

## 3 Project Description and Construction Methodology

### 3.1 General Alignment

As discussed in **Section 2**, the SCL (TAW-HUH) is an approximately 11km long extension of the Ma On Shan Line (MOL) from Tai Wai through new stations, including Hin Keng Station (HIK), Diamond Hill Station (DIH), Kai Tak Station (KAT), To Kwa Wan Station (TKW), Ma Tau Wai Station (MTW), Ho Man Tin Station (HOM) and connects the West Rail Line at Hung Hom Station (HUH). Most of the sections would be underground except for a section at Hin Keng, and another section at Hung Hom, where the alignments need to be raised and linked with the Ma On Shan Line and the West Rail Line respectively to form a strategic east-west rail corridor (see **Section 2.5**). The underground sections of the alignment would be constructed by various construction methods including drill-and-blast, cut-&-cover, bored tunnelling, and mined method. Open cut/ cut-&-cover method will be employed for the tunnel portals at Hin Keng and Hung Hom North Fan area, 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 (TAW-HUH) will interchange with the Kwun Tong Line Extension (KTE) and the SCL (MKK-HUH) at HOM and HUH respectively. As discussed in **Sections 2.3.3 and 2.3.4**, the HOM and HUH are part of other Designated Projects to be separately implemented.

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

The SCL (TAW-HUH) will also form an important part of the proposed KTD, 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. office, general storage, barging facilities, magazine sites etc.) are shown in **Figure 1.2**.

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.

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

#### 3.1.1 Tai Wai to Diamond Hill

The SCL (TAW-HUH) departs from the existing Ma On Shan Line at south of Tai Wai Depot. Leaving the Tai Wai Depot, the track would maintain on embankment and connecting to HIK which is an elevated station.

After departing from HIK with a section of viaduct and embankment, the alignment then heads towards the Hin Keng portal at the west 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. The vertical alignment and construction method have also been specially designed to totally avoid Tei Lung Hau Stream and the secondary woodland in Tai Wai (See **Figure 3.1A**).

From the Lion Rock Country Park, the alignment runs towards Ma Chai Hang and Wong Tai Sin. The SCL (TAW-HUH) would interface with the existing KTL at DIH located directly below Lung Cheung Road. SCL (TAW-HUH) passengers would be able to interchange with KTL at this station.

A train stabling sidings would be constructed in the former Tai Hom Village south of DIH.

### **3.1.2 Diamond Hill to To Kwa Wan**

After leaving the DIH, the SCL (TAW-HUH) runs adjacent to the Tate's Cairn Viaduct and crosses Prince Edward Road East to reach KAT within the Kai Tak Development area, currently a vacant site but with planned future residential and commercial developments.

The alignment runs towards southwest and enters TKW near Sung Wong Toi Garden.

### **3.1.3 To Kwa Wan to Hung Hom**

The alignment runs below Ma Tau Chung Road/ Ma Tau Wai Road towards west and reaches MTW. The areas along Ma Tau Chung Road/ Ma Tau Wai Road comprise high density of multi-storey buildings, including residential, commercial and industrial buildings.

After leaving MTW, the alignment passes Ko Shan Road and joins HOM at the intersection of Fat Kwong Street and Shun Yung Street. HOM, to be implemented by other Designated Project, is also an interchange station at which passengers can interchange between SCL (TAW-HUH) and KTE.

After leaving HOM, the alignment runs below the Winslow Street underpass and the Chatham Road North embankment and then pass through the HUH portal adjacent to Sai Sing Funeral Parlour. Out of the HUH portal, the alignment runs at-grade and heads to HUH.

The tracks for SCL (TAW-HUH) within extension of the HUH area would be at-grade and would eventually join the existing WRL tunnel near to the junction of Salisbury Road and Science Museum Road.

The SCL (TAW-HUH) would interface with the SCL (MKK-HUH) and SCL (HUH-ADM) at new HUH to be implemented by other Designated Project. Passengers would be able to interchange at this station.

The HUH would be entirely under the existing podium deck.

### **3.1.4 Vertical Alignment**

As discussed in **Section 2.1.1 to 2.1.3**, the alignment will run through different areas in Tai Wai, Wong Tai Sin, Diamond Hill, Kai Tak, To Kwa Wan and Hung Hom. Most of these areas are relatively flat terrains except for the areas in Lion Rock and Chuk Yuen. The vertical profile of SCL (TAW-HUH) is provided in **Appendix 3.1**.

## **3.2 Key Design Elements**

### **3.2.1 Need for Short At-Grade and Above-Grade Sections**

The use of tunnel would help to contain train induced air-borne noise that may be affecting neighbouring noise sensitive receivers, especially in an urban setting where noise sensitive receivers could be very close to the alignment. Optimising the tunnelling section has therefore been one of the important exercises conducted throughout the design process.

Out of the 11km long alignment of SCL (TAW-HUH), tunnel section would occupy about 8km which is more than 70% of the total length. However, since the SCL (TAW-HUH) has to connect the existing West Rail Line at Hung Hom and the Ma On Shan Line at Tai Wai to form an east west strategic rail corridor, the vertical levels of SCL (TAW - HUH) at these 2 sections have to be raised to join these existing rail accordingly. These 2 sections would therefore inevitably need to be at-grade or on viaduct instead of in the form of a tunnel. The noise impacts of these 2 at-grade or viaduct sections have been assessed. Noise mitigation measures including noise barrier have been recommended.

As discussed in **Section 3.2.4**, in order to avoid directly affecting Tei Lung Hau stream and the neighbouring secondary woodland, the proposed tunnel has been designed to pass underneath the stream and the secondary woodland until emerging above ground level over 100m away from the stream. After that the at-grade/ elevated section will be fully enclosed

until reaching HIK. Hence, only the enclosure for the at-grade section and the elevated section would be seen by the neighbouring visual sensitive receivers. For the construction of this section, excavation will be carried out along the road side slopes and a working shaft will also be excavated at the existing slope adjacent to Tei Lung Hau stream.

There are 2 tunnel portals in Hung Hom. The north approach portal is located near Chatham Road North which allows the tracks from HOM to raise and join the at-grade tracks in HUH. A concrete trough would be required for the section just outside the portal (see **Figure 3.1.8**). The existing south approach portal is located at the interface with the West Rail Tunnel (see **Figure 3.1.8**). A concrete trough is also required to allow for interface between tunnel and at-grade section.

### **3.2.2 Need for Ventilation Building at Ma Chai Hang**

Tunnel ventilation is an essential operational and safety requirement for an underground railway system. The majority of the ventilation shafts for the tunnel sections in SCL (TAW-HUH) are located within or very close to the station footprint to minimise the land intake and hence the impacts on landuse. Each station would also be designed with a number of ventilation shafts to optimise the dimension of the above ground structures and hence lessen the associated visual impacts.

The tunnel section from Hin Keng to Diamond Hill which is about 4.2km long. A sizeable ventilation building would therefore be required to meet the technical requirements. The Fire Services Department requires that within an individually ventilated section inside a tunnel, only one train is allowed. To achieve the ultimate headway, three trains in each track will need to be operated inside the tunnel between Hin Keng and Diamond Hill. Hence, a ventilation building must be constructed between Hin Keng and Diamond Hill in order to separate each tunnel into three ventilation sections. The Ma Chai Hang Recreation Ground is a strategic location that would have the following advantages:

It is located outside the Lion Rock Country Park where no significant ecological impacts is anticipated;

- It does not affect the existing slopes to avoid extensive engineering work that would have adverse impact on both landscape and existing buildings foundation;
- No major site formation work is required and hence the amount of spoil generated would be less;
- A shaft has to be constructed there for construction of the tunnel towards Hin Keng and the tunnel towards Diamond Hill. By using the works shaft as the ventilation shaft, it will greatly reduce the total amount of land take in the district.

Locating a ventilation building within the Lion Rock Hill area has been considered. However, it is proved technically not feasible due to the extreme depth between the ground level and the proposed running tunnel. Lacking of proper access to the ventilation building within the Lion Rock Hill area is also a concern. In addition, locating a ventilation building within the Lion Rock Hill area would also likely have certain impacts on ecology and hence is not preferred from an environmental perspective.

For the feasibility of locating a ventilation building within Wong Tai Sin district, the open area at Chuk Yuen Estate was initially considered and reviewed at the beginning of preliminary design. However, the alignment is found to be infeasible (refer **Section 2**) and hence the site would not be considered for use as a ventilation building.

Other locations have also been considered but discarded due to the extreme technical difficulties, effect on existing buildings and slopes, and the fact that a shaft has to be constructed at Ma Chai Hang Playground.

### **3.2.3 Integrating the Tunnel Ventilation Building with HIK**

As discussed above, a tunnel ventilation building is also required near the HIK. Two options had been considered on the location of this ventilation building. The original option is to have the ventilation building close to the tunnel portal. This has the advantage of reducing the tunnel length slightly by about 250m which in turn reduce the size of the ventilation building. However, this option would place a permanent structure at the slope directly opposite to Hin Keng Estate and would induce more adverse landscape and visual impacts on the neighbouring visually sensitive receivers such as the residential towers at the south of Hin Keng Estate.

The other option is to move the ventilation building north and integrate with the HIK. This would provide an excellent opportunity to integrate the design of the ventilation building together with the station (see **Section 5** for more details). Although it would increase the tunnel length, the extra tunnel length from the portal to HIK of about 250m would only constitute about 10% of the total tunnel length from Hin Keng to Ma Chai Hang. Furthermore, locating it at HIK will save some spoil disposal as compared with the option of locating it at the tunnel portal, due to reduction of extents of earthworks. Moreover, this would allow the at-grade/ elevated section adjacent to Hin Keng Estate to be fully enclosed. This design can help reducing the air-borne noise impact during operation on the residents nearby.

On this basis, it is considered that it is more environmentally friendly to integrate the ventilation building at Hin Keng with the HIK.

### **3.2.4 Avoidance of the Lion Rock Country Park, Natural Streams and Secondary Woodland in Tai Wai**

The ecological values of the Lion Rock Country Park, the natural streams and secondary woodland in Tai Wai have been one of the important considerations for designing the vertical alignment and the associated construction methodology for the portal in Tai Wai. In endeavour to preserve these habitats, the vertical alignment near the portal has been lowered as much as practicable such that all the engineering works would not encroach the country park boundary, the entire Tei Lung Hau Stream and the secondary woodland near the portal. The tunnel, to be constructed in the form of mined tunnelling, would only pass underneath the streams with adequate vertical separation of about 6m. Canopy tubes will be installed from the shaft structure and extend the full width of the stream. These canopy tubes with sieves along its length will be grouted and form a stable and low permeable 'umbrella' for further mining works to be carried out in stages. The canopy tubes beneath the stream area are within Completely Decomposed Granite (CDG) stratum, which is effective in terms of minimizing the drawdown of water table. There will be no construction work to the south of Tei Lung Hau Stream near Hin Keng Estate where the secondary woodland is located (see **Figure 3.1A**).

### **3.2.5 Need for Emergency Access (EA)/ Emergency Escape Access (EEA) / Emergency Egress Point (EEP)**

As a consideration of public safety, EA allows rapid access for fire-fighting personnel to reach the threatened area within a reasonable time to commence fire-fighting and rescue operations. Concurrently, EEA is also required to provide an effective means of escape to allow passengers to leave the incident zones within acceptable period of time.

The EA/EEA at Ma Chai Hang is located together with the Ma Chai Hang Ventilation Building (MCV) which is closest to the Lion Rock tunnel section to reduce the distance from HIK as much as practical. The size for the EA/EEA is minimal and it is well within the footprint of MCV.

The EA/EEA at Wong Tai Sin is carefully chosen to be in the mid way between MCV EA/EEA and Diamond Hill Station at the open area along Fung Tak Road. The EA/EEA is only a single storey structure with limited size and is therefore considered not intrusive to

the surrounding environment. Alternative locations were considered and deemed not feasible as they would encroach into either the existing buildings or roads.

The Tam Kung Road Emergency Egress Point (EEP) is situated at the road junction of Ma Tau Wai Road and Tam Kung Road. The building is designed to minimize visual impact by keeping the roof level as low as possible. The EEP is required to provide passengers with a safe egress from the tunnels to the ultimate point of safety during emergency.

### 3.2.6 Train System

As discussed in **Sections 1 and 2**, the proposed SCL (TAW - HUH) is a link to integrate the existing West Rail Line and Ma On Shan Line to form a strategic east-west rail corridor. The existing rolling stock being adopted in the West Rail Line and Ma On Shan Line are SP1900 and SP1950 respectively. Hence, it is essential that similar type of trains are adopted in SCL (TAW-HUH), or otherwise if alternative train system is used, the passengers would need to have more frequent interchange to different train system and this would greatly compromise the convenience provided by the railway system.

### 3.2.7 Summary of Design

A summary of the general design of SCL (TAW-HUH) is given below:

**Table 3.1:** Summary of design of SCL - Tai Wai to Hung Hom Section

Type	Location	Design
Alignment sections	Tai Wai Depot	At-grade
	Tai Wai Depot to HIK	Embankment
	HIK to HIK Portal	Viaduct + Embankment + Tunnel
	HIK Portal	Embankment
	HIK Portal to DIH	Tunnel
	DIH to KAT	Tunnel
	KAT to TKW	Tunnel
	TKW to MTW	Tunnel
	MTW to HOM	Tunnel
	HOM to HUH Portal	Tunnel
	HUH Portal	From Tunnel to At-grade
	HUH Portal to WRL Tunnel	At-grade section
Stations	HIK	Elevated station
	DIH	Underground station
	Diamond Hill Stabling Sidings (DHS)	Semi-underground
	KAT	Underground station
	TKW	Underground station
	MTW	Underground station
	HOM <sup>[1]</sup>	Underground station (by other Designated Project)
	HUH <sup>[1]</sup>	Semi-underground station (by other Designated Project)
Ventilation Building	Ma Chai Hang	At-grade structure
Emergency Access/Emergency Escape Access (EA/EEA)	Ma Chai Hang	Integrated with Ma Chai Hang Ventilation Building
	Wong Tai Sin	At-grade structure

Type	Location	Design
Emergency Egress Point (EEP)	Tam Kung Road	At-grade structure

Notes:

- [1] The HOM would be implemented under the KTE. The HUH would be implemented under the SCL (MKK-HUH). Their cumulative impacts have been addressed in different sections of this EIA to fulfil the requirements of the EIA study Brief.

### 3.3 Implementation Programme

According to the latest programme, the construction works for SCL (TAW-HUH) would commence in 2012. All major civil contracts would be completed by 2016. The remaining works including station fit-out, track layout etc would be completed by 2018.

### 3.4 Proposed Construction Methodology

#### 3.4.1 Alignment Sections

As discussed in **Section 3.2.1**, the proposed Project would be constructed mostly in tunnel except for a viaduct and an embankment section in Tai Wai and an at-grade section in Hung Hom. 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 3.1.1 to 3.1.8** 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 3.2** below. **Figures 3.2.1 to 3.2.8** show the locations and demarcations of all the at-grade temporary works sites. Three rock crushing facilities each with design capacity of about 500 tonnes per day would be operating within the tunnels to be constructed in Hin Keng, Ma Chai Hang and Shansi Street. **Appendix 3.2** shows the typical construction sequence for tunnelling and portal construction. Barging facilities are separately shown as off-site works areas in **Section 3.2.5**.

**Table 3.2:** Tentative construction methods for different alignment sections

Section	Form	Tentative Construction Method	Selection Reason
Tai Wai to HIK and Hin Keng Portal	At grade + Embankment + Viaduct + Cut-&-cover	<p>Typical viaduct construction:</p> <ul style="list-style-type: none"> <li>The substructure could be in a form of column pier with pier head.</li> <li>The box girder viaduct would be constructed by cast in-situ method supported on traditional falsework.</li> </ul> <p><u>Embankment/ At grade</u></p> <ul style="list-style-type: none"> <li>The semi-to fully underground portion of tunnel box facing Hin Keng Estate before entering Hin Keng Portal would be constructed by typical cut-&amp;-cover method.</li> </ul> <p><u>Portal</u></p> <ul style="list-style-type: none"> <li>Hin Keng Portal will be constructed by mined tunnel method to avoid ecological impact on Tei Lung Hau stream</li> </ul>	The method of constructing this section is dictated by the existing track level at high level on the embankment north of HIK which the SCL (TAW-HUH) must join. The existing tracks also connect to the Tai Wai Depot which must remain operational before and after opening of the SCL (TAW-HUH). The alignment south of HIK must remain in viaduct in order to cross Hin Keng Road and will be landed on an embankment inside Hin Keng Estate.
Hin Keng Portal	Tunnel	Drill-&-blast tunnelling:	The use of tunnelling in this

Section	Form	Tentative Construction Method	Selection Reason
to Ma Chai Hang		<ul style="list-style-type: none"> <li>A small section of mined ground tunnelling would be constructed at Hin Keng Portal. The construction would avoid the Tei Lung Hau freshwater stream and the neighbouring secondary woodland.</li> <li>The long tunnel between Hin Keng Portal and Ma Chai Hang (underneath the Lion Rock Country Park) will mainly be constructed by drill-and-blast method. Drill-&amp;-blast operations will commence when the work face is about 100m into the tunnel due to the soft ground works near the tunnel portal. Rock crushers will also be operating within the tunnel area.</li> <li>A ventilation building constructed by cut-&amp;-cover method, will be located at the Ma Chai Hang Recreation Ground.</li> </ul> <p>(NB There is no at-grade construction activities within the Lion Rock Country Park. All the construction works within the Lion Rock Country Park would be underground.)</p>	<p>section would provide a vertical separation of about 6m from the Tei Lung Hau stream. In addition, canopy tubes will be installed from the shaft structure and extend the full width of the stream, which will form a stable and low permeable 'umbrella' within granite level Completely Decomposed Granite (CDG) stratum, minimizing the drawdown of water table.(see <b>Figure 3.1A</b>). Drill and blast tunnelling is a commonly employed method under such geological condition. As the tunnel is within bed rock and deep under the Lion Rock, the drill and blast operation will have no impact to the buildings atop (i.e. Tsui Chuk Garden).</p>
Ma Chai Hang to DIH	Tunnel	<p>Bored tunnelling:</p> <ul style="list-style-type: none"> <li>A TBM launching chamber is planned at Ma Chai Hang Recreation Ground. The retrieval chamber is located at the west end of DIH.</li> </ul>	<p>The use of bored tunnelling in this section would ensure that there would be insignificant impacts on ground water level and minimise construction phase impacts to the neighbouring sensitive receivers.</p>
DIH to KAT	Tunnel	<p>Combination of cut-&amp;-cover and bored tunnelling:</p> <ul style="list-style-type: none"> <li>The mainline tunnels between DIH and Kai Tak north would be constructed by bored tunnelling. The TBM launching shaft would be located at Kai Tak north and the TBM retrieval chamber would be located at DIH.</li> <li>The stabling entry tracks from stabling sidings to Kai Tak Development area would be constructed by cut-</li> </ul>	<p>Bored tunnelling, mined tunnelling and cut-&amp;-cover tunnelling would be used as far as practicable.</p> <p>The reason for adopting the cut-&amp;-cover design is due to the shallow soil cover to the tunnel crown of DHS stabling entry tunnels and the acute tunnel connection between DHS stabling entry tunnels and mainline tunnels.</p>

Section	Form	Tentative Construction Method	Selection Reason
		&-cover method and bored tunnel. TBM retrieval shaft would be located at south of Choi Hung Road.	
DHS	Semi-underground	<ul style="list-style-type: none"> <li>The DHS and the associated tunnels from the stabling siding to the entry tracks near south of Choi Hung Road will be constructed by cut-&amp;-cover method.</li> </ul>	Given the semi-underground nature of the Stabling Sidings, its construction would require a cut & cover method.
KAT to TKW	Tunnel	<p>Cut-&amp;-Cover tunnelling:</p> <ul style="list-style-type: none"> <li>The tunnels would pass under the Former Kowloon City Pier and 1924 Seawalls.</li> <li>For the tunnel section between Former Kowloon City Pier and KAT, trench excavation within braced cofferdam has been proposed to preserve buried seawall steps of the 1924 seawall north of the tunnel alignment that would otherwise be disturbed by open cut excavation. The 1924 seawall will be exposed in the trench excavation nearer KAT. For the tunnel section directly under the Former Kowloon City Pier buffer zone (for a section of about 40m), mined tunneling with a vertical separation of 1.8m – 2.2m between the bottom of the piers and the top of the tunnel structure would be included.</li> </ul>	The reason for adopting the cut-&-cover design is that tunnels between KAT and TKW will be constructed in railway reserves inside future residential development sites in Kai Tak Development. Provisions have been made for future development foundations and basement to be constructed in close proximity to these tunnels. Cut-&-cover form of tunnels will provide more flexibility for future basement construction under this special arrangement.
TKW to MTW	Tunnel	<p>Bored tunnelling:</p> <ul style="list-style-type: none"> <li>The tunnels between the south end of TKW and the north end of MTW are located within the dense urban environment along Ma Tau Chung Road/ Ma Tau Wai Road.</li> <li>TBM launching shaft is planned at the southern end of TKW and the retrieval shaft at the Shanshi Street Carpark. A rock crusher will also be operating within the tunnel section.</li> <li>There would not be any at-grade construction activities</li> </ul>	The use of bored tunnelling in this section would ensure that there would be insignificant impacts on ground water level and minimum construction phase impacts to the neighbouring sensitive receivers.



Section	Form	Tentative Construction Method	Selection Reason
		within this section except for the ground treatment works as necessary.	
MTW to HOM	Tunnel	<p>Combination of bored tunnelling and drill-&amp;-blast tunnelling:</p> <ul style="list-style-type: none"> <li>• A circular construction works shaft is proposed at the existing open space car park at Shansi Street for the retrieval of TBM machine from MTW and provide access to tunnel works towards HOM.</li> <li>• Bored tunnelling method will be employed for the section between MTW and Shansi Street Carpark.</li> <li>• The 500m section of tunnels between works shaft at Shansi Street Carpark and HOM would be constructed as twin single-track tunnels. This tunnel section could be constructed by the drill-&amp;-blast method or TBM method. Based on the current design, the drill-&amp;-blast method is assumed.</li> </ul>	Bored tunnelling and drill-&-blast tunnelling would be used as far as practicable.
HOM to HUH	Tunnel + at-grade	<p>Cut-&amp;-cover tunnelling:</p> <ul style="list-style-type: none"> <li>• The tunnel section crossing Chatham Road North and near to Winslow Street would be constructed using cut-&amp;-cover method. Passing through the HUH portal adjacent to Sai Sing Funeral Parlour, it will become at-grade section with concrete open trough.</li> </ul>	Cut-&-cover tunnelling has been selected to represent worst case assessment scenario.
HUH to WRL Tunnel	At-grade	<p>Open Cut</p> <ul style="list-style-type: none"> <li>• The section between HUH section and the WRL stub tunnel would be constructed using open cut method</li> </ul>	Section between HUH and WRL stub tunnel runs downward from the at-grade HUH to semi-underground at the stub tunnel portal, which is proposed to be constructed by open-cut.

\*See **Appendix 3.3** for general discussion of tunnelling methods and their general environmental considerations.

It should be noted from the above table that more environmentally friendly approaches such as bored tunneling, drill-&-blast and mined tunneling which do not require much at-grade construction activities have been adopted as much as possible in urban areas where sensitive receivers are located much closer. There are however some tunnel sections that these construction methodologies are not practically feasible and hence cut-&-cover tunneling has to be adopted. A summary of these tunnel sections is given in below:

**Table 3.3:** Sections adopting cut-&-cover tunnel method

Section	Length of Cut-&-Cover Tunnel	Reason for Requiring Cut-&-Cover Tunnel
Tai Wai to HIK and Hin Keng Portal	280m (viaduct and at-grade structure)	<ul style="list-style-type: none"> <li>The section of tunnel adjacent to Hin Keng Estate access road is partly above ground.</li> </ul>
DIH to KAT	230m	<ul style="list-style-type: none"> <li>The mainline tunnels from DIH toward KAT are constructed by TBM method until reaching Kai Tak Development area where the DHS entry track will have to connect to the mainline tracks with turnouts which cannot be accommodated in the TBM tunnels. The extent of the cut and cover has been minimised by driving the TBM through a number of chambers for these turnouts.</li> </ul>
KAT to TKW	780m	<ul style="list-style-type: none"> <li>Tunnels between KAT and TKW will be constructed in railway reserves inside future residential development sites in the Kai Tak Development. Provisions have been made for future development foundations and basement to be constructed in close proximity to these tunnels. Cut and cover form of tunnels will provide more flexibility for future basement construction under this special arrangement.</li> </ul>
HOM to HUH	500m	<ul style="list-style-type: none"> <li>For tunnel section crossing Chatham Road North, the shallow soil cover to tunnel crown and also the complexity of existing ground conditions will induce high construction risk if underground mining or bored tunnelling by TBM method is adopted. As a result, cut-&amp;-cover method has been proposed.</li> </ul>

### 3.4.2 Stations and Entrances

Except for HIK and HUH, all the other stations would be underground. Their tentative construction methodologies and associated entrances are summarized below.

**Table 3.4:** Tentative Construction Methods for Stations and Entrances

Stations and Entrances	Tentative Construction Methodologies
HIK	<p><u>Elevated Station:</u></p> <ul style="list-style-type: none"> <li>The station foundation would employ bored piling and the superstructure will be constructed by in-situ concreting.</li> </ul>
Other stations including: <ul style="list-style-type: none"> <li>DIH</li> <li>DHS</li> <li>KAT</li> <li>TKW</li> <li>MTW</li> </ul>	<p><u>Underground Stations:</u></p> <ul style="list-style-type: none"> <li>For stations other than KAT, the station foundation would employ either bored piles or D-walls and the underground structure will be constructed by in-situ concreting.</li> <li>For KAT, the foundation is constructed by open-cut method.</li> </ul>

Note:

The construction for HOM and HUH will be implemented under other Designated Projects

As all proposed stations will situate in soft ground (except HOM which would be implemented by another designated project), cut-&-cover method will be deployed for all stations excepted for KAT and TKW, which would be constructed by open-cut and cut-&-cover method respectively.

### 3.4.3 Ventilation Building

As discussed in **Section 3.2.2**, there is only one separate ventilation building in Ma Chai Hang for SCL (TAW-HUH). The ventilation shaft in Tai Wai has been integrated with the

HIK to minimise landscape and visual impacts (see **Section 3.2.3**). Other stations would have ventilation shafts as necessary.

The ventilation building is above-grade and would be constructed by typical building construction methodologies. Key stages of the construction for ventilation buildings include the following:

- Foundation construction (either by bored piling or diaphragm wall);
- Superstructures (typically by in-situ concreting); and
- Architectural landscaping and builder's works.

#### 3.4.4 Tunnel Portals

There are 2 portals for the proposed Project, one at Hin Keng and one at Hung Hom at the STT car park at Winslow Street.

Their construction methodologies are summarized below:

**Table 3.5:** Tentative construction method for portals

Portals	Tentative Construction Methodologies
Hin Keng	<ul style="list-style-type: none"> <li>• Mined tunnel/ cut-&amp; cover</li> </ul>
Hung Hom	<ul style="list-style-type: none"> <li>• cut &amp; cover</li> </ul>

For the tunnel underneath Lion Rock, the spoil would be transporting from the portal at Hin Keng and the construction shaft at Ma Chai Hang. Spoil will be transported along Che Kung Miu Road and then Tai Po Road to various barging facilities. For the construction shaft at Ma Chai Hang, spoil will be transported along Ma Chai Hang Road and then Lung Cheung Road to barging facilities.

In addition to the Hin Keng portal, spoils would also be excavated out from three other main construction shafts located at Ma Chai Hang, Kai Tak and Shansi Street respectively. They would be transported to the barging facilities by trucks.

The number of trucks required for transporting the spoil to the barging facilities would vary depending on the activities to be conducted, the construction programme and actual site conditions. Nonetheless, as the mucking out points are located within urban areas, it is envisaged that the trucks from these points would not result in an increase in the prevailing traffic to a level that would cause an adverse environmental impact. Furthermore, spoils on the trucks would be fully covered and their wheels would be washed before leaving the mucking out points. Therefore, adverse environmental impacts would not be anticipated.

#### 3.4.5 Temporary Works Sites / Areas

In addition to the temporary works sites in the vicinity of the tunnel and station structures, there are some off-site temporary works sites / areas to facilitate the construction process. **Figures 3.3.1 to 3.3.6** show the locations of the off-site temporary works areas. These off-site temporary works areas are summarized below:

**Table 3.6:** Tentative uses for off-site temporary works areas

Off-Site Works Areas	Proposed Uses	Selection Reasons
Kai Tak Runway	<ul style="list-style-type: none"> <li>• Barging activities (sediment removal is required)</li> <li>• Approximately 39,500 m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Close to mucking out points with shorter traffic route</li> </ul>
Freight Pier at Hung Hom <sup>[1]</sup>	<ul style="list-style-type: none"> <li>• Barging activities (sediment removal not required)</li> <li>• Approximately 43,000 m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Close to mucking out points with shorter traffic route</li> </ul>
TKO Area137	<ul style="list-style-type: none"> <li>• Magazine site</li> <li>• Approximately 11,100 m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Far away from receivers</li> </ul>

Off-Site Works Areas	Proposed Uses	Selection Reasons
Ma On Shan (Heng On and Tai Shui Hang)	<ul style="list-style-type: none"> <li>Contractor site office</li> <li>Workshop</li> <li>Storage of materials and equipment</li> <li>Approximately 7,430 m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>Close to works sites</li> </ul>
Shek Mun (in Shatin)	<ul style="list-style-type: none"> <li>Contractor site office</li> <li>Workshop</li> <li>Storage of construction materials and equipments</li> <li>Approximately 31,100m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>Close to works sites</li> </ul>
Pak Tin	<ul style="list-style-type: none"> <li>Temporary storage area</li> <li>Workshop</li> <li>Approximately 2,100 m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>Close to works sites</li> </ul>

Note:

[1] Shared use with KTE and SCL (MKK-HUH).

It should be noted that, other than the works area for the sediment removal works for the barging facility at Kai Tak Runway, all the off-site works areas have been previously employed as temporary car parks or works areas under other infrastructure projects. It is not necessary to increase the footprints of these off-site temporary works areas for the SCL (TAW-HUH).

All the trees affected by the construction of SCL (TAW-HUH) would be compensated within the project boundary as far as possible. However, due to the availability of on-site areas, some of the compensatory trees may need to be planted off-site. The locations of these off-site tree reception areas are yet to be decided and subject to the tree felling applications. Some possible sites that may be considered include Long Valley, Ho Sheung Heung Priority Site and along Ng Tung River. These off-site tree reception areas may also need to be shared among different railway projects including but not limited to other sections of the SCL.

For the Barging Facility at Kai Tak, the nearest ASRs and NSRs would be the planned residential premises near KAT (KAT-P1-6) which would be more than 1350m away. The fugitive dust assessment and construction noise assessment are given in **Section 7.6.5** and **Section 8.3.7** respectively. Results indicated that the Barging Facility would not cause unacceptable air quality and noise impacts.

For the Freight Pier at Hung Hom, cumulative fugitive dust and noise impacts from SCL (MKK-HUH) & SCL (HUH-ADM) and KTE have included the construction activities within the Freight Pier (See **Section 7.6.7** and **Section 8.3.9** respectively). Results indicated that the cumulative fugitive dust and construction noise impacts on the neighbouring sensitive receivers would comply with the respective criteria.

For TKO Area 137, there are no ASRs and NSRs within 1200m and hence adverse impacts are not anticipated.

For the temporary works areas at Ma On Shan, Shek Mun and Pak Tin which would be used for site accommodation, workshop and temporary storage area, there would be no heavy construction activities carried out and the noise would mainly be generated by the initial construction of the site accommodation, the movement of site vehicles, the relatively infrequent use of cranes for loading / unloading of construction materials and also the final reinstatement of the site. Majority of these activities would only be conducted during daytime or the Contractor would be required to apply for a CNP from EPD separately. Any fugitive dust impacts caused by these general activities would also be very limited. On this

basis, the temporary works areas at Ma On Shan, Shek Mun and Pak Tin are unlikely to cause adverse construction impacts on the neighbouring sensitive receivers.

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 3.4**) 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 3.2.1 to Figure 3.2.8**. Subject to actual site conditions and constraints, minor preparatory works could also be required to be conducted in and around the project 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.