3 Project Description and Construction Methodology

3.1 General

The HHS will be located underneath the existing podium structure covering the former Hung Hom Freight Yard at Hung Hom, except its shunt neck, launching/ retrieval and emergency tracks which will extend outside the podium as they connect to the tracks to be constructed for the SCL (TAW to HUH) section. It is also necessary to make appropriate changes in the design of Hung Hom, Kai Tak and Diamond Hill Stations and its associated alignment and facilities proposed in SCL (TAW-HUH) and SCL (MKK-HUH) EIA Reports to suit this operational arrangement. This chapter presents the key design elements of the Project. The construction methodology for all the key elements would also be discussed. The indicative location of the Project is shown in **Figure 1.1**.

Minor updates to the Project, such as locations and structures, could occur during further design development and construction, and these would be updated through the monthly EM&A reporting.

3.2 Key Design Elements

3.2.1 Summary of Design

A summary of the general design of the key elements of the Project is given in **Table 3.1** below. The demarcation of permanent works for Hung Hom, Kai Tak and Diamond Hill area considered under this Project is illustrated in **Figure 3.1.1a to 3.1.3a**.

Table 3.1: Summary of Key Elements of SCL (HHS)

Key Elements	Location	Key Works Required
Stabling Sidings	HHS	• Construction of a train stabling sidings under the existing deck of Hung Hom Station • Construction of a fan area to the north of the train stabling sidings • Construction of tracks to the north and south of the stabling sidings to enable manoeuvring of trains to and from the stabling to the SCL (TAW-HUH) alignment • Construction of noise mitigation over the fan area and near the shunt neck.
Stations and its associated alignment and facilities	HUH Modification	• Construction of underground platforms • Modification work of HUH podium • Construction of plant rooms underneath HUH podium • Construction of ventilation shafts/plant and CLP transformer plant • Others such as utility diversion
	KAT	• Construction of Kai Tak Station and associated tunnels • Construction of underground refuge sidings of about 300m in length as part of the Kai Tak Station construction
	DIH	• Construction of the interchange station with existing Kwun Tong Line at Diamond Hill • Site formation to connect station to adjacent existing ground. • Construction of SCL (TAW-HUH) tunnel section approaching to Diamond Hill Station to suit the DIH location without DHS. • Others such as utility diversion in Diamond Hill CDA site arising from the deletion of DHS

3.2.2 Temporary At-Grade Works Sites/Areas

Figure 3.1.1 to **Figure 3.1.3** shows the locations and demarcations of all the at-grade temporary works sites/areas. To minimize the potential disturbance and impact to the public and environment, the major works sites/areas are typically located at the site of the permanent works. To support the construction of the Project, additional temporary works areas would be required within SCL scheme / project boundary for the provision of site office, storage of materials, utility, temporary traffic management scheme, temporary accesses / bridges, silos and ground treatment. The locations of works areas have been selected with consideration of their accessibility and suitability for construction works and future permanent facilities. The EIA report has included locations of the works sites/areas for the Project and indicated the extent of SCL scheme / project boundary (as indicated in **Appendix 3.1**) within which minor activities/ works for supporting the construction of the Project may occur based on the latest information at the time of writing. These are illustrated in **Figure 3.1.1 to Figure 3.1.3**. Subject to actual site conditions and constraints, minor preparatory works could also be required to be conducted in and around the boundary indicated in the EIA report. However, these would only be short-term without inducing major environmental implications to nearby sensitive receivers. With the implementation of appropriate standard control measures and good site practices for construction works, no adverse environmental impact would be anticipated.

3.3 Consideration of Alternative Construction Methods

3.3.1 Train Stabling Sidings and Hung Hom Station

HHS and HUH are located within the densely built up area in Hung Hom. The lack of space available at the surface for locating HHS and HUH and the need of connecting to future SCL (TAW-HUH) alignment poses constraint on the location and design of HHS and HUH and thereby limited the options of construction methods available.

The tentative construction methodologies for the HHS and HUH are summarized below.

Table 3.2: Tentative Construction Methods for HHS and HUH

Key Design Elements	Tentative Construction Methodologies
HHS	<u>Train stabling sidings under the existing deck of Hung Hom Station</u> • Piling for underpinning of existing structure • General concreting work • At-grade track laying • General utilities <u>Fan area to the north of the train stabling sidings</u> • At-grade track laying within a trough structure • Installation of semi-enclosures with piled support (see **Section 8.6)** • General utilities <u>Shunt neck to the north of the train stabling sidings</u> • At-grade track laying within a trough structure • Construction of tunnel box under Chatham Road North • Installation of vertical noise barriers (see **Section 8.6)** • General utilities <u>Launching and retrieval tracks to the south of the train stabling sidings</u> • At-grade track laying within a trough structure • General utilities
HUH Modification	<u>Hung Hom Station and Associated Plant Rooms</u> • D-wall, Pre-bored H-piles and barrettes for foundation

Key Design Elements	Tentative Construction Methodologies
	• Underpinning Scheme • General concreting works <u>Ventilation shafts and plant rooms</u> • Pre-bored H-piles for foundation • Relocation of facilities displaced by HHS <u>Others such as utility diversion</u> • Typical smaller scale excavation, concreting etc

Both the stabling sidings and HUH will be located underneath the existing podium. Two construction methods were considered appropriate for further investigation for the areas under the existing podium, which are:

- Temporary Open Deck Scheme; or
- Underpinning Scheme.

<u>Temporary Open Deck Scheme</u>

This construction method is to "remove" the constraints imposed by the existing podium deck arrangements. The affected part of the existing podium deck would need to be demolished prior to the construction of SCL tunnels.

In order to minimize any potential implication to existing infrastructure (e.g. HKC, existing Hung Hom Station, Metropolis Tower, Metropolis Residence and Harbour Plaza Metropolis), a staged construction scheme must be developed to minimize the duration and extent of podium deck to be removed at any one time. The main tunnel works for SCL would be deferred until after each stage of podium deck reconstruction is completed, with only the temporary cofferdam walls being installed at each stage of the deck removal. Temporary reprovisioning of the affected HKC facilities would also be required.

<u>Underpinning Scheme</u>

This construction method is to construct new foundations and columns to underpin the existing podium deck structure. Once the loading is successfully transferred to the new supporting structure, those columns and foundations which are obstructing the SCL tunnel are able to be demolished.

The underpinning works are more complex than the open deck scheme as the mid-level walkway and plant room locations must be maintained throughout construction (as the facilities will remain open) and the headroom under these structures must be limited to 5m. The CLP substation and chiller plant room which serve the existing HUH will also be required to be maintained during all construction stages. In addition, no cofferdam wall could be undertaken within this area as maintenance access will be required. However, in order to avoid impact with existing foundation locations, the alignment of the cofferdam wall and temporary retaining wall will require precision engineering.

After the underpinning works, the connection between the column base and the pile cap can be cut. An excavation with layers of strut and waling can then commence in stages and a bottom up method could be used. Underpinning schemes have been modified to minimize the engineering difficulties as this is the scheme favoured by stakeholders such as HKC due to minimal interference with their activities.

The benefits and constraints of the two construction methods are compared in **Table 3.3**.

Table 3.3: Benefits and Constraints of the Proposed Construction Methods

Station Works Construction Method	Benefits	Constraints
Temporary Open Deck Scheme	• Easier construction method and simple form of design. • No need for long term continuous inspection and maintenance of permanent bearings. • Shorter construction programme.	• A staged construction scheme has to be developed to minimise as much as possible the duration and extent of podium deck to be removed at any one time. • Temporary reprovisioning of the affected HKC facilities would also be required which will have concern from HKC due to the potential interference on activities. • Since part of the deck needs to be demolished and some of the construction activities will be exposed. Relatively higher construction noise and dust will be anticipated. Additional mitigation measures would be required to minimize the impact.
Underpinning Scheme	• This method in general is favoured by stakeholders, such as HKC due to minimal interference with their activities. • Less environmental impacts, through reduction in construction noise, dust and waste. • Less impacts on community through reduction in construction noise and dust; • Existing evacuation route and emergency vehicular access for the HKC would not be affected. • This method can be modified to minimize the engineering difficulties.	• More difficult construction method and very complex in design. • Continuous inspection and maintenance of permanent left in place bearing in future are required. • Longer programme is expected for underpinning due to the complexity of works.

Since the temporary open deck scheme requires demolition of part of the deck and resulting exposure of major construction activities, nearby sensitive receivers would experience adverse construction noise and dust impact and require additional mitigation measures. Furthermore, HKC operator, LCSD, raised objection to the use of temporary open deck scheme. Therefore the underpinning option has been selected as the preferred construction method for HHS and HUH.

As constrained by the geographical and engineering constraint, the approach tracks in north fan area, shunt neck and launching/retrieval and emergency tracks are located at grade level. Therefore, it is considered appropriate to adopt traditional construction methodology as described in **Table 3.2** and it would be futile to seek out alternative construction methods.

3.3.2 DIH and KAT

Both DIH and KAT would be underground. Their tentative construction methodologies and associated entrances are summarized in **Table 3.4**.

Table 3.4: Tentative Construction Methods for DIH and KAT

Key Design Elements	Tentative Construction Methodologies
KAT	Underground Station • Foundation is constructed by open-cut method. Underground Refuge Sidings • The refuge sidings would be within the temporary works areas of KAT. Typical open cut for tunnel construction as part of the KAT Station construction would be required. KAT Associated Tunnel • Cut and cover
DIH	Underground Station • Station foundation would employ either bored piles or D-walls and the underground structure will be constructed by in-situ concreting • SCL (TAW-HUH) tunnel section approaching to Diamond Hill Station by bored tunnelling. . Others such as utility diversion • Typical smaller scale excavation, concreting etc

A cavern station could be constructed by drill-and-blast method to minimise disturbance to surrounding areas, only if it situates within hard rock zone with sufficient rock cover to the station crown. However, DIH and KAT will situate in soft ground, drill-and-blast method would not be applicable and DIH and KAT will adopt cut-&-cover and open cut method respectively.

3.4 Implementation Programme

According to the latest programme, the construction works for the Project would commence in 2012 with completion in 2018.