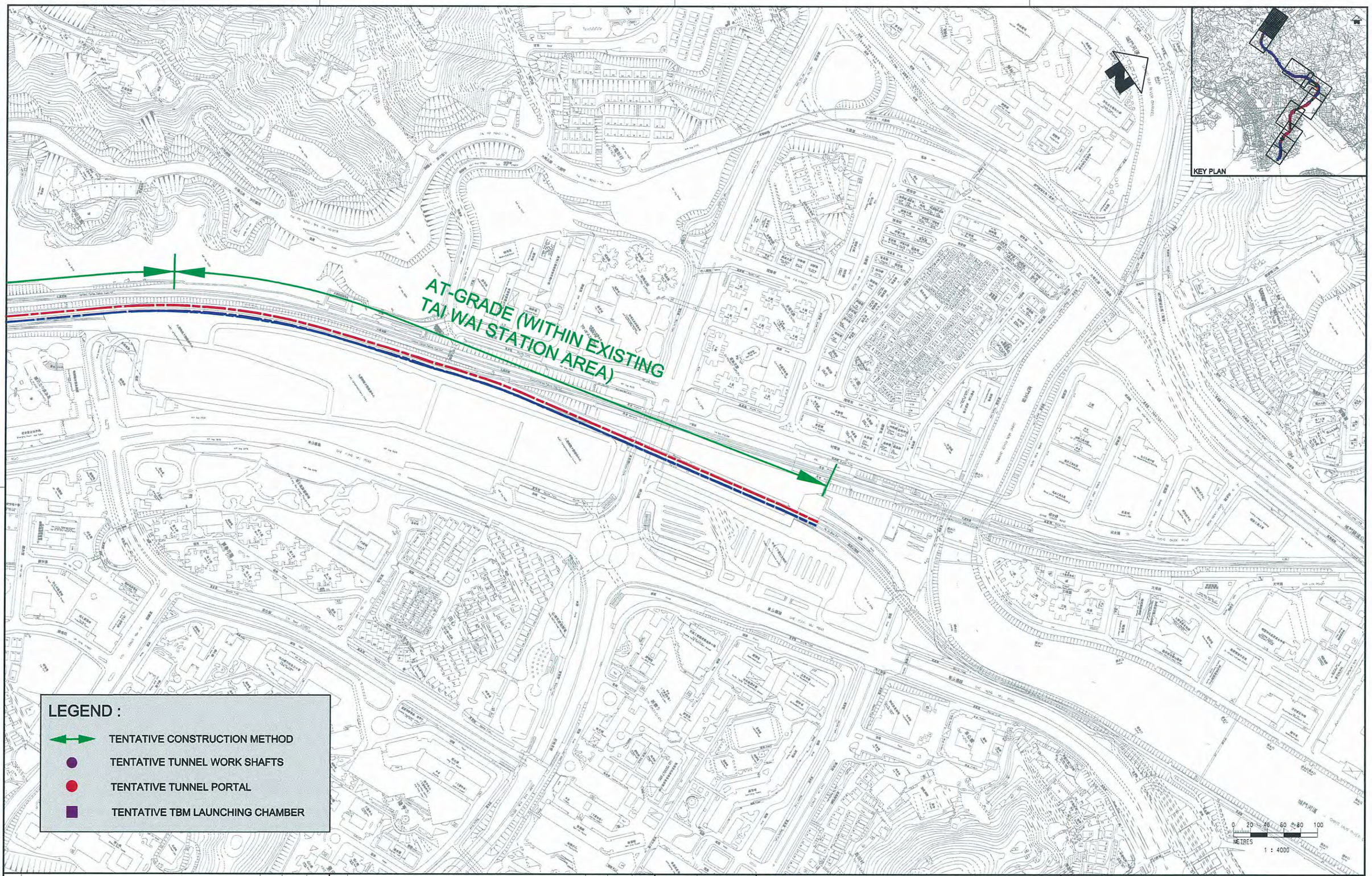

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TITLE
NEX 2206 – TAW TO HUH SECTION
Construction Methodologies (Sheet 1 of 8)

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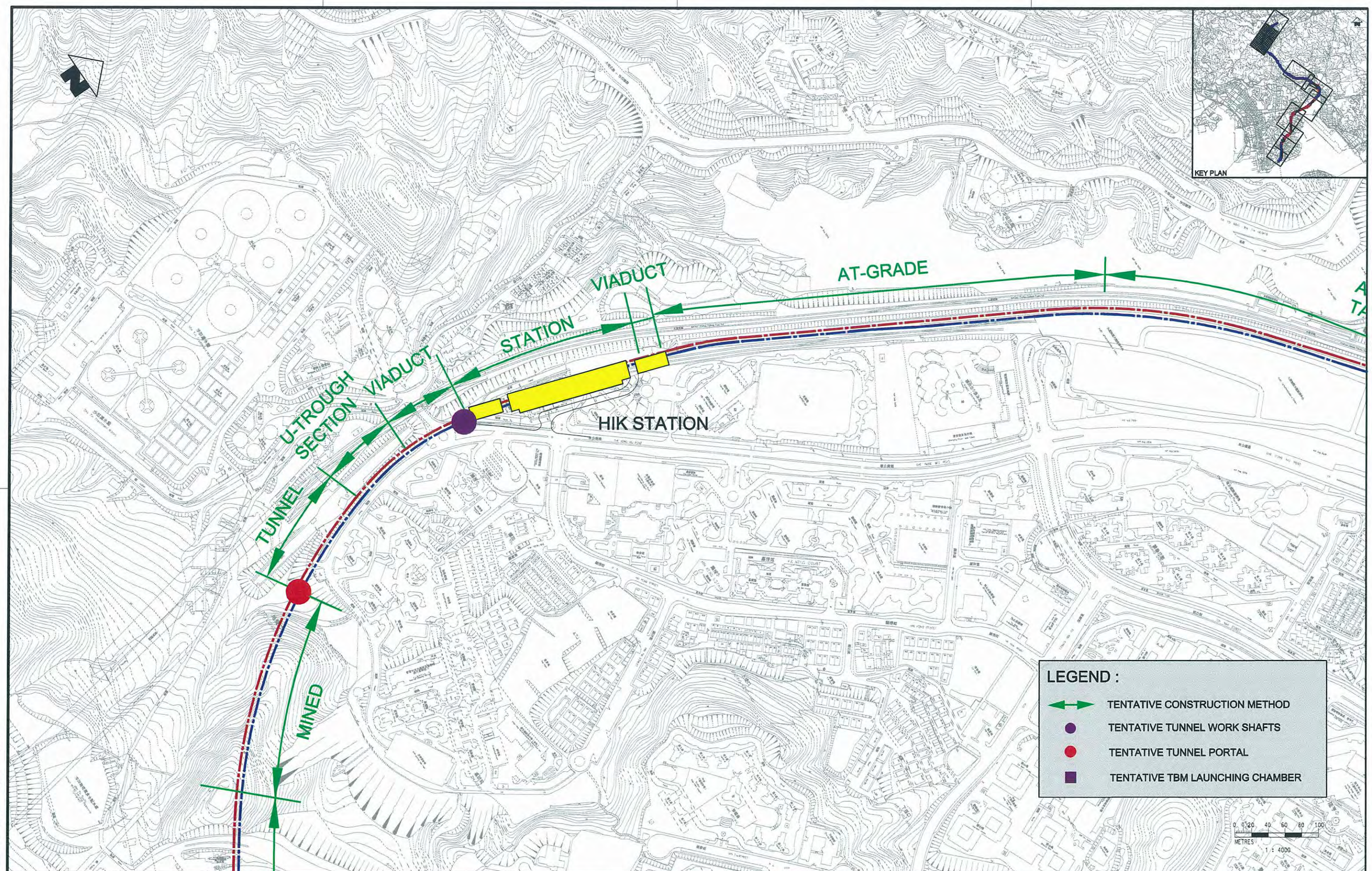
REV. C



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NEX 2206 – TAW TO HUH SECTION
Construction Methodologies (Sheet 2 of 8)

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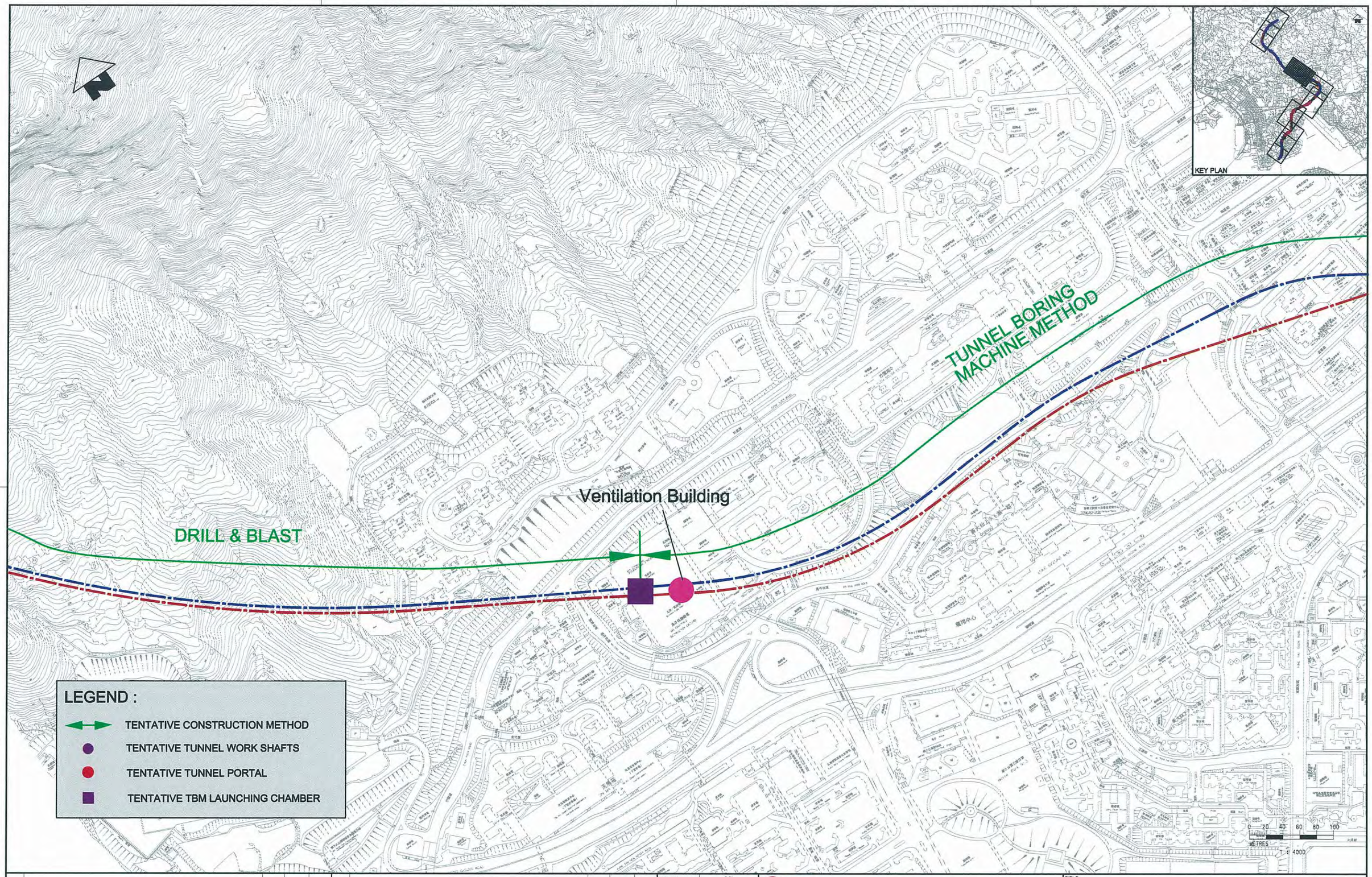

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NEX 2206 – TAW TO HUH SECTION
Construction Methodologies (Sheet 3 of 8)

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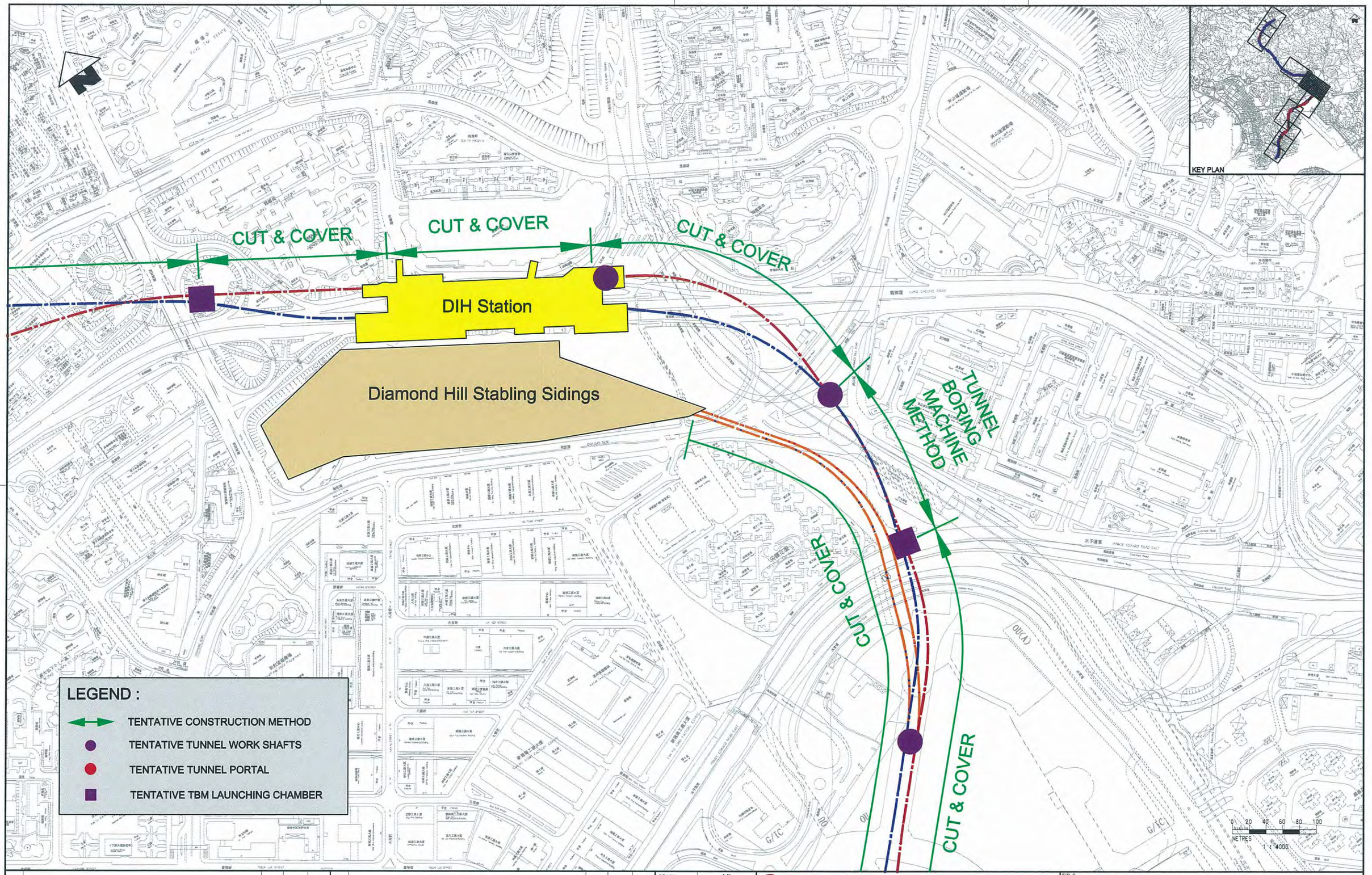

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Construction Methodologies (Sheet 4 of 8)

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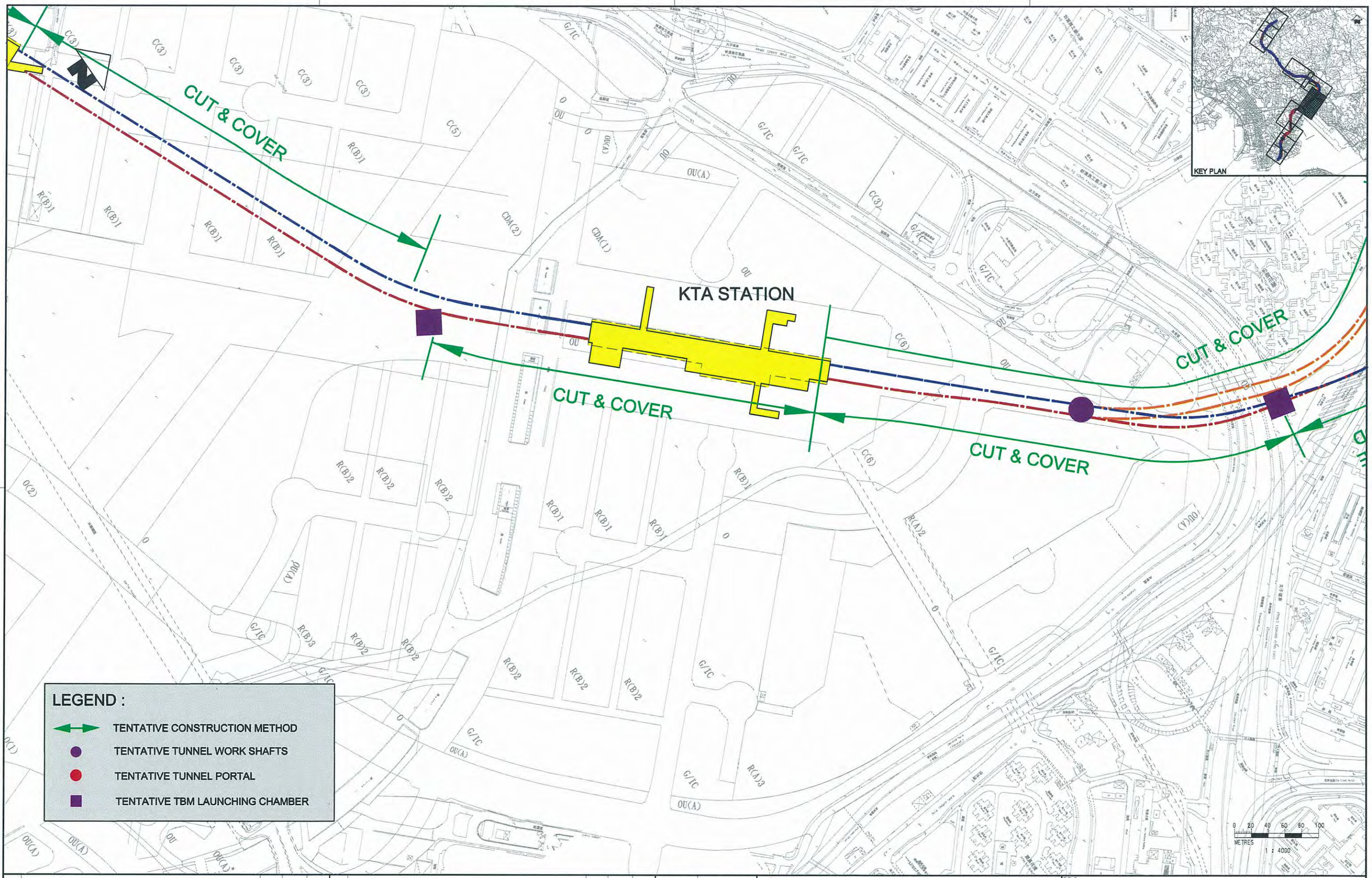

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- TENTATIVE TUNNEL WORK SHAFTS
- TENTATIVE TUNNEL PORTAL
- TENTATIVE TBM LAUNCHING CHAMBER

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Construction Methodologies (Sheet 5 of 8)

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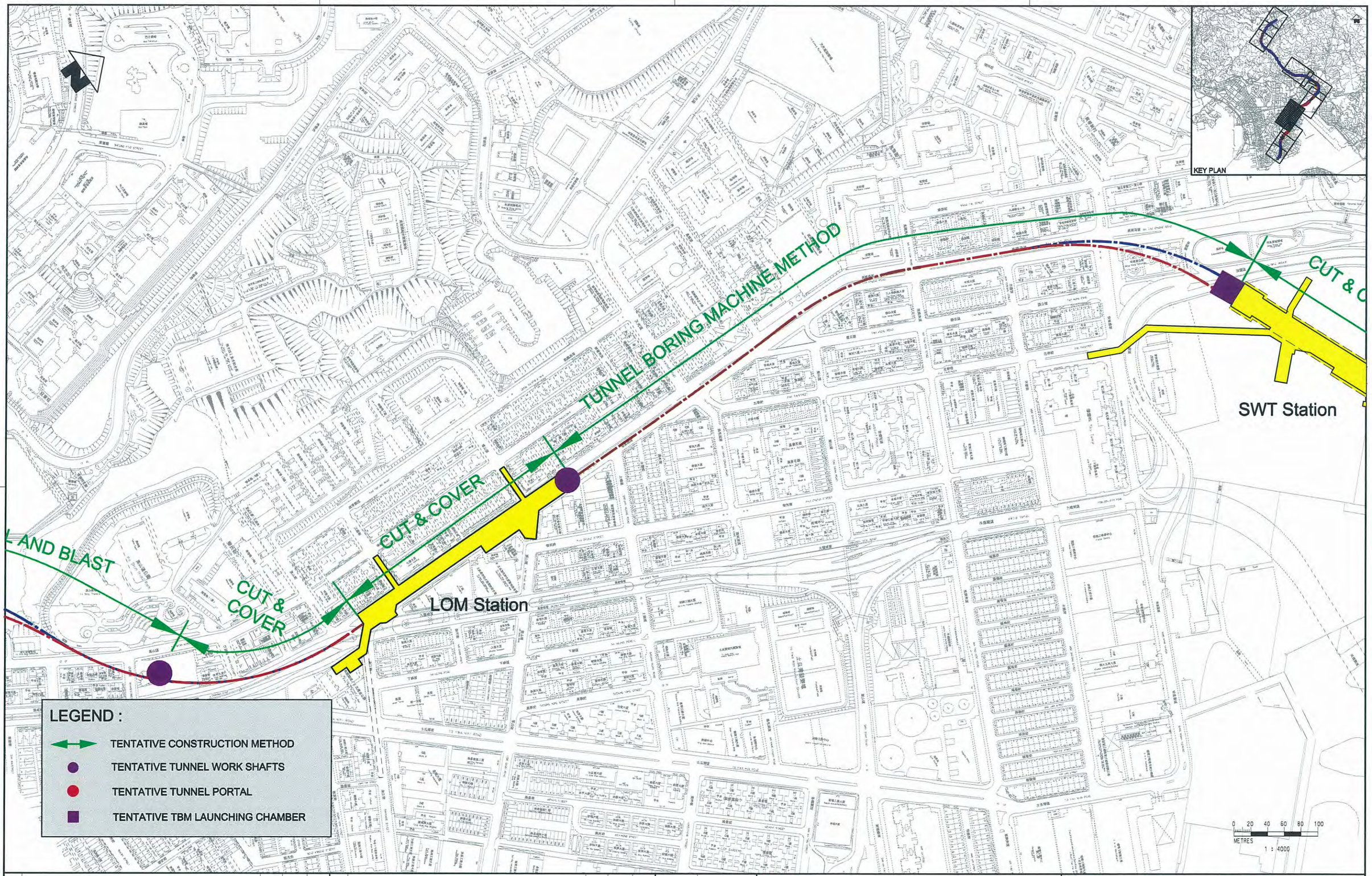

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Construction Methodologies (Sheet 6 of 8)

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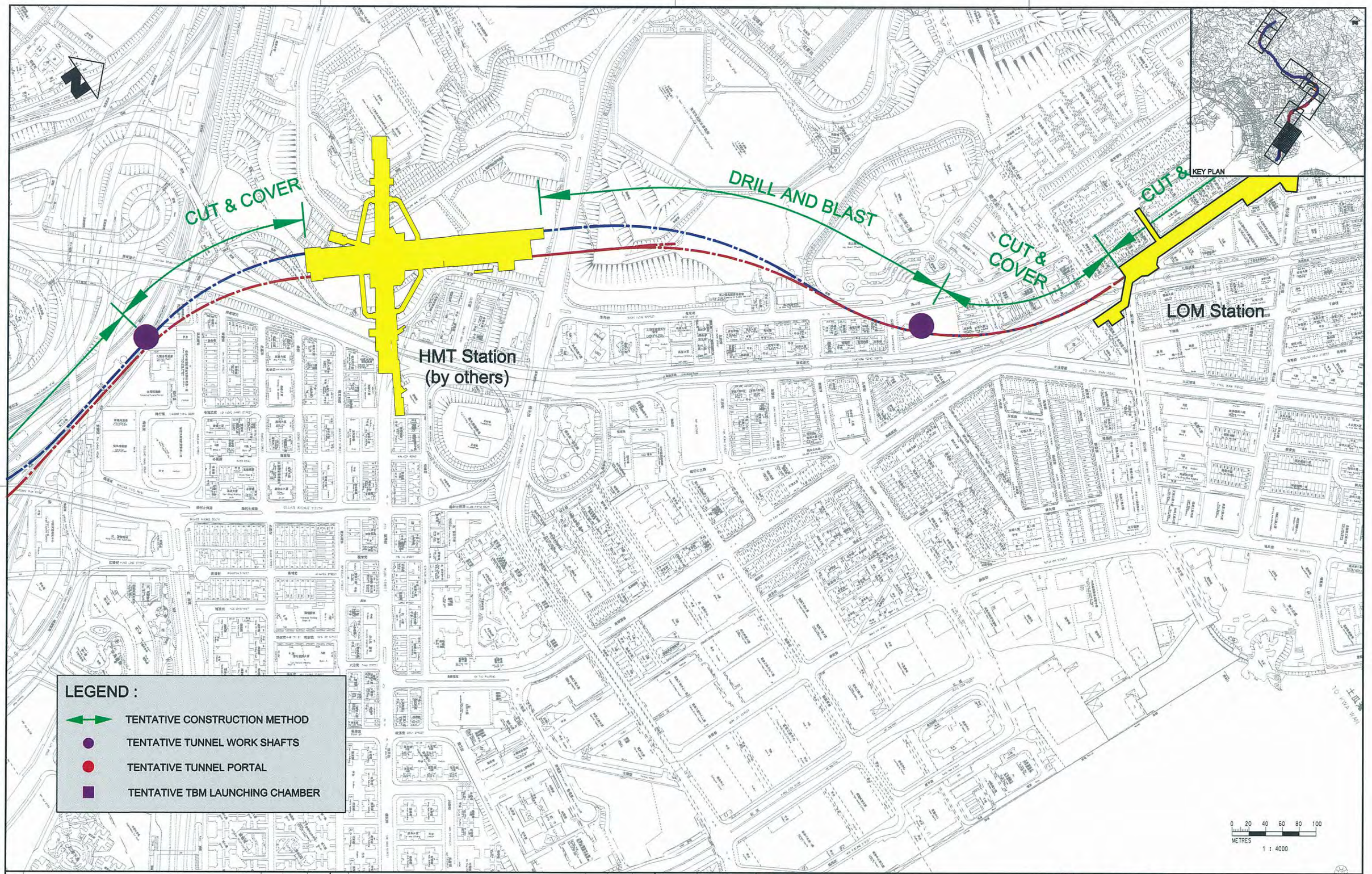

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NEX 2206 - TAW TO HUH SECTION
Construction Methodologies (Sheet 7 of 8)

SCALE	DRAWING NO.	REV.
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KEY PLAN

CUT & COVER

HMT Station
(by others)

AT-GRADE (WITHIN EXISTING HUNG HOM STATION AREA)

HUH Station
(by others)

LEGEND :

- TENTATIVE CONSTRUCTION METHOD
- TENTATIVE TUNNEL WORK SHAFTS
- TENTATIVE TUNNEL PORTAL
- TENTATIVE TBM LAUNCHING CHAMBER

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NEX 2206 - TAW TO HUH SECTION
Construction Methodologies (Sheet 8 of 8)

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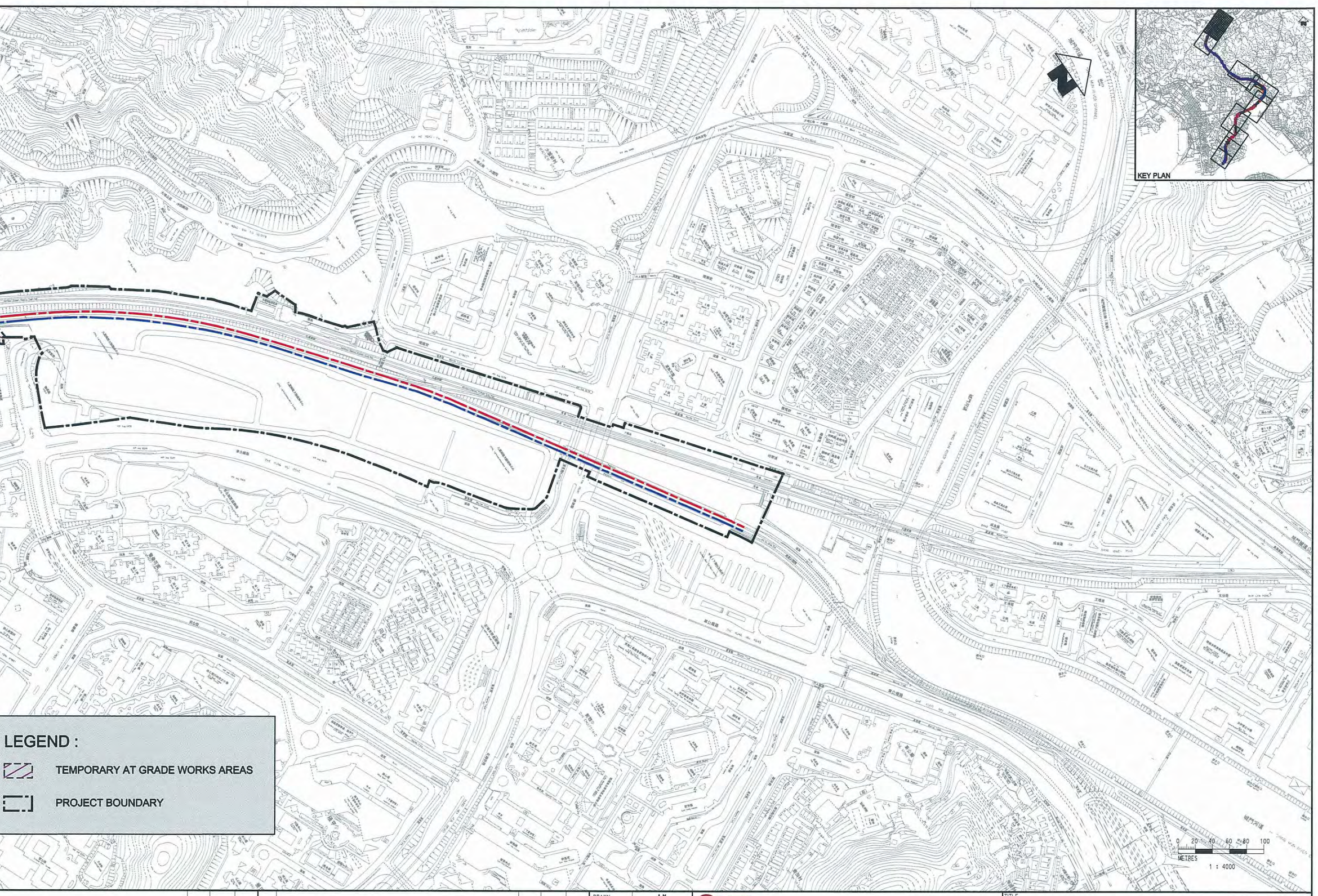

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TITLE
NEX 2206 - TAW TO HUH SECTION
Temporary at grade works areas
(Sheet 1 of 8)

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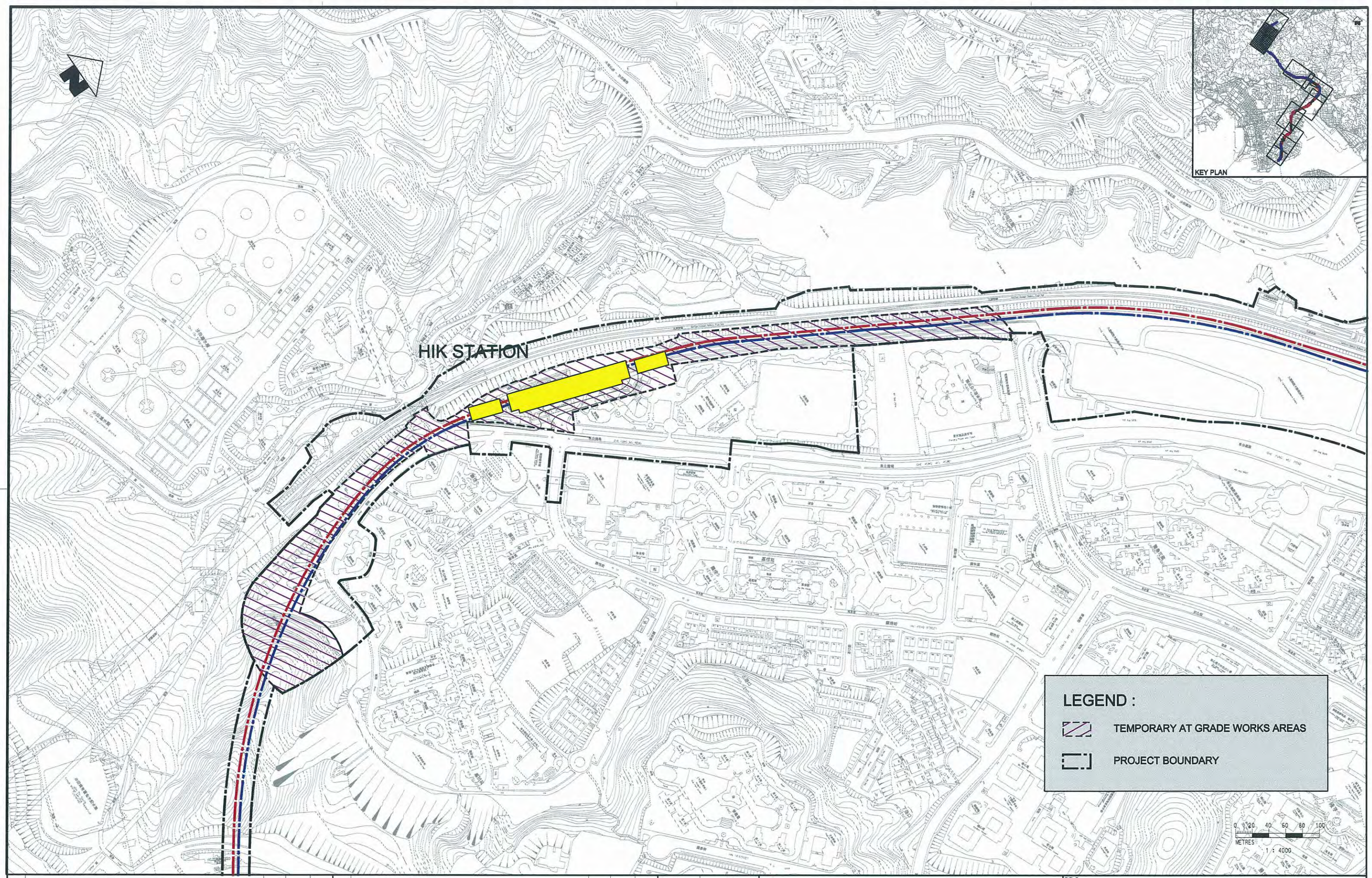

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TITLE
NEX 2206 - TAW TO HUH SECTION
Temporary at grade works areas
(Sheet 2 of 8)

SCALE	DRAWING NO.	REV.
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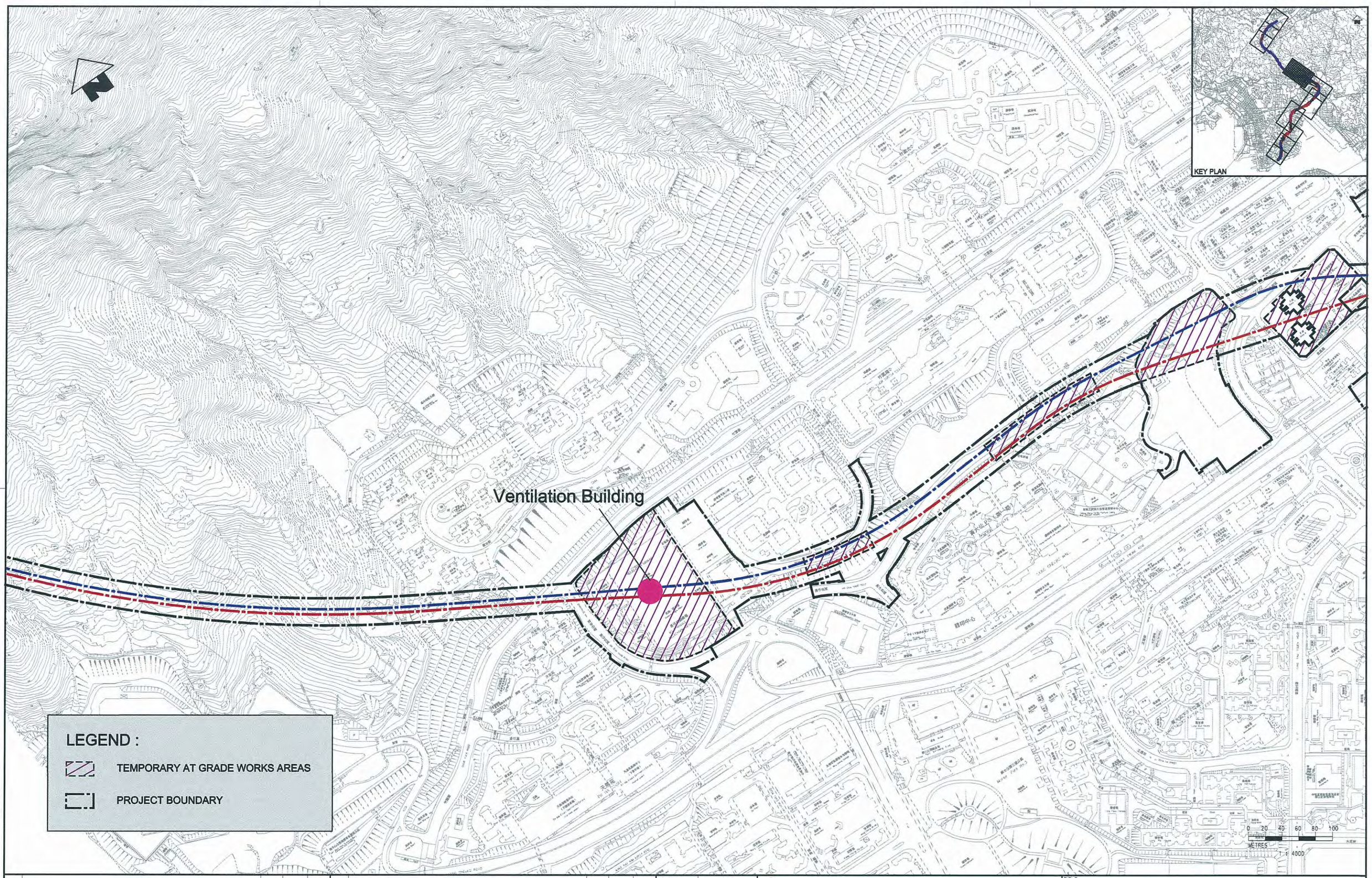

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TITLE
NEX 2206 - TAW TO HUH SECTION
Temporary at grade works areas
(Sheet 3 of 8)

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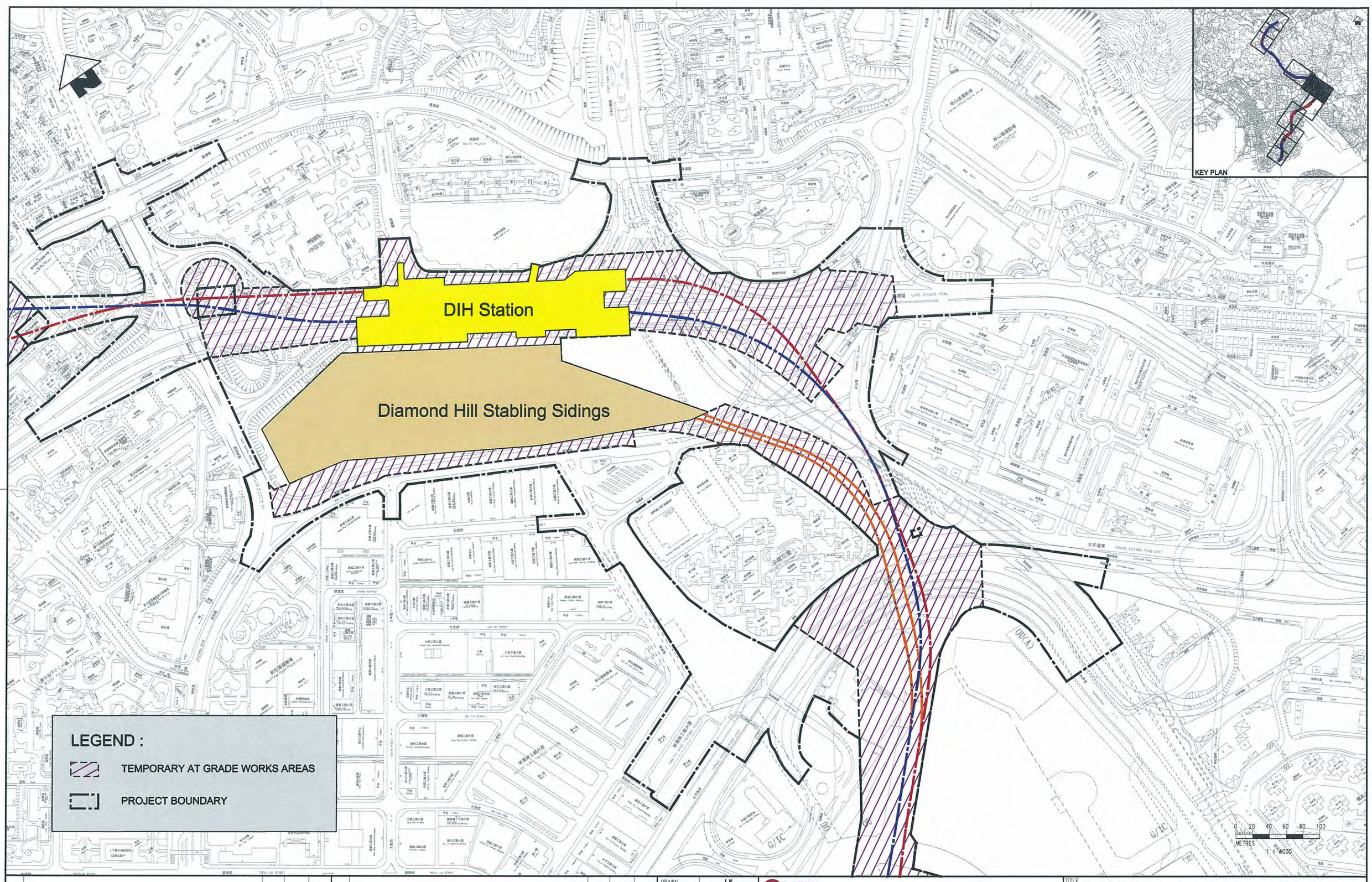

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MODEL NAME:
FILENAME:
$PLTDRVL$
$MODEL$
$FILE$

PRINTED BY: $USER$ $DATE$ $TIME$

REV	DESCRIPTION	BY	DATE	APPROVED
C	THIRD ISSUE	LK	06/09	FC
B	SECOND ISSUE	LK	02/09	FC
A	FIRST ISSUE	LK	12/08	FC

DRAWN	LK
DESIGNED	LK
CHECKED	SC
APPROVED	FC
DATE	13/JUN/2009

MTR

SHATIN TO CENTRAL LINK

ORIGINATOR
ARUP Ove Arup & Partners Hong Kong Limited

CADD REF. NEX2206_C_SCL_DAP_ENV_005C

TITLE
NEX 2206 – TAW TO HUH SECTION
Temporary at grade works areas
(Sheet 4 of 8)

SCALE 1 : 4000 (A3)

DRAWING NO. Figure 2.2.4

REV. C

KTA STATION

KEY PLAN

LEGEND :

TEMPORARY AT GRADE WORKS AREAS

PROJECT BOUNDARY

0 20 40 60 80 100
METRES
1 : 4000

REV	DESCRIPTION	BY	DATE	APPROVED
C	THIRD ISSUE	LK	06/09	FC
B	SECOND ISSUE	LK	04/09	FC
A	FIRST ISSUE	LK	12/08	FC

DRAWN	LK
DESIGNED	LK
CHECKED	SC
APPROVED	FC
DATE	13/JUN/2009

MTR

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ORIGINATOR

ARUP Ove Arup & Partners Hong Kong Limited

CADD REF. NEX2206_C_SCL_OAP_ENV_006C

TITLE

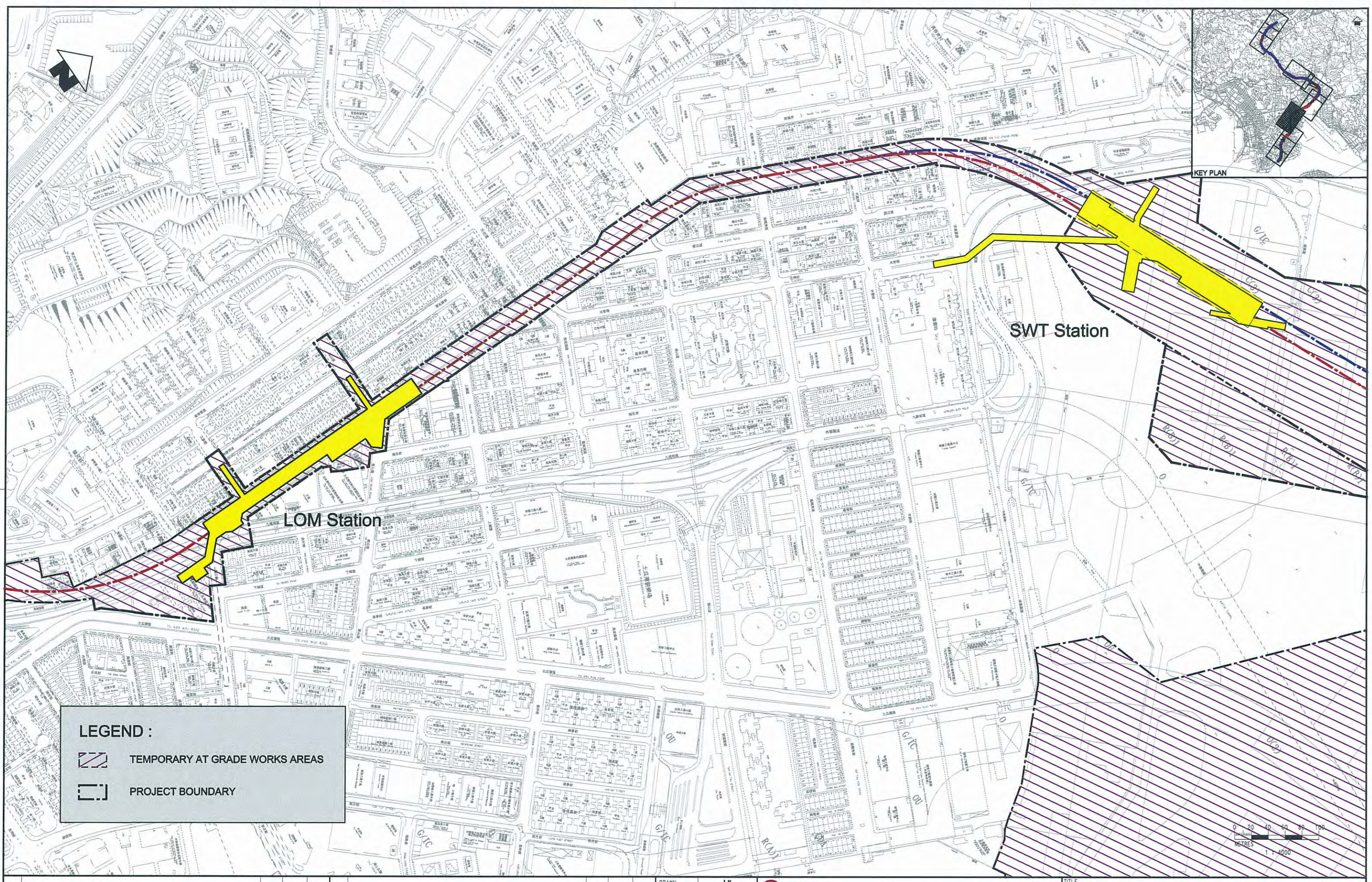
NEX 2206 – TAW TO HUH SECTION
Temporary at grade works areas
(Sheet 5 of 8)

SCALE 1 : 4000 (A3)

DRAWING NO. FIGURE 2.2.5

REV. C

PLOT DRV: $PLTDRV$
MODEL NAME: $MODEL$
FILENAME: $FILE$
PRINTED BY: $USER$ $DATE$ $TIME$



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MODELNAME: $MODEL$
FILENAME: $FILE$
PRINTED BY: $USER$ $DATE$ $TIME$

REV	DESCRIPTION	BY	DATE	APPROVED
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B	SECOND ISSUE	LK	04/09	FC
A	FIRST ISSUE	LK	12/08	FC

DRAWN	LK
DESIGNED	LK
CHECKED	SC
APPROVED	FC
DATE	13/JUN/2009

DO NOT SCALE DRAWINGS. ALL DIMENSIONS SHALL BE VERIFIED ON SITE.

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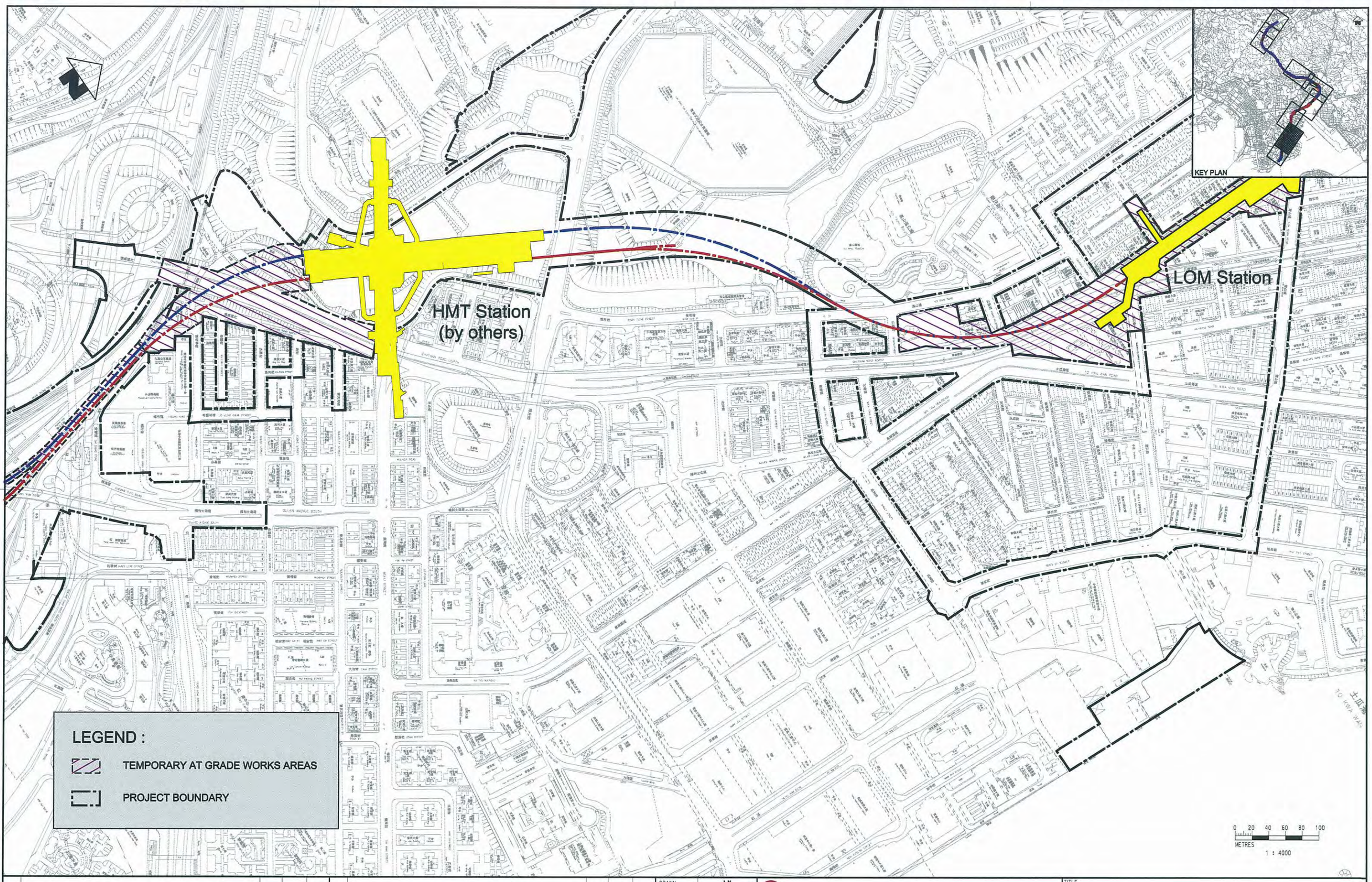
TITLE
NEX 2206 – TAW TO HUH SECTION
Temporary at grade works areas
(Sheet 6 of 8)

SCALE	DRAWING NO.	REV.
1 : 4000 (A3)	Figure 2.2.6	C



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MODEL NAME: $MODEL$
FILENAME: $FILE$
PRINTED BY: $USER$ $DATE$ $TIME$

REV	DESCRIPTION	BY	DATE	APPROVED
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B	SECOND ISSUE	LK	04/09	FC
A	FIRST ISSUE	LK	12/08	FC

DRAWN	LK
DESIGNED	LK
CHECKED	SC
APPROVED	FC
DATE	13/JUN/2009

MTR

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ORIGINATOR
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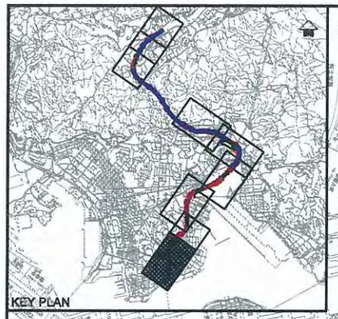
CADD REF. NEX2206_C_SCL_DAP_ENV_008C

TITLE
NEX 2206 - TAW TO HUH SECTION
Temporary at grade works areas
(Sheet 7 of 8)

SCALE 1 : 4000 (A3)

DRAWING NO. Figure 2.2.7

REV. C



HMT Station
(by others)

Extent of Deck
for HUH Station

HUH Station
(by others)

LEGEND :

TEMPORARY AT GRADE WORKS AREAS

PROJECT BOUNDARY

0 20 40 60 80 100
METRES
1 : 4000

PLOT DRV: $PLTDRVL$
MODEL NAME: $MODEL$
FILENAME: $FILE$
PRINTED BY: $USER$ $DATE$ $TIME$

REV	DESCRIPTION	BY	DATE	APPROVED
C	THIRD ISSUE	LK	06/09	FC
B	SECOND ISSUE	LK	04/09	FC
A	FIRST ISSUE	LK	03/09	FC

DRAWN	LK
DESIGNED	LK
CHECKED	SC
APPROVED	FC
DATE	13/JUN/2009

MTR

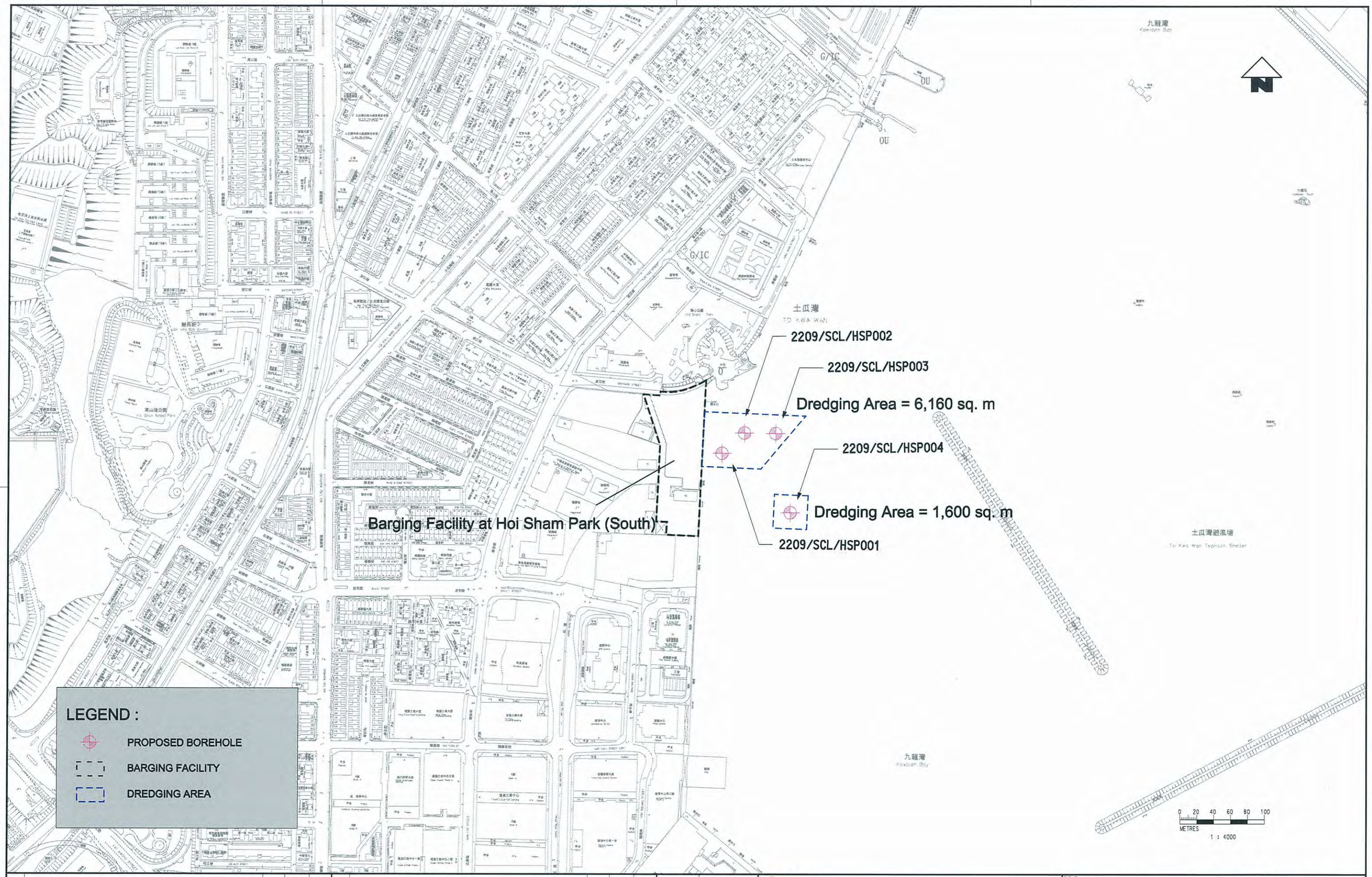
SHATIN TO CENTRAL LINK

ORIGINATOR
ARUP Ove Arup & Partners Hong Kong Limited

CADD REF. NEX2206_C_SCL_OAP_ENV_009C

TITLE
NEX 2206 - TAW TO HUH SECTION
Temporary at grade works areas
(Sheet 8 of 8)

SCALE	DRAWING NO.	REV.
1 : 4000 (A3)	Figure 2.2.8	C



PLOT DRV: $PLTDRVL$
MODEL NAME: $MODEL$
FILENAME: $FILE$
PRINTED BY: $USER$ $DATE$ $TIME$

REV	DESCRIPTION	BY	DATE	APPROVED
A	FIRST ISSUE			

DRAWN	LK
DESIGNED	LK
CHECKED	SC
APPROVED	FC
DATE	27/APR/2009

MTR

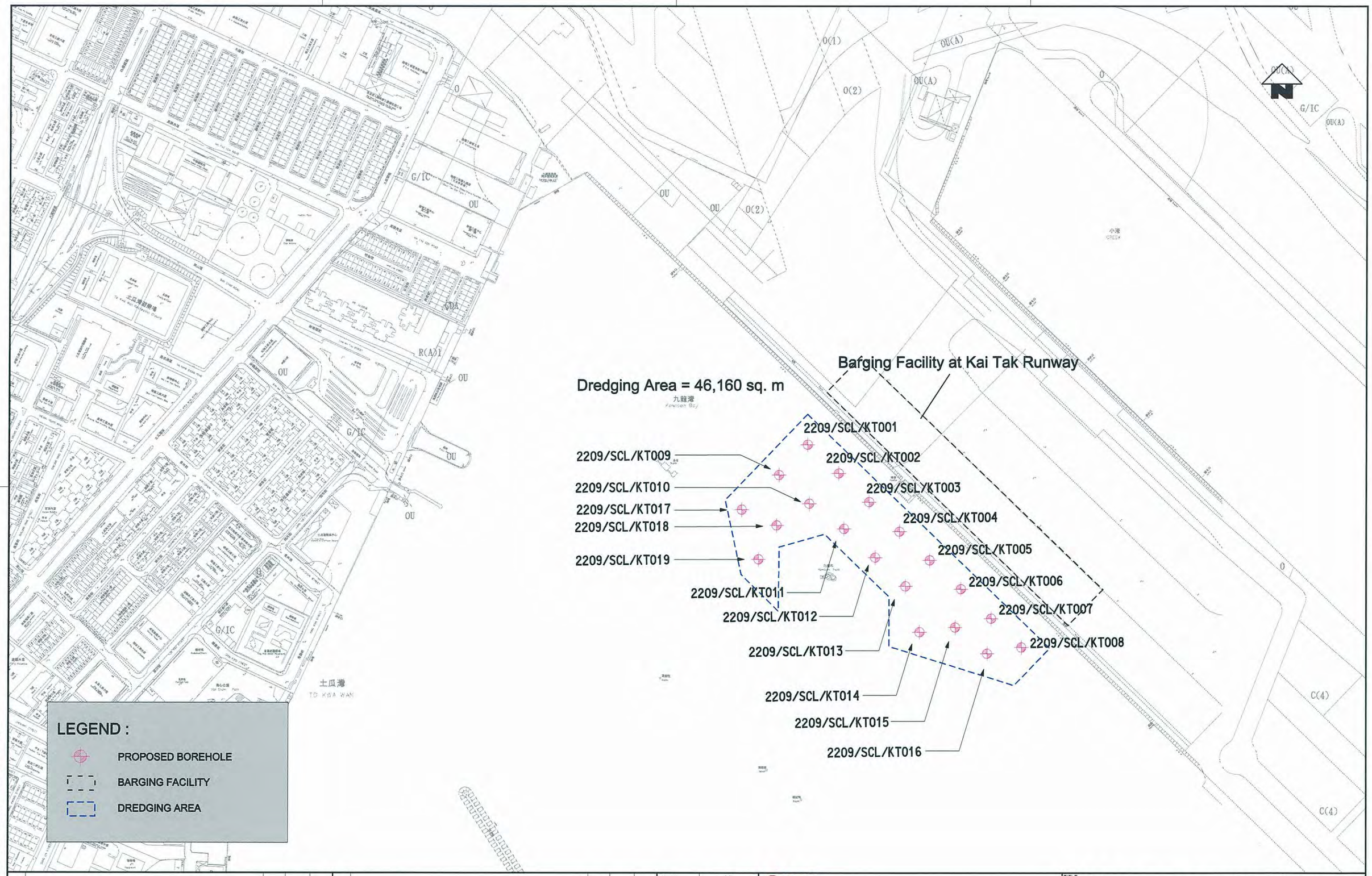
SHATIN TO CENTRAL LINK

ORIGINATOR
ARUP Ove Arup & Partners Hong Kong Limited

CADD REF. NEX2206_C_SCL_OAP_ENV_012A

TITLE
NEX 2206 - TAW TO HUH SECTION
Marine Base Sediment Sampling Locations
(Sheet 1 of 2)

SCALE	DRAWING NO.	REV.
1 : 4000 (A3)	FIGURE 4.1.1	A



REV	DESCRIPTION	BY	DATE	APPROVED
A	FIRST ISSUE			

DRAWN	LK
DESIGNED	LK
CHECKED	SC
APPROVED	FC
DATE	27/APR/2009

MTR

SHATIN TO CENTRAL LINK

ORIGINATOR

ARUP Ove Arup & Partners Hong Kong Limited

CADD REF. NEX2206_C_SCL_OAP_ENV_013A

TITLE

NEX 2206 – TAW TO HUH SECTION
Marine Base Sediment Sampling Locations
(Sheet 2 of 2)

SCALE	DRAWING NO.	REV.
1 : 4000 (A3)	FIGURE 4.1.2	A

PLOT DRV: $PLTDRVL$
MODELNAME: $MODEL$
FILENAME: $FILE$
PRINTED BY: $USER$ $DATE$ $TIME$

2209/SCL/EDH173
2209/SCL/EDH172
2209/SCL/EDH137
2209/SCL/EDH136
2209/SCL/EDH075(P)
2209/SCL/EDH171
2209/SCL/EDH135
2209/SCL/EDH069
2209/SCL/EDH064(P)
2209/SCL/EDH131
KTA STATION
2209/SCL/EDH138
2209/SCL/EDH071
2209/SCL/EDH063
2209/SCL/EDH066

KEY PLAN

LEGEND :

- PROPOSED BOREHOLE
- TEMPORARY AT GRADE WORKS AREAS

0 20 40 60 80 100
METRES
1 : 4000

PLOT DRV: $PLTDRV$
MODELNAME: $MODEL$
FILENAME: $FILE$
PRINTED BY: $USER$ $DATE$ $TIME$

REV	DESCRIPTION	BY	DATE	APPROVED
	SECOND ISSUE	LK	04/09	FC
A	FIRST ISSUE	LK	12/08	FC

DRAWN	LK
DESIGNED	LK
CHECKED	SC
APPROVED	FC
DATE	19/APR/2009

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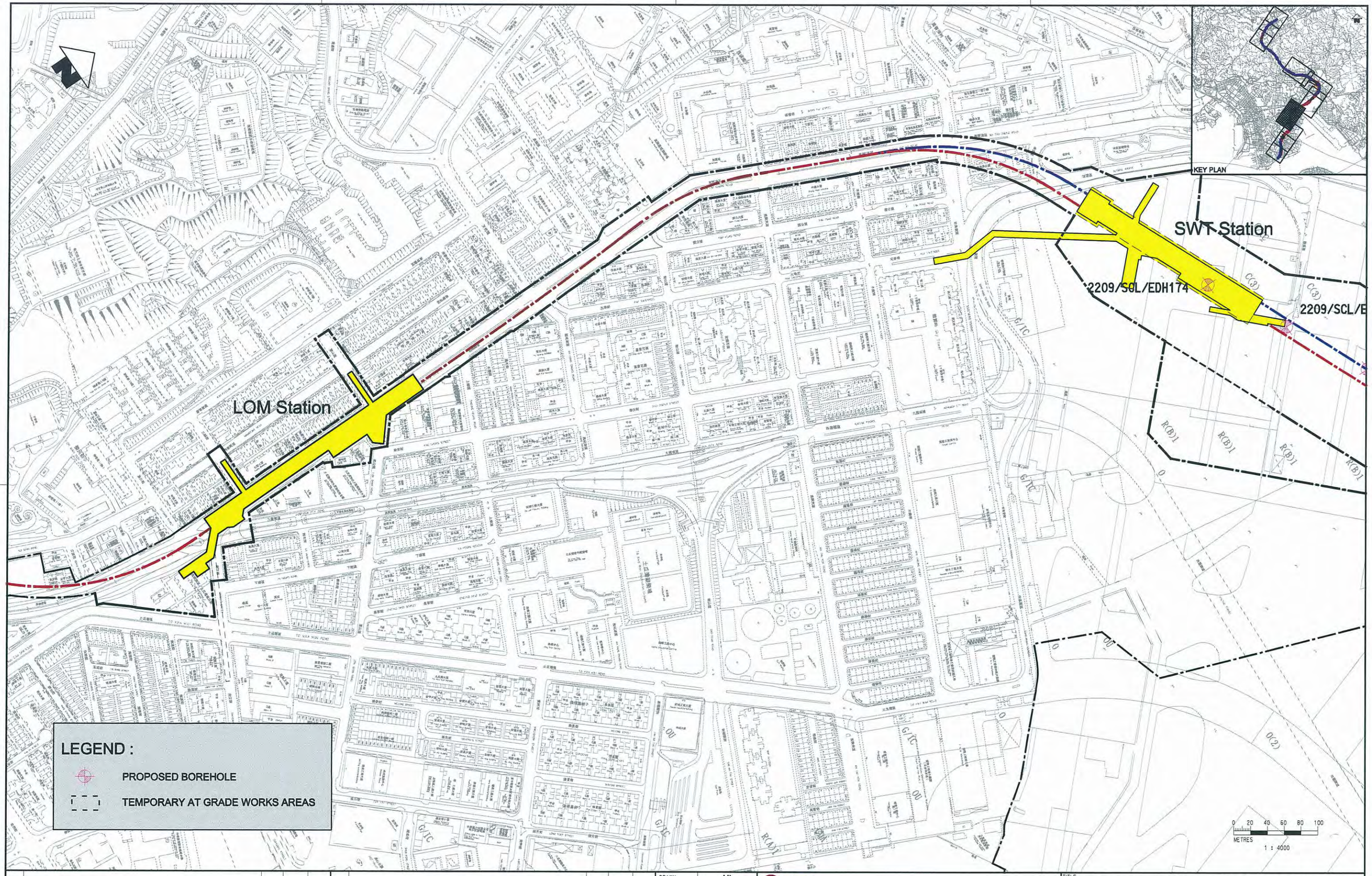
ORIGINATOR
ARUP Ove Arup & Partners Hong Kong Limited

CADD REF. NEX2206_C_SCL_OAP_ENV_006C

TITLE
NEX 2206 – TAW TO HUH SECTION
Land Base Sediment Sampling Locations
(Sheet 1 of 3)

SCALE 1 : 4000 (A3)
DRAWING NO. FIGURE 4.1.3
REV. B



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REV	DESCRIPTION	BY	DATE	APPROVED

REV	DESCRIPTION	BY	DATE	APPROVED
	THIRD ISSUE	LK	06/09	FC
	SECOND ISSUE	LK	04/09	FC
A	FIRST ISSUE	LK	12/08	FC

DRAWN	LK
DESIGNED	LK
CHECKED	SC
APPROVED	FC
DATE	13/JUN/2009

MTR

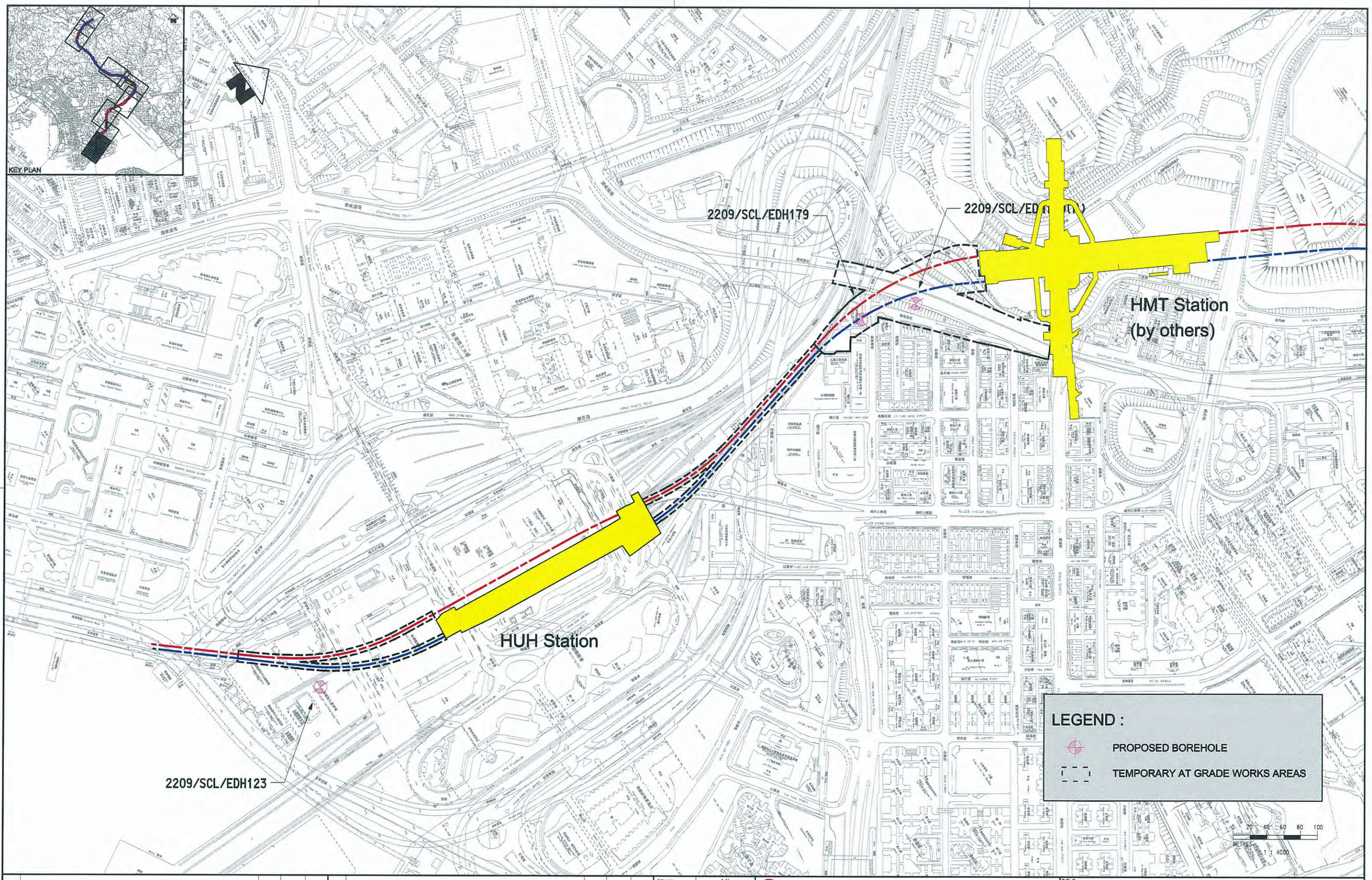
SHATIN TO CENTRAL LINK

ORIGINATOR
ARUP Ove Arup & Partners Hong Kong Limited

CADD REF. NEX2206_C_SCL_OAP_ENV_007D

TITLE
NEX 2206 - TAW TO HUH SECTION
Land Base Sediment Sampling Locations
(Sheet 2 of 3)

SCALE	DRAWING NO.	REV.
1 : 4000 (A3)	Figure 4.1.4	C



REV	DESCRIPTION	BY	DATE	APPROVED
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A	FIRST ISSUE	LK	03/09	FC

DRAWN	LK
DESIGNED	LK
CHECKED	SC
APPROVED	FC
DATE	27/APR/2009

MTR

SHATIN TO CENTRAL LINK

ORIGINATOR

ARUP Ove Arup & Partners Hong Kong Limited

CADD REF. NEX2206_C_SCL_OAP_ENV_009C

TITLE

NEX 2206 – TAW TO HUH SECTION
Land Base Sediment Sampling Locations
(Sheet 3 of 3)

SCALE 1 : 4000 (A3)

DRAWING NO. FIGURE 4.1.5

REV. B

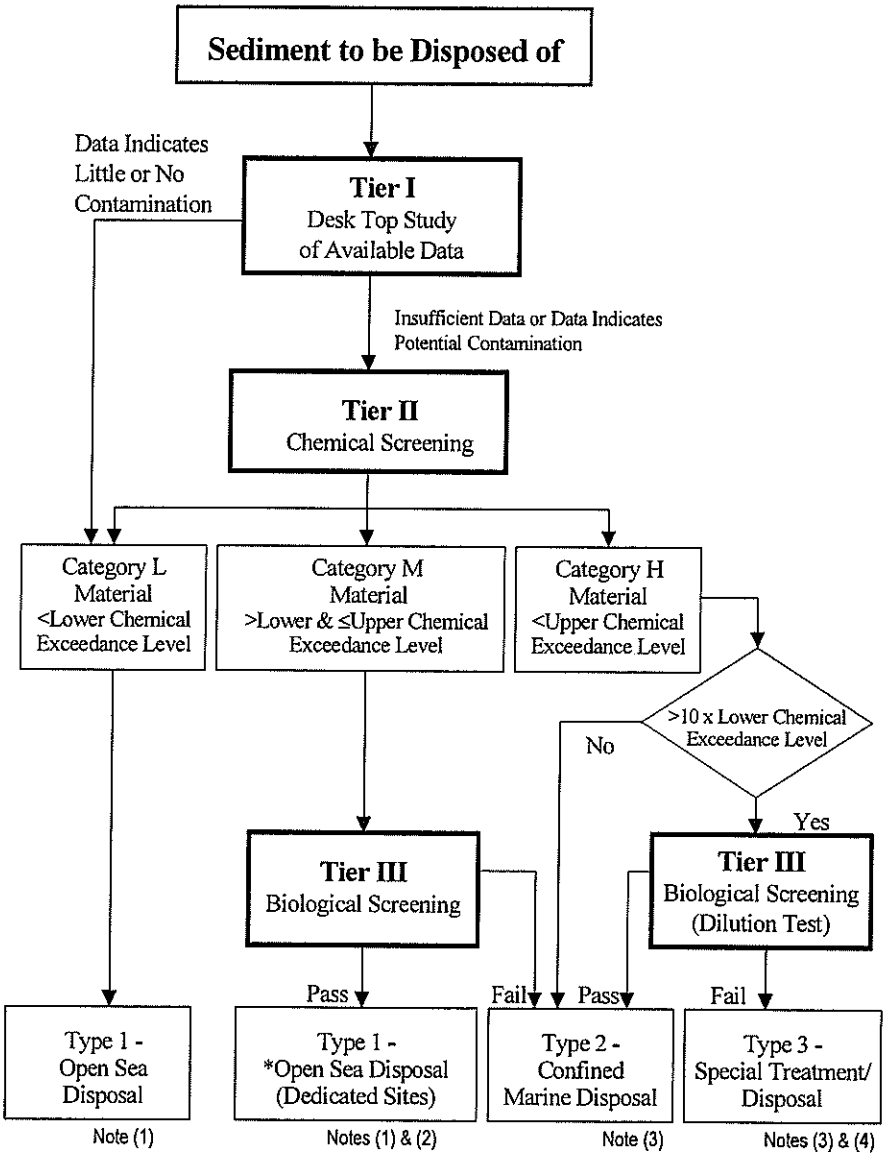
PLOT DRV: $PLTDRV$
MODEL NAME: $MODEL$
FILENAME: $FILE$
PRINTED BY: $USER$ $DATE$ $TIME$

Appendices

APPENDIX A

Management Framework of Dredged/Excavated Sediment in Hong Kong

Appendix A: Management Framework of Dredged/Excavated Sediment in Hong Kong



Notes

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

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

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

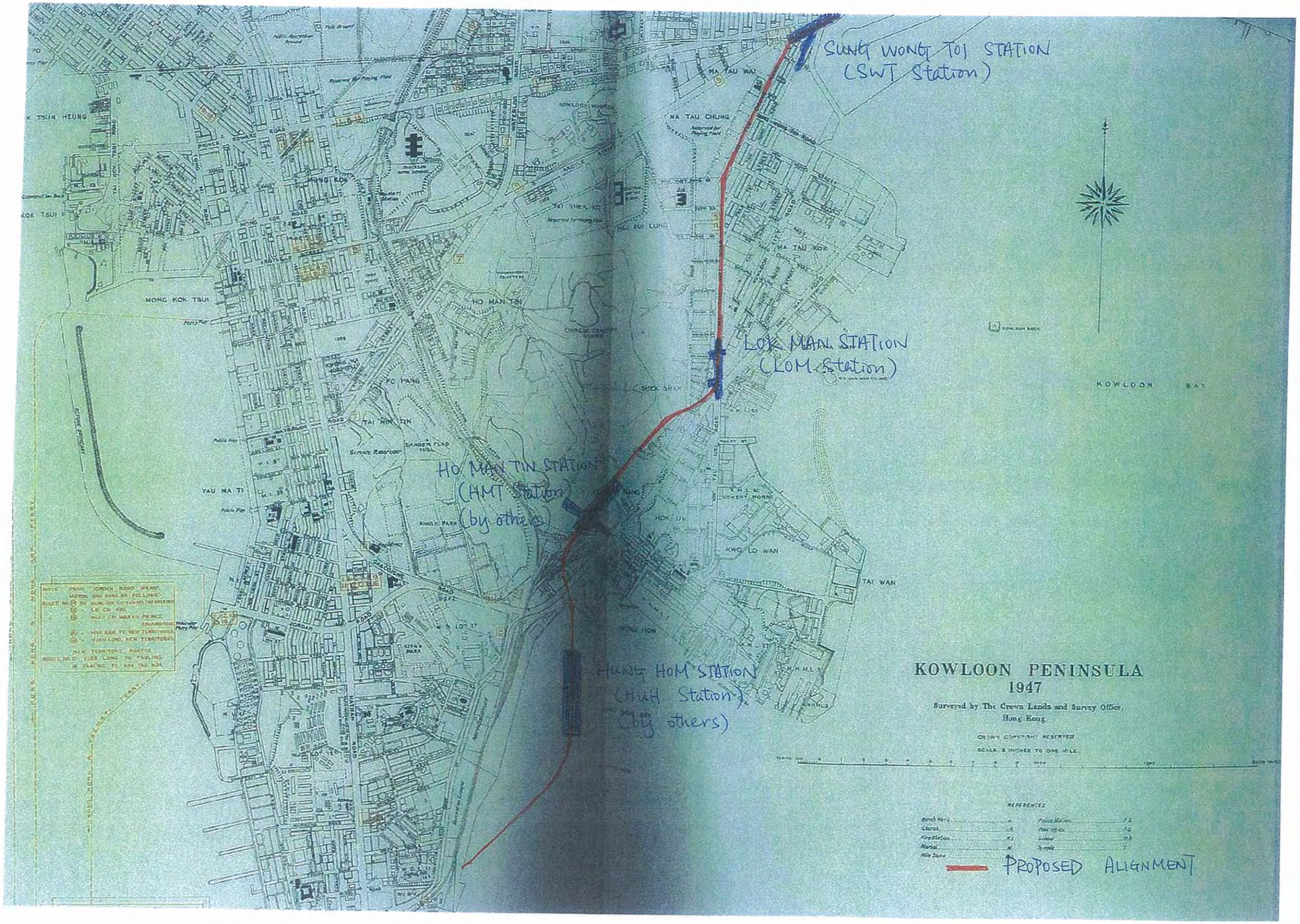
(4) If any sediment suitable for Type 3 disposal (Category H sediment failing the biological dilution test) is identified, it is the responsibility of the project proponent, in consultation with DEP, to identify and agree with him/her, the most appropriate treatment and/or disposal arrangement. Such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

Appendix B

Historical Maps

Historical Map

Year 1947



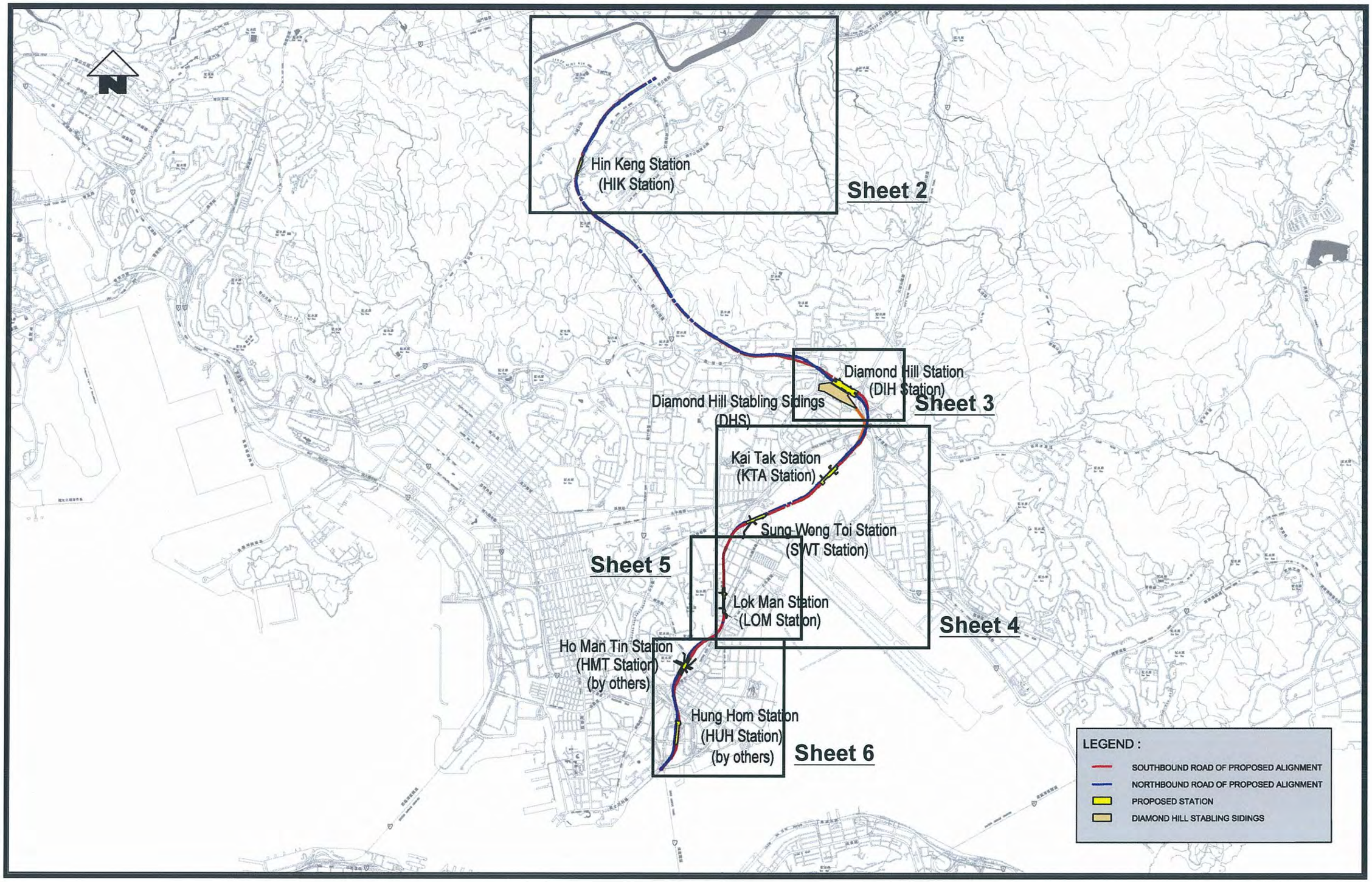
Historical Map

Year 1964

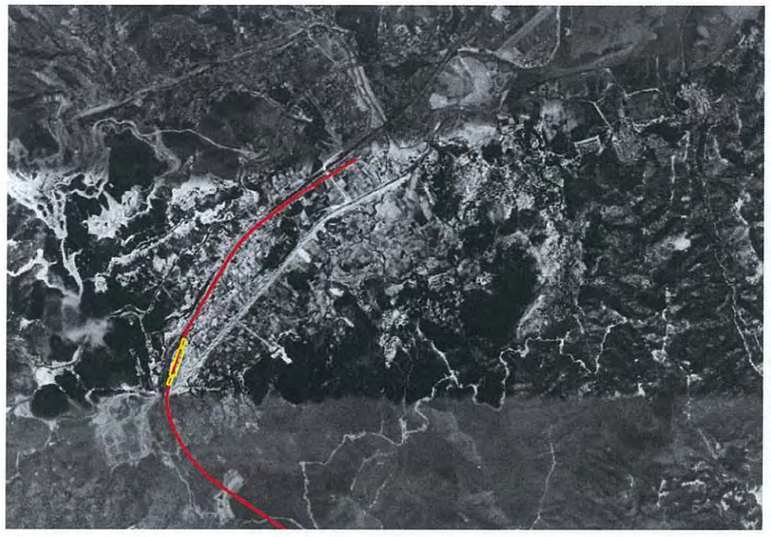
APPENDIX C

Historical Aerial Photos

Historical Aerial Photographs along SCL Alignment (Year 1963 – 2008) – Key Plan

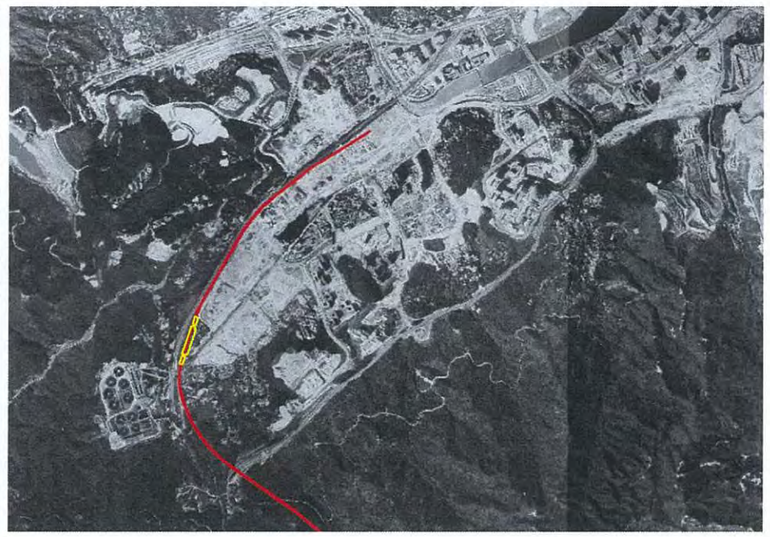


Historical Aerial Photographs of Tai Wai (Year 1963 – 2008)



Year 1963

Year 1973



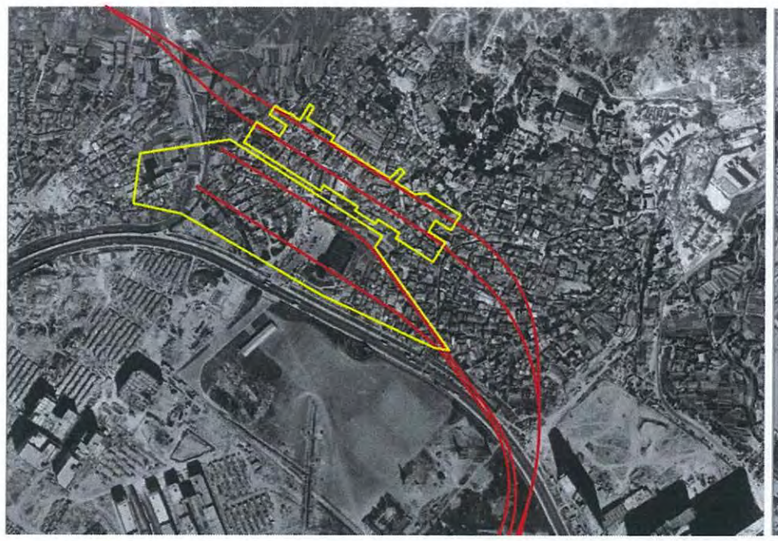
Year 1982

Year 1993

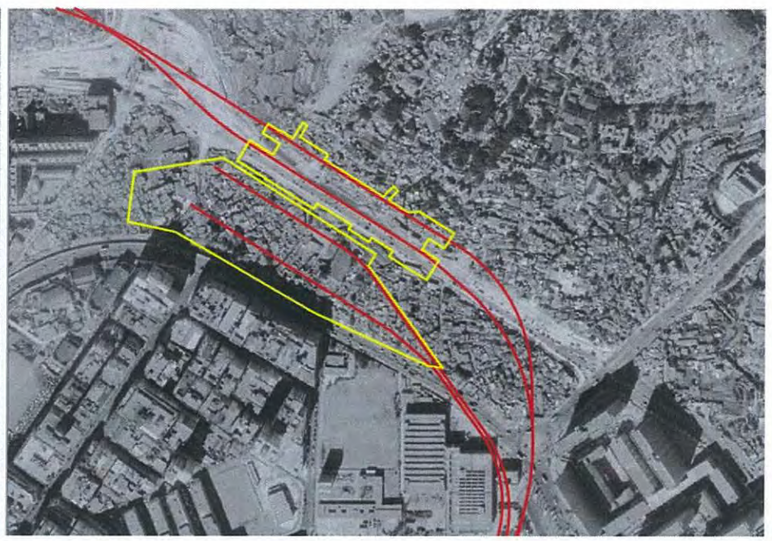
Year 2000

Year 2008

Historical Aerial Photographs of Diamond Hill (Year 1963 – 2008)

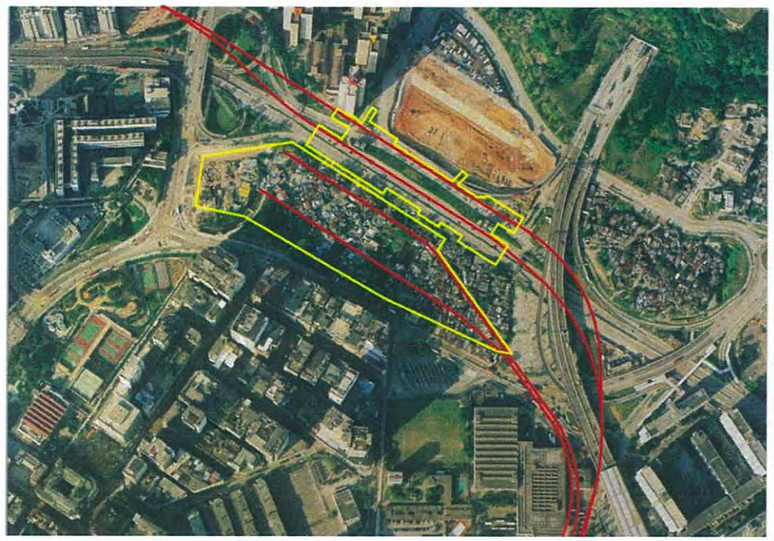


Year 1963



Year 1973

Year 1982

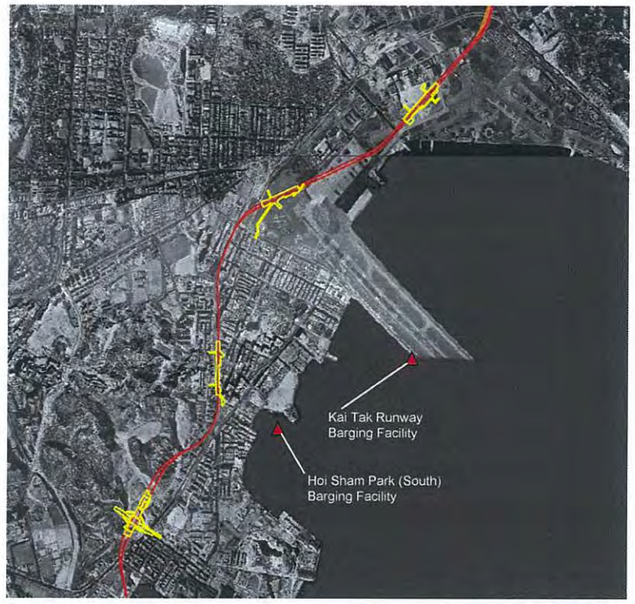


Year 1993

Year 2000

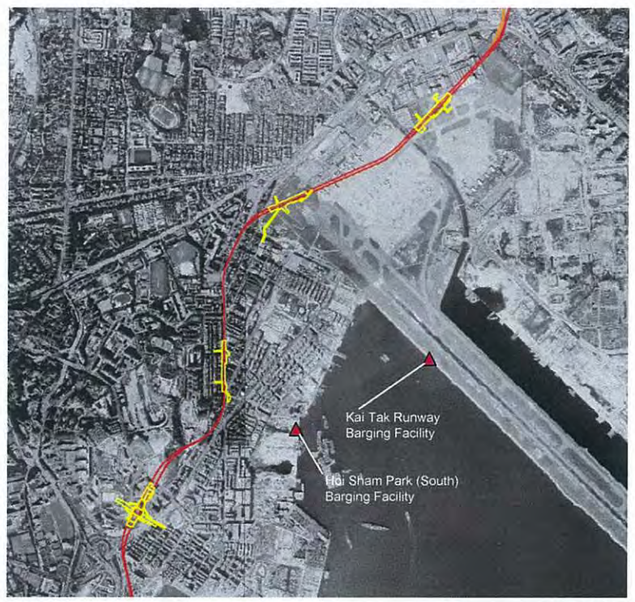
Year 2008

Historical Aerial Photographs of Kai Tak (Year 1963 – 2008)



Year 1963

Year 1973



Year 1982

Year 1993

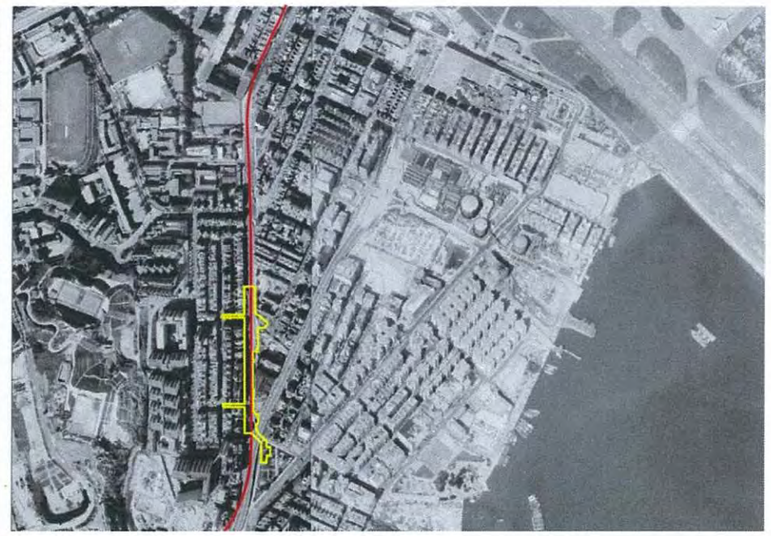
Year 2000

Year 2008

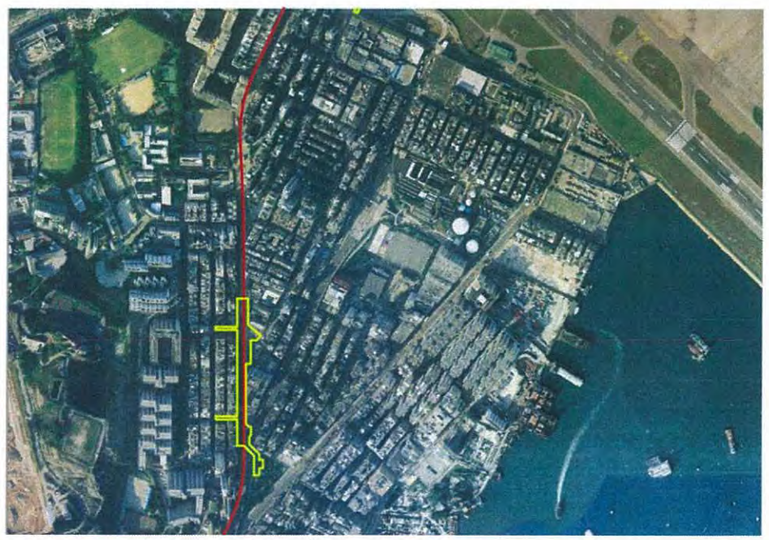
Historical Aerial Photographs along Ma Tau Wai Road (Year 1963 – 2008)

Year 1963

Year 1973



Year 1982



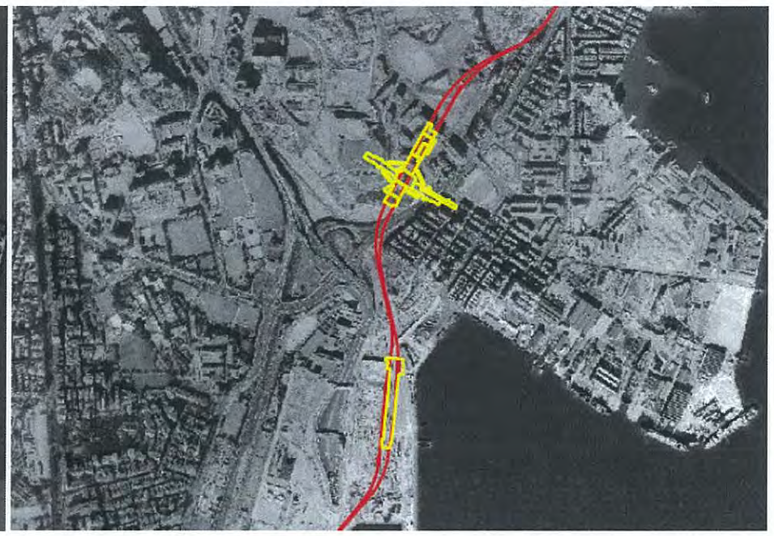
Year 1993

Year 2000

Year 2008

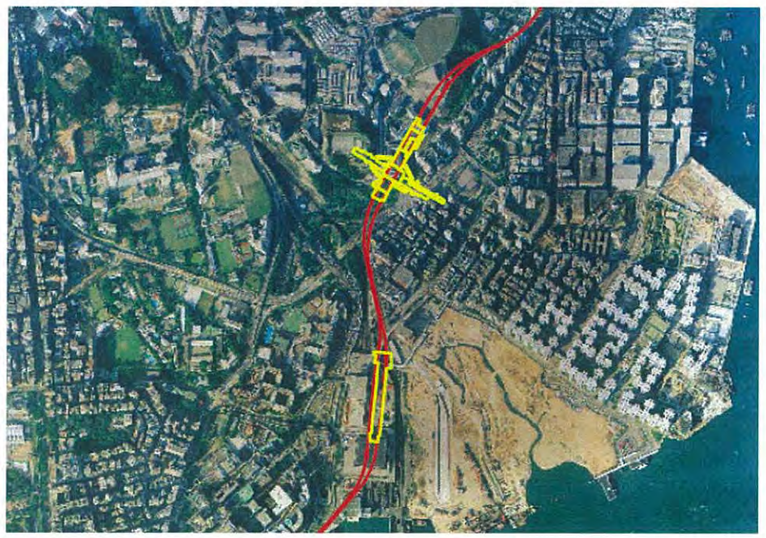
Historical Aerial Photographs of Ho Man Tin and Hung Hom (Year 1963 – 2008)

Year 1963



Year 1973

Year 1982



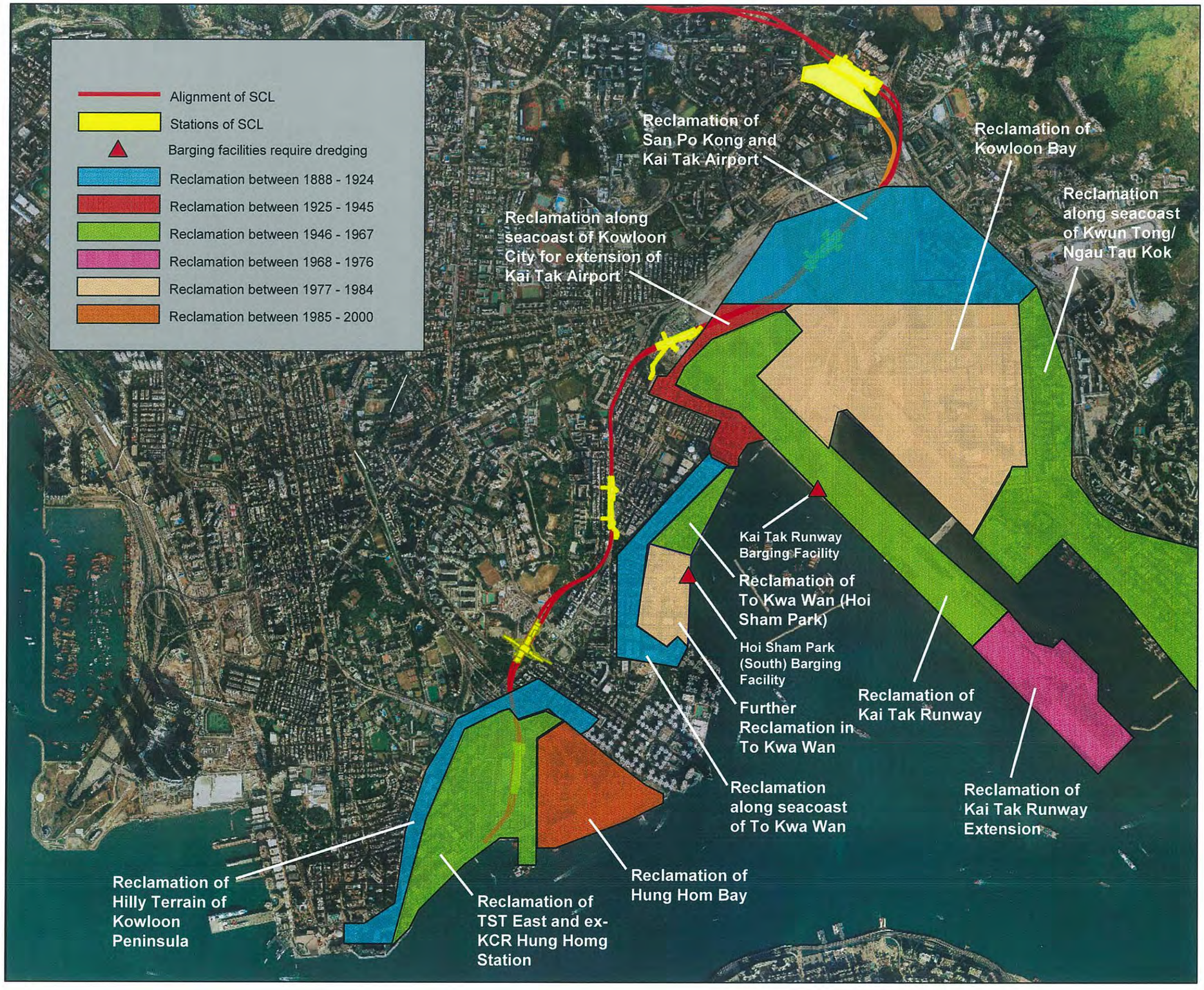
Year 1993

Year 2000

Year 2008

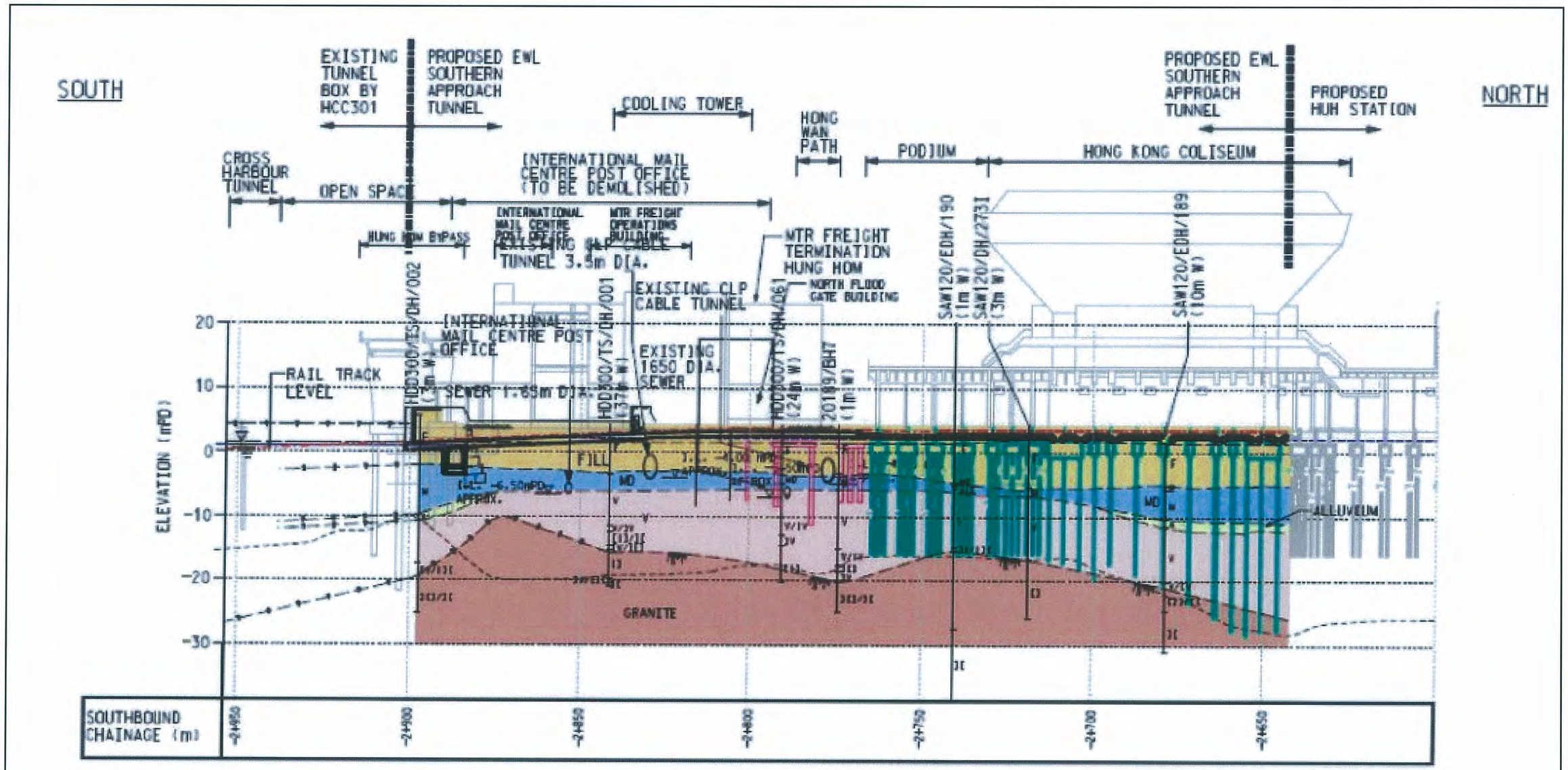
APPENDIX D

Reclamation History Plan


Alignment of SCL
Stations of SCL
Barging facilities require dredging
Reclamation between 1888 - 1924
Reclamation between 1925 - 1945
Reclamation between 1946 - 1967
Reclamation between 1968 - 1976
Reclamation between 1977 - 1984
Reclamation between 1985 - 2000
Reclamation of San Po Kong and Kai Tak Airport
Reclamation of Kowloon Bay
Reclamation along seacoast of Kowloon City for extension of Kai Tak Airport
Reclamation along seacoast of Kwun Tong/ Ngau Tau Kok
Kai Tak Runway Barging Facility
Reclamation of To Kwa Wan (Hoi Sham Park)
Hoi Sham Park (South) Barging Facility
Further Reclamation in To Kwa Wan
Reclamation of Kai Tak Runway
Reclamation along seacoast of To Kwa Wan
Reclamation of Kai Tak Runway Extension
Reclamation of Hilly Terrain of Kowloon Peninsula
Reclamation of TST East and ex-KCR Hung Homg Station
Reclamation of Hung Hom Bay

APPENDIX E

Geological Profiles



GEOLOGICAL PROFILE HOR. SCALE 1:1000 (A1)
VER. SCALE 1: 500 (A1)

LEGEND:

FILL	F	FILL	Qzm	QUARTZ MONZONITE	HIGHEST GROUND WATER LEVEL MEASURED ON PIEZOMETER
MARINE DEPOSITS	M, MD	MARINE DEPOSITS	Ba	BASALT	DIFFERED ROCKHEAD CONTOUR FOR -50mPD
COLLUVIUM	CD	BEACH DEPOSITS	Sy	SYENITE	EXISTING NON-PROJECT SPECIFIC GI
ALLUVIUM	DFD	DEBRIS FLOW DEPOSITS	Ry	RHYOLITE	EXISTING MTR S&W DRILLHOLE
GRANITE (GRADE IV, V AND CW)	A, ALL	ALLUVIUM	Mz	MYLONITE	MTR PROPOSED DRILLHOLE
GRANITE (GRADE IVC OR BETTER)	RC	RESIDUAL SOIL	Bre	BRECCIA	MTR PROPOSED TRIAL TRENCH
MONZONITE (GRADE IVC OR BETTER)	W	COMPLETELY DECOMPOSED	Peg	PEGMATITE	EXISTING MTR S&W TRIAL TRENCH
1 VERY SOFT TO SOFT CLAY / SILT	CW	HIGHLY DECOMPOSED	Kik	KOWLOON GRANITE	ADDITIONAL COLLECTED GI
2 FIRM TO STIFF CLAY / SILT	CCC	MODERATELY DECOMPOSED	Nit	SHA TIN GRANITE	OTHER NON-PROJECT SPECIFIC GI
3 SAND	CC	SLIGHTLY DECOMPOSED		QUARTZ MONZONITE	132kV CABLE OR ABOVE
4 COBBLES / GRAVEL / BOULDERS		CORESTONE		DIFFERED FAULT OR PHOTOGEOLOGICAL LINEAMENT	
				HIGHEST GROUND WATER LEVEL MEASURED IN STANDPIPE	

DRILLHOLE NUMBER

REPORT NUMBER — SHATIN/DEEP/169 (100mE) — OFFSET DISTANCE AND DIRECTION

SPT 'N' VALUE — HS F3 / HS / HI MATERIAL CODE / HT / A2 / HS / H15 V/IV / C11/33

EXH

HMT

CONTRACT NEX 2201

PLAN
SCALE 1:2000 (A3)

HUNG HOM STATION

CHEONG WAN ROAD

HUNG HOM BYPASS

WENSLOW STREET UNDERPASS

CHATHAM ROAD NORTH

1924 SEAWALL

CONTRACT NEX 2202

CONTRACT NEX 2201

FILL

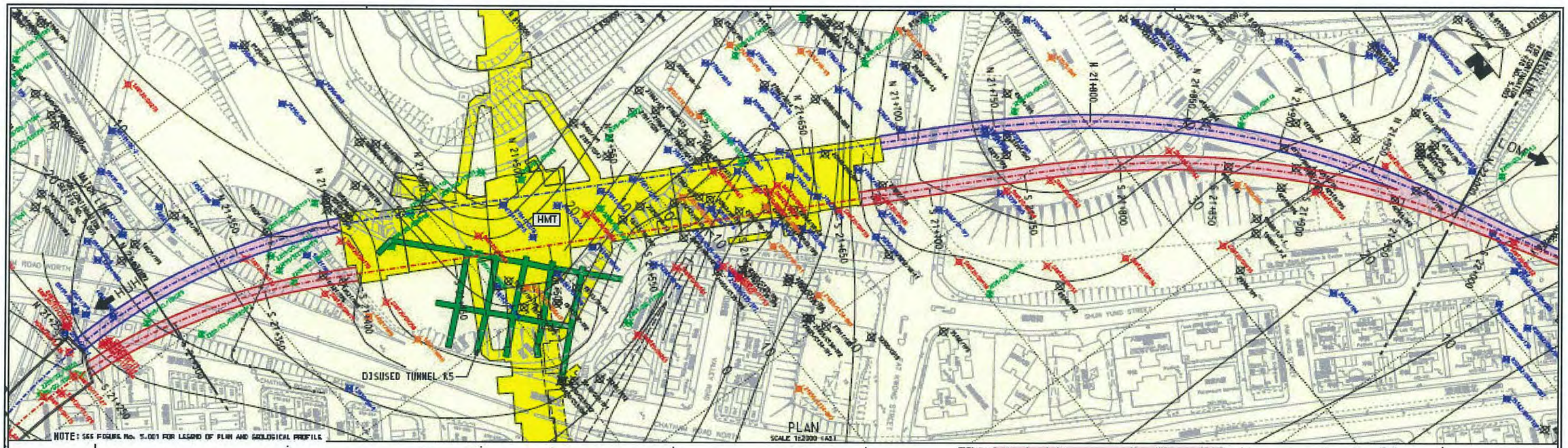
ALL

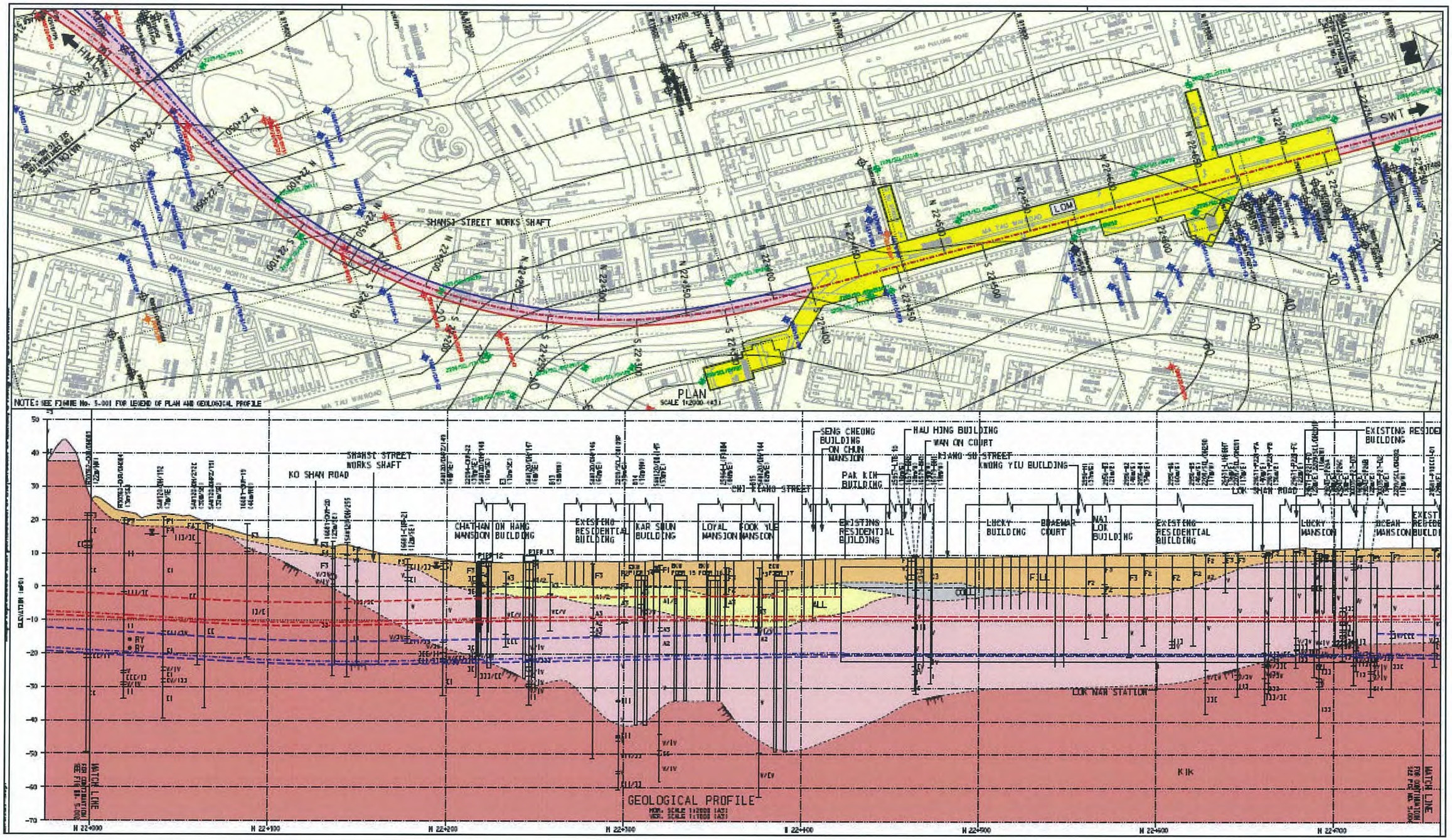
MD

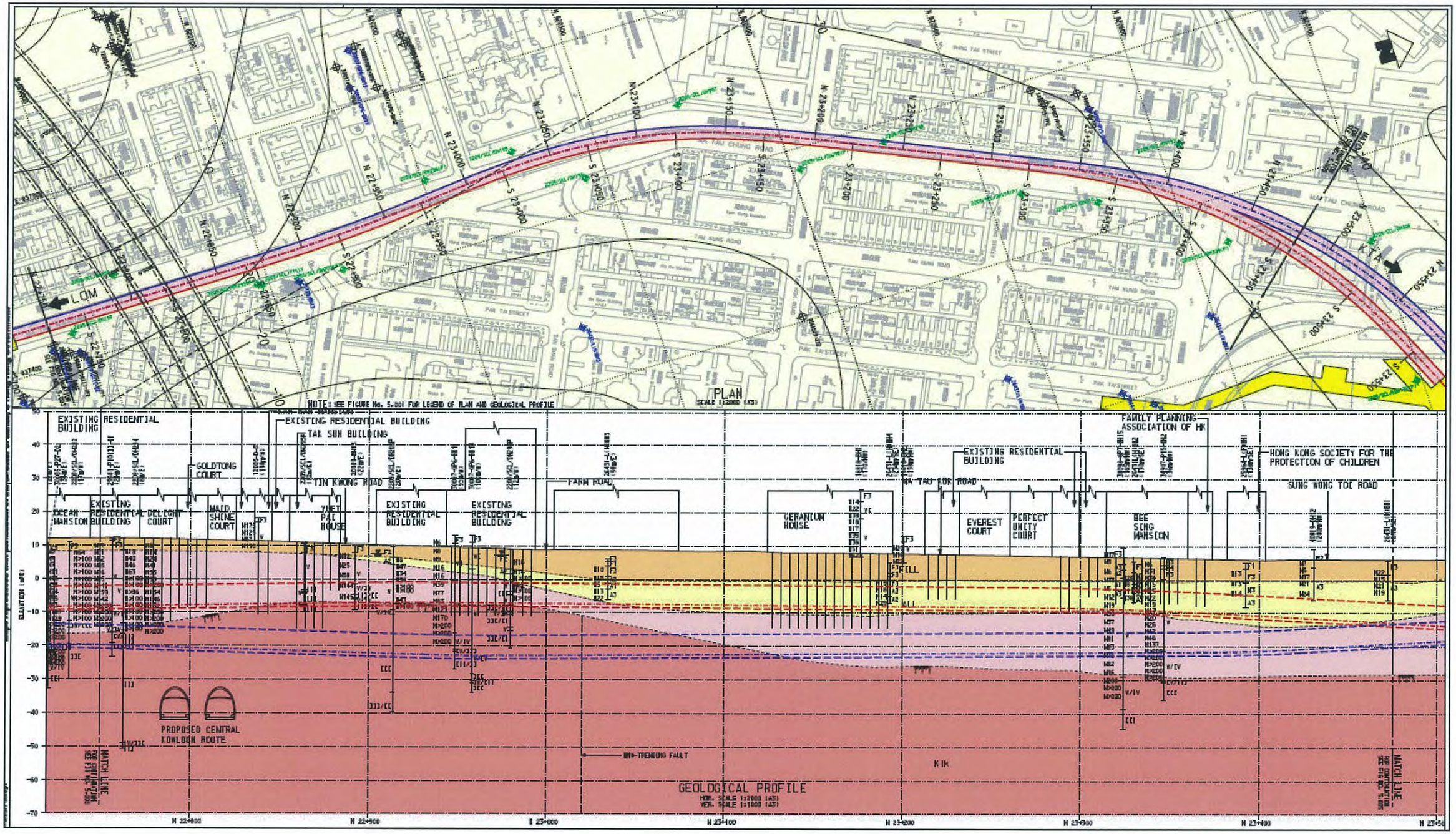
Kik

MATCH LINE

GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)


HMT
DISUSED TUNNEL K5
PLAN
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
DISUSED TUNNEL K5
CHATHAM ROAD NORTH
FAT KWONG ST.
ABANDONED QUARRY
FILL
MD
ALL
Peg
PROPOSED KWUN TONG LINE EXTENSION
HO MAN TIN STATION
GEOLOGICAL PROFILE
KTK
MATCH LINE
ELEVATION (mPD)


SHANSI STREET WORKS SHAFT
LOM
SWT
PLAN
SCALE 1:2000 (A3)
NOTE: SEE FIGURE No. 5-001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
KO SHAN ROAD
SHANSI STREET WORKS SHAFT
CHI KIANG STREET
SENG CHEONG BUILDING
ON CHUN MANSION
HAU HING BUILDING
WAN ON COURT
PAK KIN BUILDING
KWONG YEU BUILDINGS
LOK SHAN ROAD
EXISTING RESIDENTIAL BUILDING
CHATHAM MANSION
ON HANG BUILDING
KAR SHUN BUILDING
LOYAL MANSION
FOOK YUE MANSION
LUCKY BUILDING
BOAKWAH COURT
WAI LOK BUILDING
LUCKY MANSION
OCEAN MANSION
FILL
CDG
ALL
KIK
LOK WAH STATION
GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)
ELEVATION (mPD)
MATCH LINE
N 22+000
N 22+100
N 22+200
N 22+300
N 22+400
N 22+500
N 22+600
N 22+700


LOM
KIA
PLAN
SCALE 1:2000 (A3)
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
EXISTING RESIDENTIAL BUILDING
EXISTING RESIDENTIAL BUILDING
TAK SUN BUILDING
FAMILY PLANNING ASSOCIATION OF HK
HONG KONG SOCIETY FOR THE PROTECTION OF CHILDREN
SUNG WONG TOI ROAD
TIN KWONG ROAD
FARM ROAD
OCEAN MANSION
EXISTING RESIDENTIAL BUILDING
DELIGHT COURT
GOLDTONS COURT
MALO SHINE COURT
YUET PAC HOUSE
EXISTING RESIDENTIAL BUILDING
EXISTING RESIDENTIAL BUILDING
GERANIUM HOUSE
EXISTING RESIDENTIAL BUILDING
EVEREST COURT
PERFECT UNITY COURT
BEE SING MANSION
FILL
PROPOSED CENTRAL KOWLOON ROUTE
MATCH LINE
SEE FIG. 5.003
BH-TRENCH0 FAULT
KIK
GEOLOGICAL PROFILE
HOR. SCALE 1:1000 (A3)
VER. SCALE 1:1000 (A3)
ELEVATION (mPD)
N 22+800
N 22+900
N 23+000
N 23+100
N 23+200
N 23+300
N 23+400
N 23+456

NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE

PLAN
SCALE 1:2000 (A3)

ETY FOR THE CHILDREN

TOI ROAD

OLYMPIC AVENUE

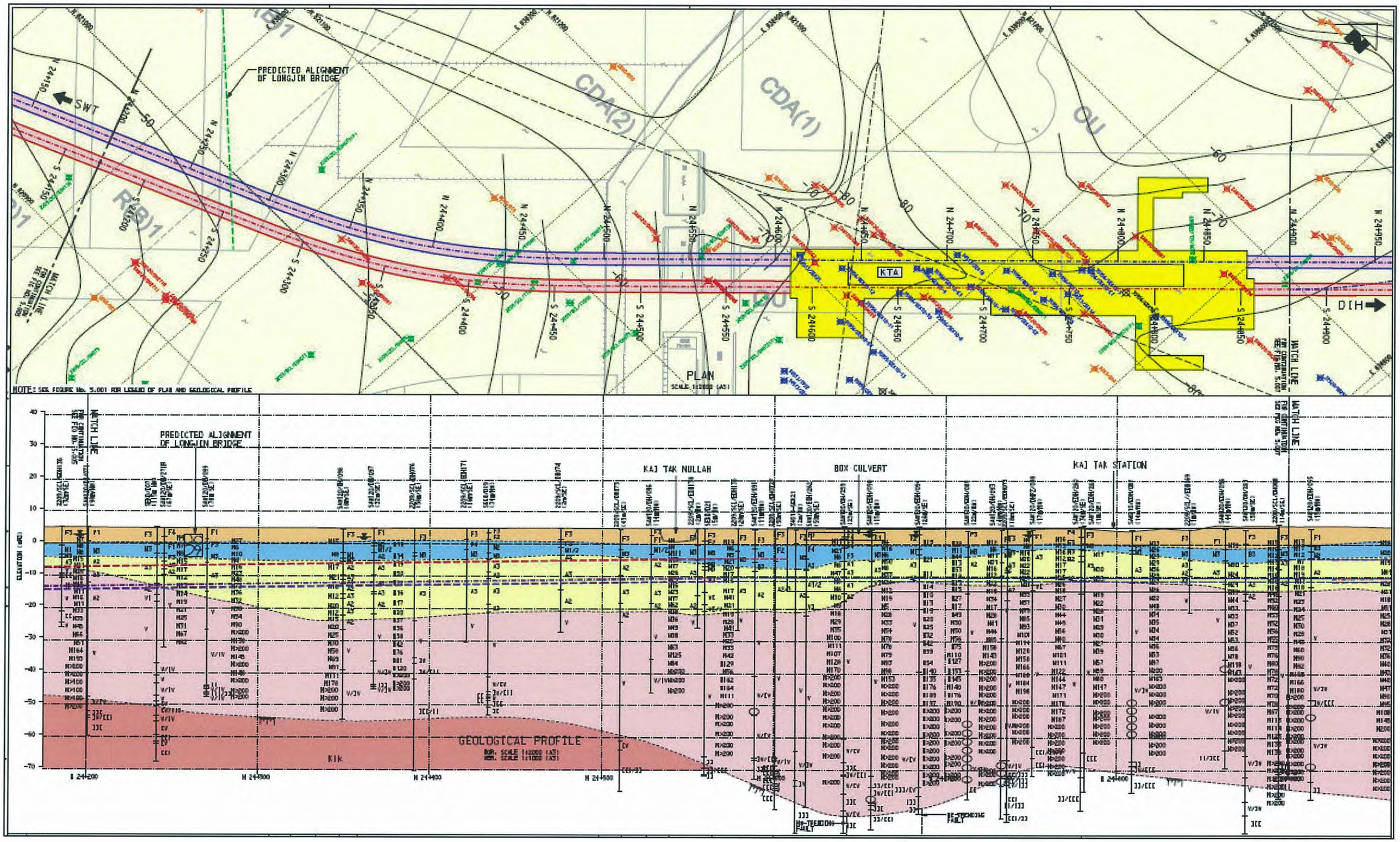
DAKOTA DRIVE

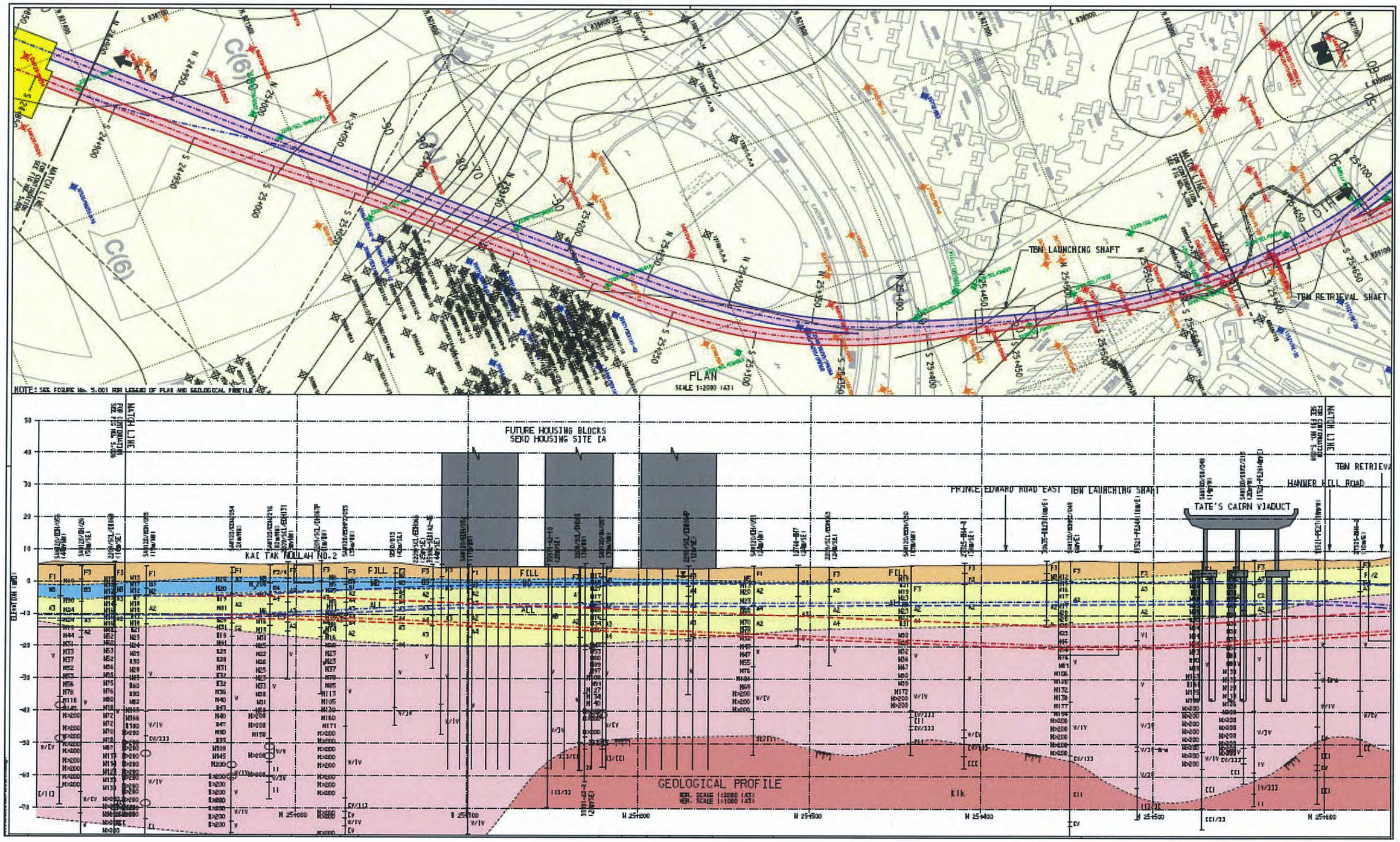
SUNG WONG TOI STATION

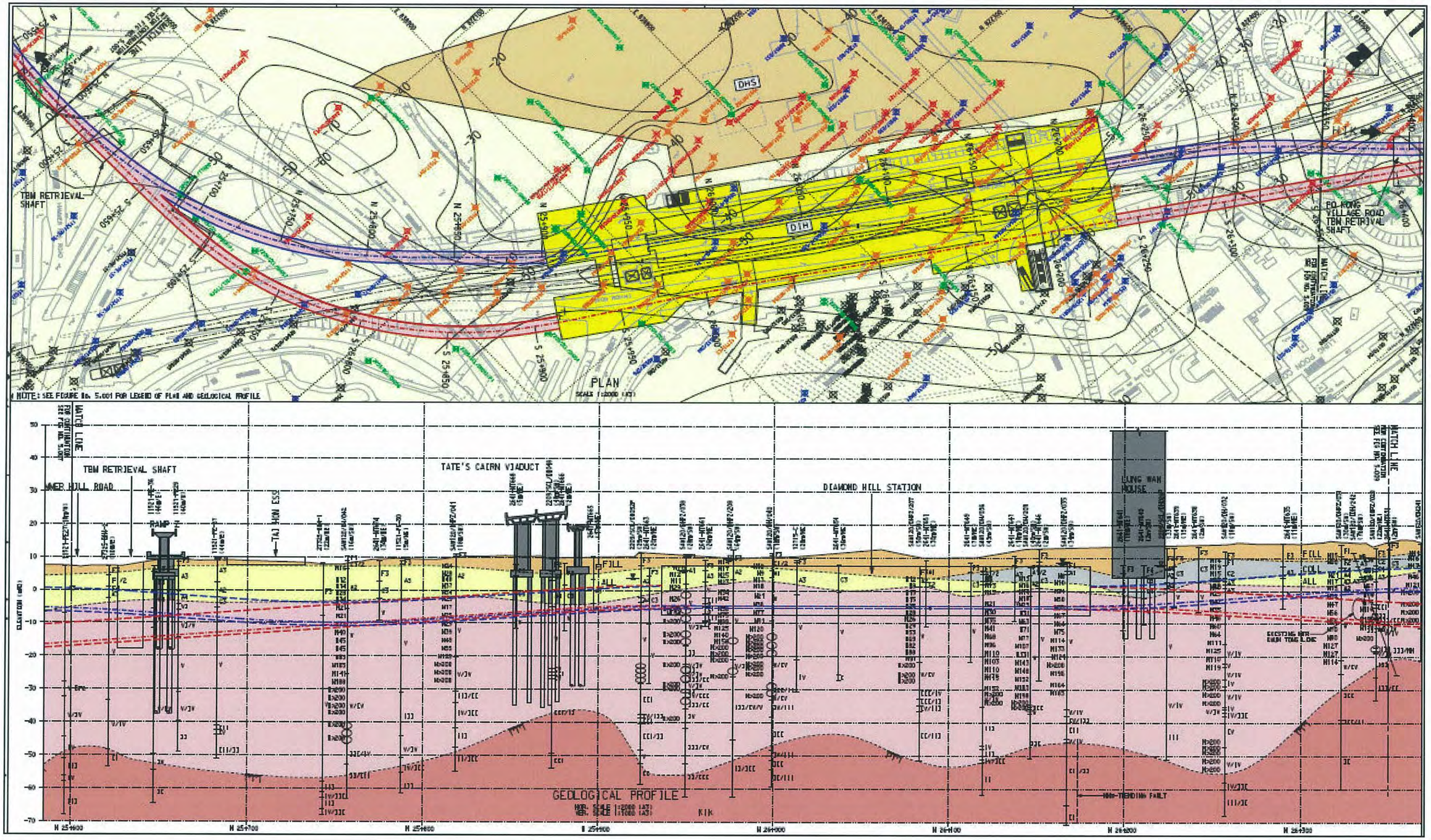
HAN-TRIGONN FAULT

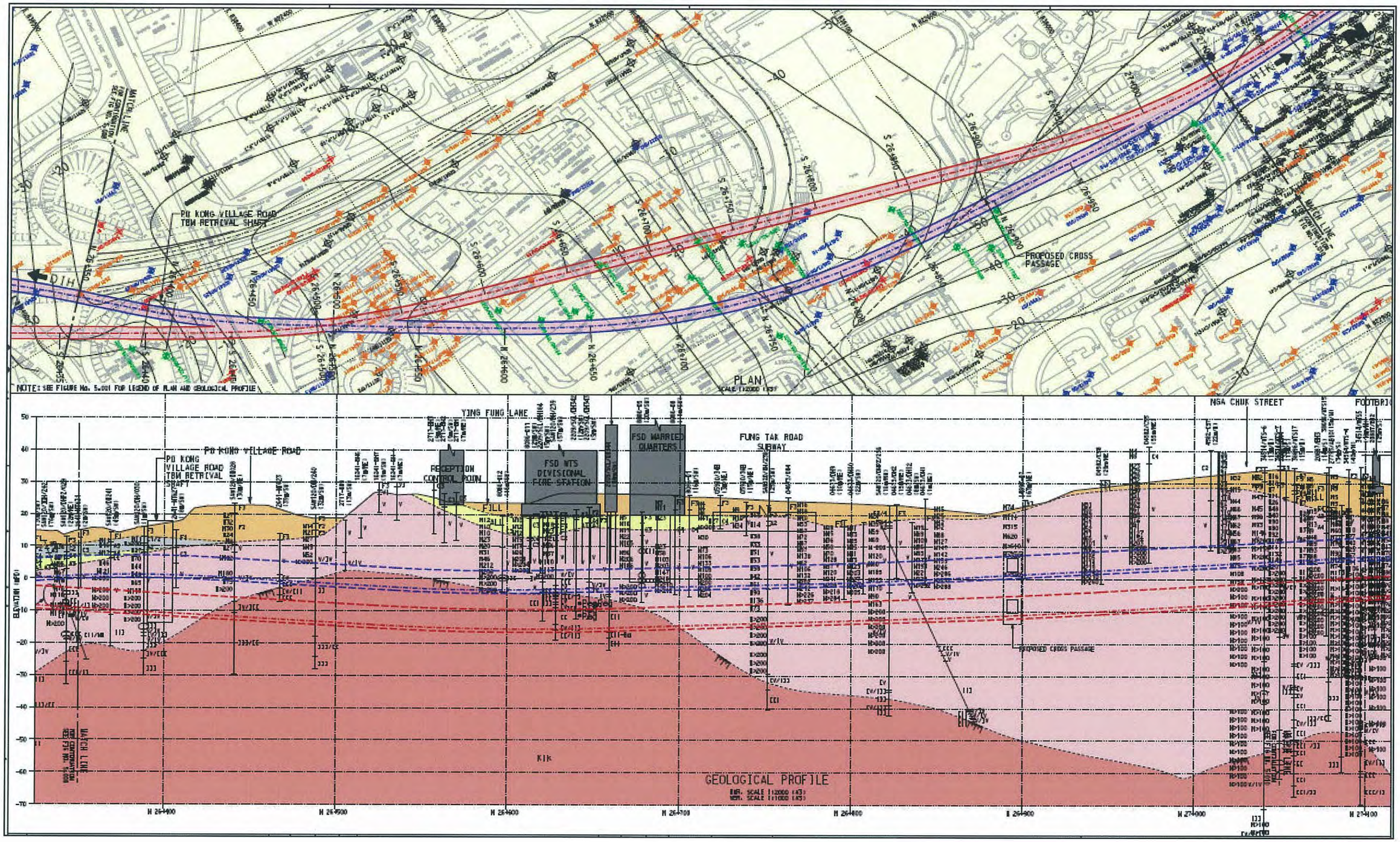
FILL

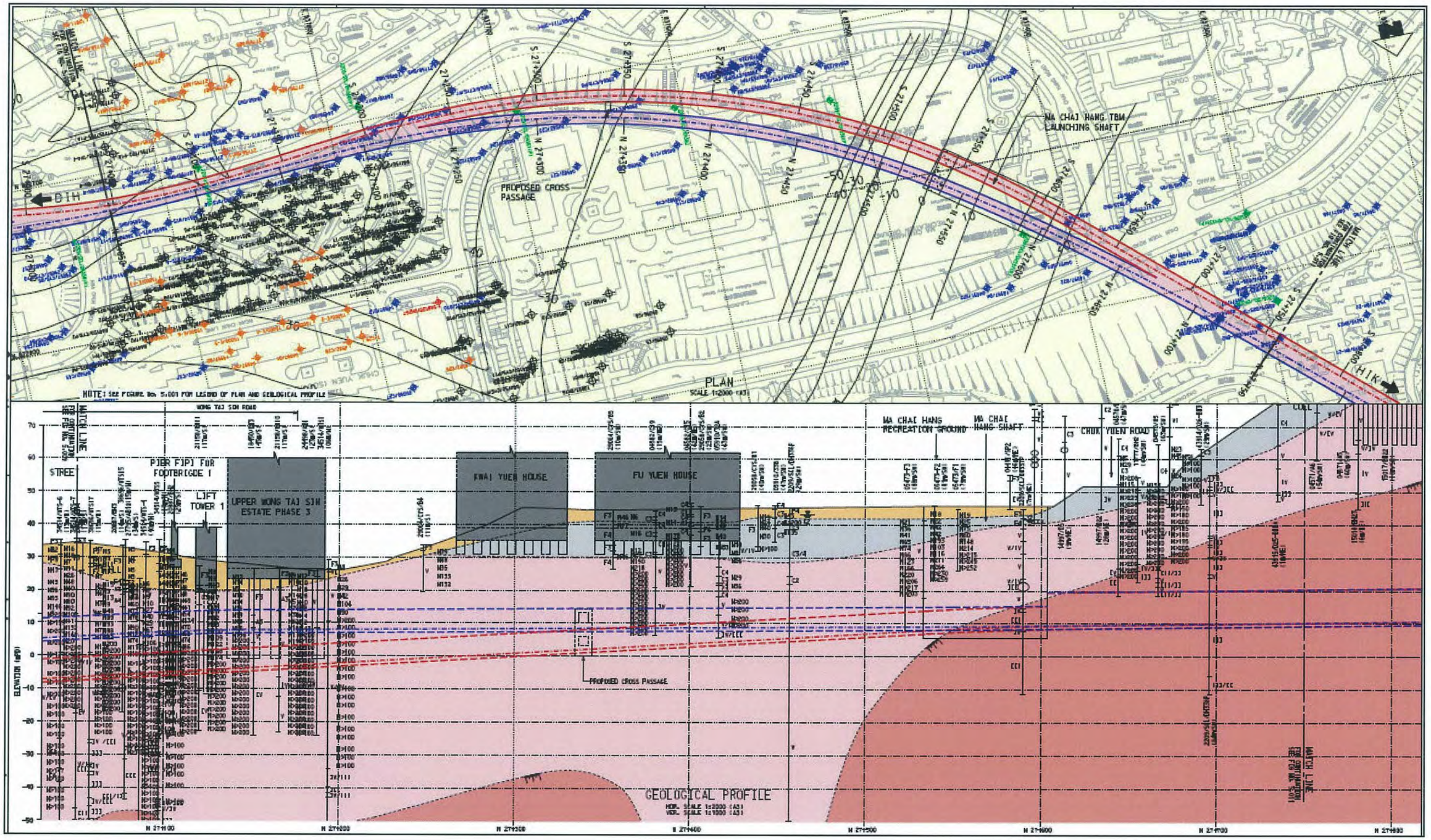
GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)


PREDICTED ALIGNMENT OF LONGJIN BRIDGE
SWT
DIH
KTA
CDA(2)
CDA(1)
CU
RB1
MATCH LINE
PLAN
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
PREDICTED ALIGNMENT OF LONG-JIN BRIDGE
KAI TAK NULLAH
BOX CULVERT
KAI TAK STATION
ELEVATION (mPD)
GEOLOGICAL PROFILE
Klk


TBM LAUNCHING SHAFT
TBM RETRIEVAL SHAFT
PLAN
SCALE 1:2000 (A3)
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
FUTURE HOUSING BLOCKS
SEKD HOUSING SITE 1A
KAU TAK NULLAH NO.2
PRINCE EDWARD ROAD EAST TBM LAUNCHING SHAFT
HANNER HILL ROAD
TATE'S CAIRN VIADUCT
FILL
ALL
GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)
ELEVATION (mPD)


TBM RETRIEVAL SHAFT
DHS
DIH
FO KONG VILLAGE ROAD TBM RETRIVAL SHAFT
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
PLAN
TBM RETRIEVAL SHAFT
TATE'S CAIRN VIADUCT
DIAMOND HILL STATION
LUNG WAN HOUSE
FILL
GEOLOGICAL PROFILE
NNW-TRENDING FAULT


PO KONG VILLAGE ROAD
TBM RETRIEVAL SHAFT
PROPOSED CROSS PASSAGE
PLAN
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
YING FUNG LANE
FSD MARRIED QUARTERS
FSD WTS DIVISIONAL FIRE STATION
RECEPTION CONTROL ROOM
FUNG TAK ROAD SUBWAY
NGA CHUK STREET
FILL
Klk
GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)


MA CHAI HANG TBM LAUNCHING SHAFT
PROPOSED CROSS PASSAGE
DIH
HIK
PLAN
SCALE 1:2000 (A3)
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
WONG TAI SIN ROAD
MATCH LINE
STREE
PIER P1P1 FOR FOOTBRIDGE 1
LIFT TOWER 1
UPPER WONG TAI SIN ESTATE PHASE 3
KWAI YUEN HOUSE
FU YUEN HOUSE
MA CHAI HANG RECREATION GROUND
MA CHAI HANG SHAFT
CHUK YUEN ROAD
PROPOSED CROSS PASSAGE
ELEVATION (mPD)
GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)
N 27+100
N 27+200
N 27+300
N 27+400
N 27+500
N 27+600
N 27+700
N 27+800

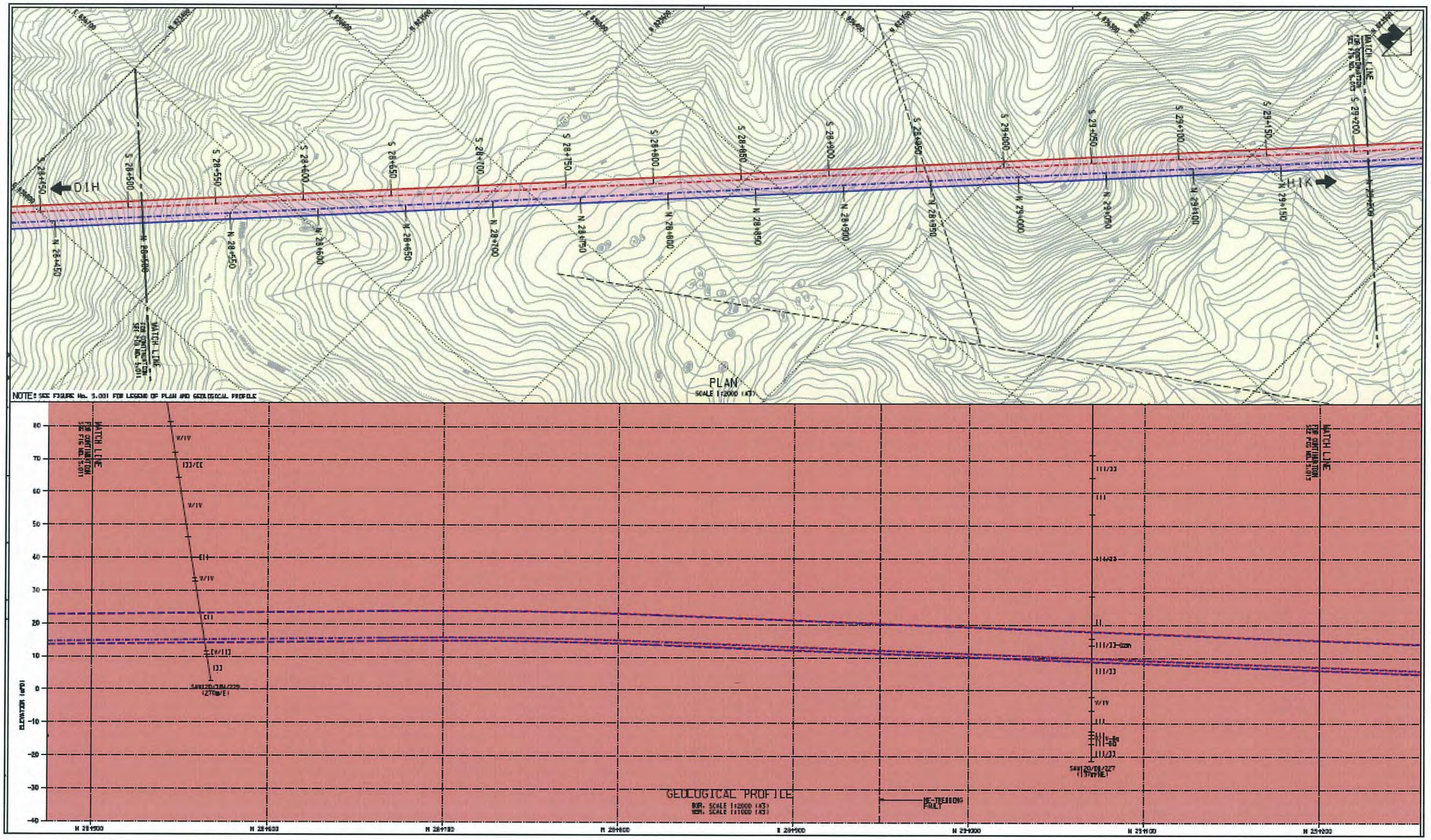
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE

PLAN

SCALE 1:2000 (A3)

GEOLOGICAL PROFILE

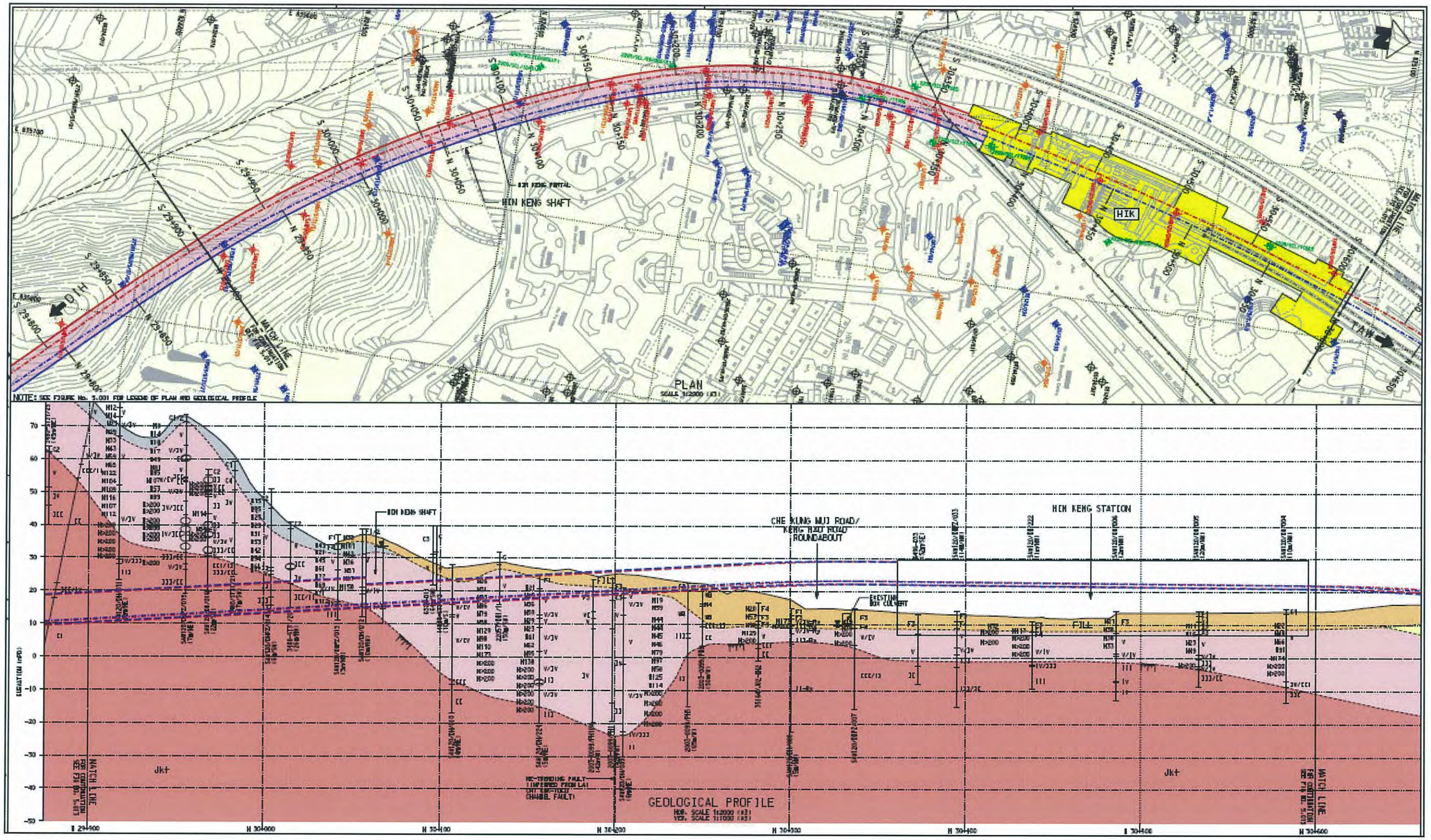
HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)

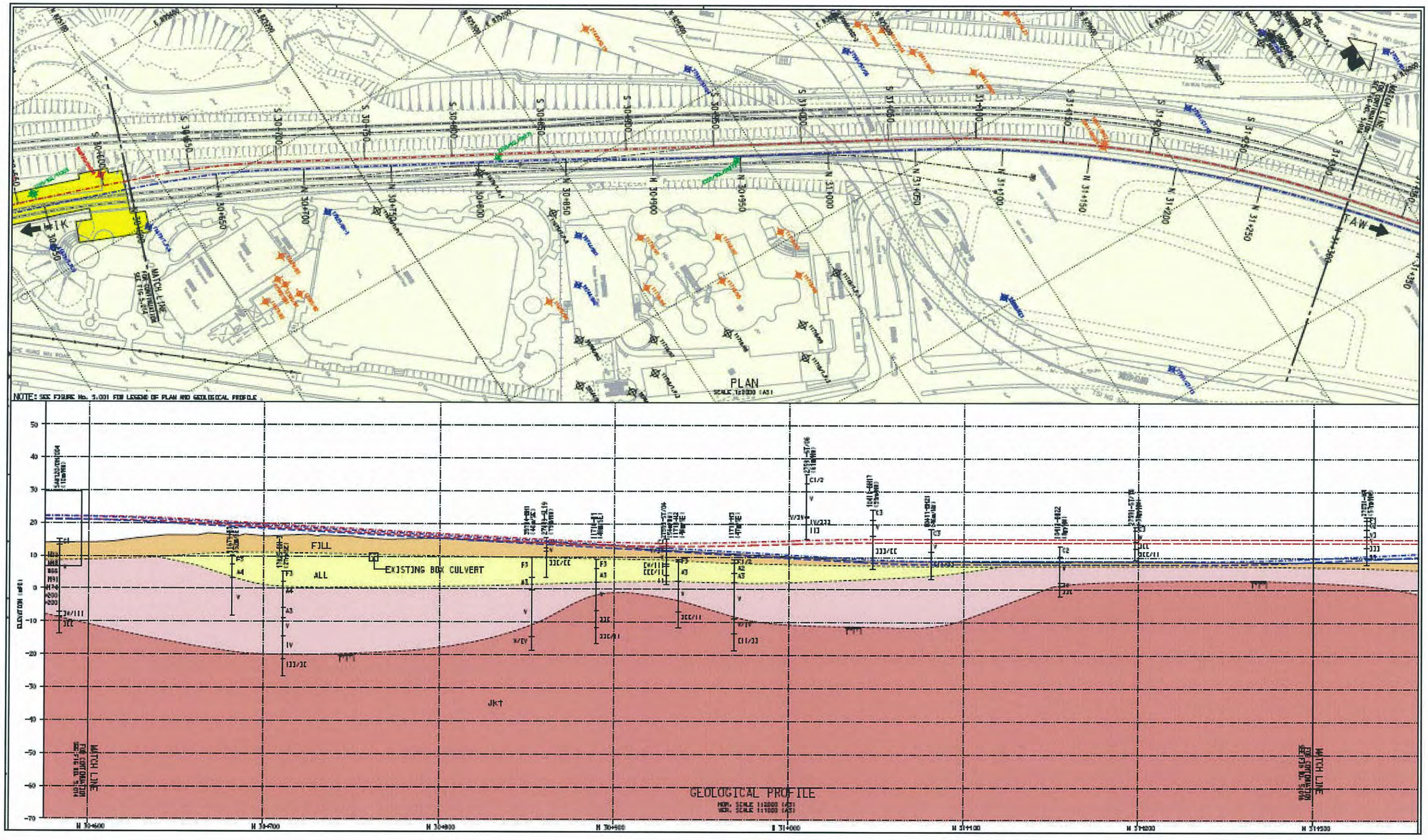

D1H
H1K
MATCH LINE
FOR CONTINUATION
SEE FIG NO. 5.011
PLAN
SCALE 1:2000 (A3)
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A3)
VERT. SCALE 1:1000 (A3)
RE-TEESDALE FAULT
ELEVATION (mPD)

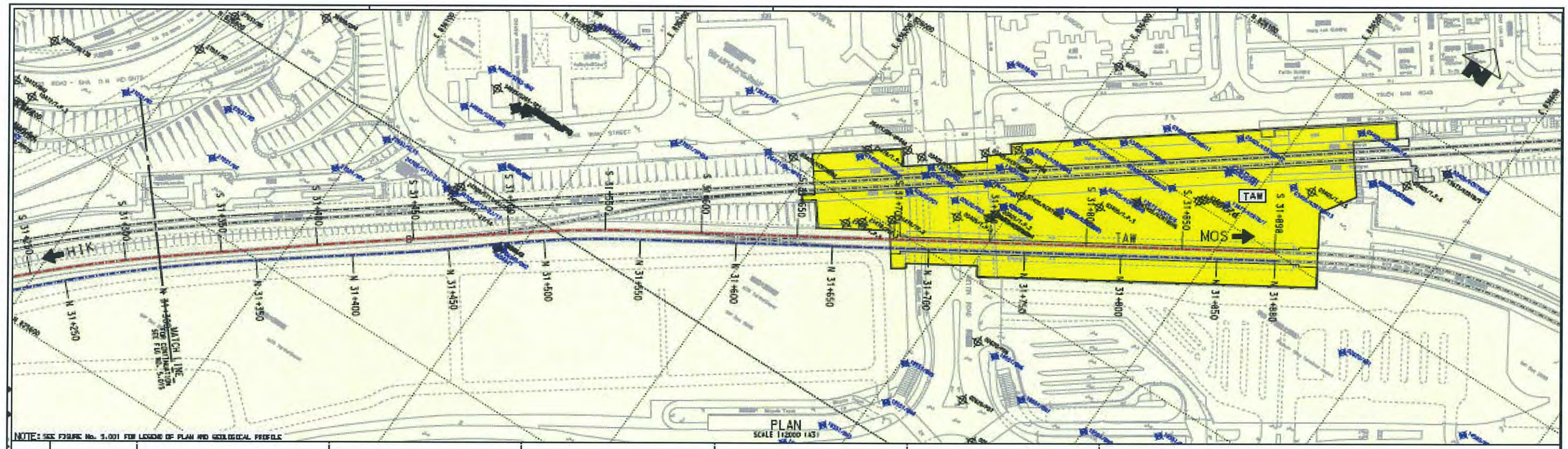
PLAN
SCALE 1:2000 (A3)

NOTE: SEE FIGURE No. 3.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE

GEOLOGICAL PROFILE


HIK
HEN KENG PORTAL
HEN KENG SHAFT
PLAN
SCALE 1:2000 (A1)
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
HEN KENG SHAFT
CHE KUNG MIU ROAD/
HENG FA CHUEN ROAD
ROUNDABOUT
HEN KENG STATION
EXISTING BOX CULVERT
Jkf
RE-TRENDING FAULT
(INFERRED FROM LAI
CHI KOK-TOLO
CHANNEL FAULT)
GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A1)
VER. SCALE 1:1000 (A1)
H 29+800
H 30+000
H 30+200
H 30+400
H 30+600


PLAN
SCALE 1:5000 (A3)
MATCH LINE
SEE CONTINUATION
SEE FIG 5.004
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
FILL
ALL
EXISTING BOX CULVERT
JKT
GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)
N 30+600
N 30+700
N 30+800
N 30+900
N 31+000
N 31+100
N 31+200
N 31+300


TAW
MOS
TAW
H1K
MATCH LINE
SEE FIGURE No. 5.001 FOR CONTINUATION
PLAN
SCALE 1:2000 (A3)
NOTE: SEE FIGURE No. 5.001 FOR LEGEND OF PLAN AND GEOLOGICAL PROFILE
ELEVATION (mOD)
ALL
MATCH LINE
SEE FIGURE No. 5.001 FOR CONTINUATION
GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)

LEGEND:

FILL	F	FILL	
MARINE DEPOSITS	M, MD	MARINE DEPOSITS	
COLLUVIUM	CO	BEACH DEPOSITS	
ALLUVIUM	DFD	DEBRIS FLOW DEPOSITS	
GRANITE (GRADE IV, V AND RS)	A, ALL	ALLUVIUM	
GRANITE (GRADE III OR BETTER)	RS	RESIDUAL SOIL	
HORNFELS (GRADE III OR BETTER)	V	COMPLETELY DECOMPOSED	
POTENTIAL VARIABLE WEATHERED ZONE	IV	HIGHLY DECOMPOSED	
1 VERY SOFT TO SOFT CLAY / SILT	III	MODERATELY DECOMPOSED	
2 FIRM TO STIFF CLAY / SILT	II	SLIGHTLY DECOMPOSED	
3 SAND	I	FRESH	
4 COBBLES / GRAVEL / BOULDERS	○	CORESTONE	

Qzm	QUARTZ MONZONITE		HIGHEST GROUND WATER LEVEL MEASURED IN PIEZOMETER
Ba	BASALT	-20	DIFFERED ROCKHEAD CONTOUR FOR -20mPD
Sy	SYENITE		EXISTING NON-PROJECT SPECIFIC GI
Py	PHYLLITE		EXISTING MTR SAH DRILLHOLE
My	MYLONITE		MTR PROPOSED DRILLHOLE
Bre	BRECCIA		MTR PROPOSED TRIAL TRENCH
Peg	PEGMATITE		EXISTING MTR SAH TRIAL TRENCH
Klk	KOWLOON GRANITE		ADDITIONAL COLLECTED GI
Kkt	SHA TIN GRANITE		OTHER NON-PROJECT SPECIFIC GI
Klt	QUARTZ MONZONITE		132kV CABLE OR ABOVE
	DIFFERED FAULT OR PHOTOGEOLOGICAL LINEAMENT		

DRILLHOLE NUMBER / REPORT NUMBER / SAMPLE NUMBER AND TYPE / OFFSET DISTANCE AND DIRECTION

'N' VALUE: F3, M5, M6, M1, M7, A2, M9, M12, V/IV, CII/33 — MATERIAL CODE

PLAN
SCALE 1:2000 (A3)

GEOLOGICAL PROFILE
HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)

EASTERN ROAD — PRINCE EDWARD ROAD EAST — POTENTIAL FAULT DIFLUENCE ZONE — MAN TONG BYPASS — LUEN YEE ROAD — ESH DMS

FILL
ALL
Klk

MATCH LINE
SEE PROFILE ON SHEET 2

ELEVATION (mPD)

N 25+000 N 25+100 N 25+200 N 25+300 N 25+400 N 25+500 N 25+600

LEGEND:

FILL	F	FILL	Qgm	QUARTZ MONZODIORITE	HIGHEST GROUND WATER LEVEL MEASURED IN PIEZOMETER
MARINE DEPOSITS	C, CLL	COLLUVIUM	Db	BASALT	INFERRED ROCKHEAD CONTOUR FOR -50mPD
COLLUVIUM	M, MB	MARINE DEPOSITS	Sy	SYENITE	EXISTING NON-PROJECT SPECIFIC GI
ALLUVIUM	BD	BEACH DEPOSITS	Ry	RHYOLITE	EXISTING MTR SAM BOREHOLE
GRANITE (GRADE VI, V AND IV)	DFD	DEBRIS FLOW DEPOSITS	Mz	MYLONITE	MTR PROPOSED DRILLHOLE
GRANITE (GRADE III OR BETTER)	A, ALL	ALLUVIUM	Bre	BRECCIA	MTR PROPOSED TRIAL TRENCH
MONZONITE (GRADE III OR BETTER)	VI	RESIDUAL SOIL	Peg	PEGMATITE	EXISTING MTR SAM TRIAL TRENCH
1 VERY SOFT TO SOFT CLAY / SILT	V	COMPLETELY DECOMPOSED	Gm	KOWLOON GRANITE	ADDITIONAL COLLECTED GI
2 FIRM TO STIFF CLAY / SILT	IV	HIGHLY DECOMPOSED	Grt	SHA TIN GRANITE	OTHER NON-PROJECT SPECIFIC GI
3 SAND	III	MODERATELY DECOMPOSED	Qtz	QUARTZ MONZODIORITE	
4 COBBLES / GRAVEL / BOULDERS	II	SLIGHTLY DECOMPOSED		INFERRED FAULT OR PROTEROZOIC DIKE/MINOR INTRUSIVE	
	○	CORESTONE			

BOREHOLE NUMBER — REPORT NUMBER — OFFSET DISTANCE AND DIRECTION — SAMPLE/CORE RUN/TRIAL PIT NO. — SPT 'N' VALUE — MATERIAL CODE

PLAN

DIAMOND HILL STABLING SIDING

LUEN YEE ROAD

PO KONG VILLAGE ROAD

FILL

ALL

GEOLOGICAL PROFILE

HOR. SCALE 1:2000 (A3)
VER. SCALE 1:1000 (A3)