16 Conclusion

16.1 Overall

An EIA Report has been prepared for Shatin to Central Link - Tai Wai to Hung Hom Section SCL (TAW-HUH) to satisfy the requirements given in the EIA Study Brief ESB-191/2008 and the Technical Memorandum on Environmental Impact Assessment Process. All the latest design information has been incorporated into the EIA process. Aspects that have been considered in this EIA Report include:

- Consideration of alternative alignment options
- Description of construction methodology
- Cultural heritage
- Ecological impacts
- Landscape and visual impacts
- Construction dust
- Airborne noise
- Groundborne noise
- Water quality
- Waste management
- Land contamination
- Hazard to life
- Environmental monitoring and auditing

All the existing and planned environmental sensitive receivers in the vicinity of the alignment have been identified by conducting site surveys and reviewing relevant planning information. The receivers identified include residential blocks, schools, quarters, performance venues, and heritage buildings. These receivers have all been considered in this EIA study.

16.2 Alignment Evaluation

Two alignment options have been considered. The main difference is the portion from KAT to MTW. The original alignment runs along To Kwa Wan Road after KAT before joining HOM. In order to serve the population better, the alternative alignment scheme has been designed to run along Ma Tau Chung Road/ Ma Tau Wai Road. The TKW is also relocated to the western side of Kai Tak Development area adjacent to Olympic Avenue, whereas MTW is relocated to Ma Tau Wai Road adjacent to Ma Tau Wai Road/ To Kwa Wan Road Garden. Both TKW and MTW will be moved closer to existing and future population centres and will serve a larger population.

Both the original and alternative alignments are similar in total length, construction methods, amount of spoil generated. Also, the number of stations and ventilation buildings will be identical in the two schemes. The number of environmental sensitive receivers from noise, air quality, visual, ecology etc would be similar. The alternative alignment, however, will experience higher impacts on built heritage, which could be readily mitigated by proper engineering solutions. However, the alternative alignment would totally avoid the PHI consultation zone of the gas depot of China Gas Co at the junction of Ma Tau Kok Road and To Kwa wan Road. On this basis, the alternative alignment is selected as the preferred alignment for the EIA Study.

16.3 Construction Method

Various construction methodologies have been considered during the design process. Bored tunnelling has been adopted for the sections from Ma Chai Hang to KAT, and TKW to MTW. This will minimise the construction noise and dust impacts on the sensitive receivers in the vicinity. Most of the construction activities will be conducted underground except at the stations and EA/EEA/EEPs where lorries and cranes may be required. The disruption to the business activities along the alignment will also be minimised by using bored tunnelling.

Drill-&-blast tunnel will be constructed for the long tunnels within Lion Rock Country Park (between Hin Keng Portal and Ma Chai Hang) and between Shansi Street Carpark and HOM. Similar to bored tunnel, this would also help to minimize the nuisance during the construction phase.

Other tunnel sections and adits will be constructed by cut-&-cover technique. Road decks will be installed whenever necessary to facilitate traffic management during the construction period. These road decks will also help reducing construction noise and dust impacts on the neighbouring sensitive receivers.

16.4 Cultural Heritage Impact

Built heritage survey and archaeological survey have been conducted within the study area of the Project. Some archaeological sites, 16 graded historical buildings, 1 proposed graded historical buildings and a number of other buildings with historical merit but without grading are identified within the Study Area. However, there are no Sites of Cultural Heritage (namely Declared Monuments) in the Project Study Area.

Though the archaeological survey at former Tai Hom Village revealed the Tang/ Song Dynasty remains to be sparse and redeposited and hence of lesser archaeological significance, assemblage of Tang/ Song archaeological finds within urban setting is considered rare in Hong Kong. A survey-cum-excavation is recommended to be conducted at the former Tai Hom Village to recover the archaeological remains. A similar survey-cum excavation would also be conducted for the excavation area, where the open cut of TKW and the associated tunnel overlap with the Sacred Hill (North) Study Area.

Potential cultural heritage impacts associated with the construction and operation of SCL (TAW-HUH) on Lung Tsun Stone Bridge and Former Kowloon City Pier have been minimized by adopting alternative construction methodologies. Other measures have also been proposed to limit the influence to the Lung Tsun Stone Bridge and Former Kowloon City Pier. These include avoidance of at-grade works within buffer zones, shifting of tunnels alignments, maintaining a vertical separation distance and compensation grouting. It is considered that with these measures properly implemented, all potential influence to the Lung Tsun Stone Bridge and Former Kowloon City Pier due to the proposed tunnel construction will be limited and controlled.

The cultural significance and all possible options of the preservation of the 3 historical buildings within former Tai Hom Village, i.e Former Royal Air Force Hangar, Stone House (No. 4 Tai Koon Yuen) and Old Pillbox have also been studied. The physical conditions of the Former Royal Airforce Hanger and the Stone House No 4 are not satisfactory for total preservation. The condition of Pillbox is better and may be feasible for total preservation. A conservation plan would be separately submitted to agree on the most appropriate approach to preserve these 3 historical buildings. Depending on the recommendation on the conservation plan, part of the hangar together with a model would be displayed and the old pill box would be reinstated within the CDA Site.

Overall, it is considered that the cultural heritage impacts in the construction and operation phases are acceptable with mitigation measures.

16.5 Ecological Impact

Ecological considerations have been integrated into development of the Project. The Project has avoided impacts on recognized sites of conservation and other ecological sensitive areas (e.g. Lion Rock Country Park, fresh water streams at Hin Keng). Literature reviews of existing information with supplement findings from recent field surveys identified that terrestrial and marine habitats within the assessment area are of low ecological value.

Terrestrial habitats within the Study Areas are largely urban/ residential areas with high disturbance and low ecological value. Habitats affected will include 4.59ha grassland, 7.7ha plantation, 56.22ha urban/residential area, 0.21ha of channelized water course, 0.96 ha of wasteground, and 4.65ha benthic habitat (during dredging). Loss of secondary woodland has been avoided by adopting alternative engineering methodology.

At Hin Keng Portal, a permanent cut slope north of the natural stream will be formed on top which also serves as the new access road to the Towngas gas offtake station. Felling and transplanting of low value, plantation trees will be required. At the portal, mined tunnelling will be used to construct the tunnel towards Lion Rock Hill. 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 draw down of water table. No realignment or diversion of the Tei Lung Hau Stream will be required.

Marine habitats within the Study Area (Kai Tak Runway Barging Facility and Freight Pier Barging Facility) are generally of low of ecological value due to their highly artificial and disturbed nature. Species diversity and abundance in these habitats were low and no rare or restricted species was recorded. The species of conservation interest recorded within the assessment area only include a single species of common hard coral (*Oulastrea crispata*) which is common and widespread in other Hong Kong waters. Indirect impact on existing coral colonies and other macrofauna of the benthic environment during the dredging activities are considered to be minor.

Direct and indirect ecological impacts arising from the Project during the construction phase have been identified and evaluated. Most impacts are considered to be of low significance. Other indirect impacts arising from the Project would be temporary and considered as negligible in nature. Overall, no significant and unacceptable ecological impacts to terrestrial, freshwater or marine resources were anticipated in this assessment.

16.6 Landscape and Visual Impact Assessment

All the landscape resources and landscape character areas in the vicinity of the Project and all the visually sensitive receivers within the visual envelopes during the construction and operational phases have been identified.

Landscape and visual mitigation measures have been identified for both the construction and operational phases. Vertical greening and green roof have been recommended at HIK, Hin Keng viaduct and tunnel box, MCV to minimize the visual impact and enhance the visual quality to the VSRs. About 2,626 trees will be affected by the Project, of which about 885 trees are located on slopes and 386 trees will require transplantation.

During the construction phase, after implementation of mitigation measures, there would still be some adverse landscape impacts, mainly due to the impacts on existing trees along the Project alignment and impacts on public open space for the construction of SCL (TAW – HUH) stations and ventilation building. Some VSRs are subject to short-term substantial residual impacts, which is unavoidable due to their close proximity and direct views to the

work sites. They are Hin Keng Estate (South) (HIK/VSR 1.10), Lung Poon Court (DIH&KAT/VSR 1.1), Galaxia (DIH&KAT /VSR 1.3), Rhythm Garden-North (DIH&KAT/VSR 1.2), Future residential development along Prince Edward Road East (DIH&KAT/VSR 1.7), Residential development at Housing Site 1A&1B (DIH&KAT/VSR 1.16), Rhythm Garden-South (DIH&KAT/VSR 1.17), Tsui Chuk Garden (MCH/VSR 1.2), Wang King House/ Wang Yuen House (MCH/VSR 1.3), Fu Yuen House/ Kwai Yuen House/ Wing Yuen House (MCH/VSR 1.4) and Chung Hong House/ Chung On House (MCH/VSR 1.5).

During the operational phase, after the mitigation measures (e.g. tree transplanting, compensatory tree planting, aesthetic landscape and architectural treatment, vertical greening and roof greening) have been implemented and tree planting has matured over 10 years, the residual landscape impacts would be slight to insubstantial, with the exception of impacts on Hin Tin Playground, Ma Chai Hang Playground and Diamond Hill CDA Site.

Hin Tin Playground and Ma Chai Hang Playground which are considered to be of moderate adverse impact significance due to the permanent loss of about 3,100m^2 and 2,065m^2 of public open space of landscape amenity area for the construction of HIK and MCV respectively. The loss of open space at Hin Tin Playground would fully be compensated by the provision of the open space at Shek Mun (approx 3,100m^2), whereas the loss of about 2,065m^2 in Ma Chai Hang Playground will remain as re-provisioning of the same within the nearby vicinity is not feasible. However, having considered the requirements of the Hong Kong Planning Standards and Guidelines in the context of the overall planning of open space provision in the area, the loss of 2065m^2 of open space within Ma Chai Hang will have negligible impact.

The Diamond Hill CDA Site will be subject to adverse impact of moderate significance with the permanent loss of about half of the vegetated area within this landscape resource (LR) and disturbance of a large number of trees. For the railway facilities within the Diamond Hill CDA Site, the open areas around the above ground structures of the railway associated facilities will be planted with amenity planting and approximately 90 trees to mitigate the loss of landscape resources. In addition, green roofs are proposed on the DIH entrance/ plant structures near Lung Cheung Road to minimize the potential adverse landscape and visual impacts.

Except for the area that would be allocated to railway associated facilities, the remaining part of the CDA site is being actively planned for future usage. The land use of the whole CDA site is being reviewed by the Planning Department. Upon completion of the review, the public will be consulted on the findings. The Diamond Hill CDA site development is anticipated to be implemented following the commissioning of the railway. It is therefore anticipated that the site above the DHS would have been handed over to the future allocatee(s) once the railway facilities are commissioned. It is anticipated that the future developer would implement typical landscaping measures including tree planting to beautify the deck in an appropriate manner to alleviate the potential adverse landscape and visual impacts. The future owners/ allocatees would maintain the green open areas, although the landscape plan could be further refined during the planning of the future development. It is considered that the impact during the operational phase in the long term after land allocation to be moderate and acceptable with mitigation.

In the unlikely event the CDA site is not allocated within 12 months following the commissioning of the railway facilities, it is proposed that interim greening measures, such as hydroseeding or planting over a thin soil base or importation of temporary pots or planters are implemented on the roof of DHS as landscape and visual mitigation measures. The maintenance of the interim greening measures will be undertaken by MTR Corporation for the first 12-month establishment period. In the case that the site is still not allocated after the establishment period, MTR would liaise with relevant government departments to agree on the subsequent maintenance agent of the interim greening measures. MTR Corporation would be responsible for the maintenance of the interim

greening measures before any agreement is made. It is considered that the impact during the transition period, after completion of DHS and before land allocation, to be moderate and acceptable with such mitigation measures.

In terms of visual impacts and in consideration of duration of impacts which is considered to be temporary in nature during construction phase, and mitigation measures will be implemented to protect the VSRs, the overall visual impacts are acceptable, with moderate and insubstantial visual impacts. However, some VSRs are subject to short-term substantial residual impacts, which is unavoidable due to their close proximity where there are direct views to the work sites. They are Hin Keng Estate (South) (HIK/VSR 1.10), Lung Poon Court (DIH&KAT/VSR 1.1), Galaxia (DIH&KAT /VSR 1.3), Rhythm Garden-North (DIH&KAT/VSR 1.2), Future residential development along Prince Edward Road East (DIH&KAT/VSR 1.7), Residential development at Housing Site 1A&1B (DIH&KAT/VSR 1.16), Rhythm Garden-South (DIH&KAT/VSR 1.17), Tsui Chuk Garden (MCH/VSR 1.2), Wang King House/ Wang Yuen House (MCH/VSR 1.3), Fu Yuen House/ Kwai Yuen House/ Wing Yuen House (MCH/VSR 1.4) and Chung Hong House/ Chung On House (MCH/VSR 1.5), and they will be affected by the site formation works and removal of trees along the Project alignment. In the operational phase, after the mitigation measures have been implemented and effect of tree planting has been fully realized over 10 years, it is considered that the residual visual impacts would be slight to insubstantial with the exception for some VSRs at close proximity and/or have view from higher height level on the site. They are Hin Keng Estate (South) (HIK/VSR 1.10), Lung Poon Court (DIH&KAT/VSR 1.1), Rhythm Garden-North (DIH&KAT/VSR 1.2), Galaxia (DIH&KAT/VSR 1.3) and workers at Hong Kong Sheng Kung Hui Nursing Home (DIH&KAT/VSR 2.3).

As discussed above, the Diamond Hill CDA site is planned for development, which is anticipated to be allocated after railway commissioning. It is anticipated that the future developer would implement typical landscaping measures including tree planting to beautify the deck in an appropriate manner when the land is allocated. Although the land allocation process is still yet to be completed, planting will be provided within some of the areas around the railway facilities as interim mitigation measures. The planting area will be maintained by the Project Proponent prior to handing over to the relevant government departments. The future owners/ allocatees would also maintain the greenery in these areas, although the landscape plan could be further refined subject to future development. It is considered that the impact during the operational phase in the long term after land allocation to be moderate and acceptable with mitigation. In the unlikely event the site is not allocated within 1 year of the railway facilities are commissioned, the Project Proponent will implement interim visual mitigation measure such as hydroseeding or planting over a thin soil base or importation of temporary pots and removable planters, which is same as that for mitigating the landscape impact, to cover the concrete top-side of the DHS. The proposed greenery will provide visual relief to the surrounding VSRs at high level, and will improve views on the otherwise unmitigated bare concrete finish topside of the DHS. With the implementation of the above mitigation measure and upon the completion of the landscaping measures implemented by the future developer, the level of visual impacts to the above VSRs is considered to be moderate in Day 1 to Year 10.

Overall, it is considered that the landscape and visual impacts in the construction and operation phases are acceptable with mitigation measures.

16.7 Construction Dust Impact

Potential dust impact may be generated from the soil excavation activities, backfilling, site erosion, storage of spoil on site, transportation of soil, as well as blasting activities during the construction phase. Quantitative fugitive dust assessments have been conducted, taking into account the cumulative impact caused by nearby concurrent projects.

Assessment results suggested that all the predicted TSP concentrations at identified ASRs would comply with the respective criteria. Adverse residual air quality impacts are not expected.

Effective dust control can also be achieved by implementing the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation and in accordance with the EM&A programme during construction. With the implementation of dust suppression control and good site practice, adverse fugitive dust impact is not anticipated.

16.8 Airborne Noise Impact

16.8.1 Construction Noise

Potential construction noise impacts would be caused by the various construction activities including excavation, backfilling and construction of superstructure etc. The use of bored tunnelling at Wong Tai Sin, Diamond Hill and Ma Tau Wai has minimised the potential construction noise impacts on the receivers along the bored tunnel areas to the maximum practicable extent.

Construction noise assessment has concluded that the unmitigated construction noise impacts would be high at the neighbouring NSRs. Suitable noise mitigation measures have been identified which could reduce the noise impacts at most of the NSRs. Careful selection of construction equipment and working methods including the use of smaller, electrically driven and quiet plant are adopted, where practicable. Other measures including good site practice, the use of site hoarding, installation of movable barriers and sequential operation of construction plant have been recommended. With the incorporation of the recommended mitigation measures, the predicted construction noise levels could be reduced by about 10dB(A). However, the construction noise levels at some NSRs will still exceed the daytime noise criteria.

Specific noise measures including temporary noise barriers for particular equipment, large full enclosure, sequencing of construction activities, have been further considered for those affected receivers. The use of temporary noise barriers and sequencing of construction activities have been adopted to further reduce the noise impacts. Large full enclosures will create secondary adverse environmental impacts (e.g. visual) and have been concluded to be not practicable and hence are not recommended. The predicted noise levels at most of the NSRs would comply with the corresponding noise criteria, except for a few NSRs near the works areas including HIK, DIH, TKW, MTW and Chatham Road North. All practicable mitigation measures are exhausted and the residual impacts are minimised.

16.8.2 Operational Noise

Operational noise impacts associated with railways and fixed noise sources have also been investigated. The SCL (TAW – HUH) would be underground except for the section at Hin Keng and Hung Hom. Airborne noise associated with the operation of railway would be minimized by the underground design. Noise barrier and retaining wall have been proposed for the at-grade track between Tai Wai Depot and HIK to mitigate airborne railway noise.

Fixed noise sources during the operational phase include ventilation/ plant buildings, and ventilation shafts in the station. Operational noise impacts can be effectively mitigated by implementing noise control treatment (e.g. acoustic silencers and louvers) at source during the design stage and hence adverse residual operational airborne noise impacts are not anticipated.

16.9 Groundborne Noise

16.9.1 Construction Phase

A groundborne noise assessment has been conducted for the development along the bored tunnel areas in Wong Tai Sin, Diamond Hill and Ma Tau Wai. Construction groundborne noise will satisfy the criteria and mitigation measures are not required.

16.9.2 Operational Phase

Potential groundborne noise will be caused by the trains running along the alignment. Operational ground borne noise impacts are within the statutory requirements and further mitigation measures are not required.

16.10 Water Quality

16.10.1 Construction Phase

Potential water pollution sources have been identified as construction runoff, sewage from site workforce, drainage diversion and groundwater contamination. Mitigation measures including covering excavated materials and providing sedimentation tanks on-site etc are recommended to mitigate any adverse water quality impacts. To minimise the potential impact due to SS during sediment dredging, deployment of silt curtains around the closed grab dredgers is recommended for the dredging works at Kai Tak Runway Barging Facility to minimize any significant water quality impact in the Victoria Harbour.

16.10.2 Operational Phase

The operational water quality impact for track run-off and tunnel seepage will have no adverse water quality impact with the incorporation of mitigation measures in the design.

16.11 Waste Management

16.11.1 Construction Phase

The quantity and timing for the generation of waste during the construction phase have been estimated. Measures, including the opportunity for on-site sorting, reusing excavated fill materials (stored in stockpiles) etc, have been maximised in the construction methodology to minimise the surplus materials to be disposed off-site via the designated barging facilities. The annual disposal quantities for C&D materials and their disposal methods have also been assessed. Surplus of rock and spoils materials would be accepted by other projects, such as Hong Kong Boundary Crossing Facilities, Hong Kong Link Road and Tuen Mun Chek Lap Kok Link.

A Sediment Sampling and Testing Plan and (SSTP) has been submitted and approved by EPD. Recommendations have been made for the Contractor to implement during the construction period to minimise the waste generation and those for off-site disposal.

16.11.2 Operational Phase

The types and quantities of waste that would be generated during the operational phase are assessed. Recommendations have been made to ensure proper treatment and disposal of these wastes.

16.12 Land Contamination

Historical information on site geological information, ground condition, and aerial photos has been reviewed to set out the requirements for a contamination evaluation of the SCL (TAW-HUH) alignment and works areas. A total of 5 trial trenches and 24 drillholes were excavated and drilled for soil and groundwater sampling at 10 identified potentially contaminated sites in accordance with the endorsed Contamination Assessment Plan (CAP) and the Supplementary CAP.

A total of 201 soil samples and 22 groundwater samples were collected. Testing results were reported in the endorsed Contamination Assessment Report (CAR) and Supplementary CAR. Laboratory results indicate that one soil sample at former Tai Hom Village needs to be remediated. A total volume of 39m^3 is required to be disposed of at the landfill as a last resort after consideration of other remediation options. The remediation action plan and specification for remediation works has been detailed in the endorsed Remediation Action Plan (RAP). Testing results of groundwater sample indicate that none of the groundwater samples exceed the RBRGs levels for industrial purpose.

Re-sampling and analysis of cyanide(free) at Site L1 (Animal Management Center at Hin Keng) would only be conducted after the sites are resumed and handed over to the Project Proponent. Following the completion of SI and lab testing works of these sites, a second supplementary CAR and RAP (if contamination is confirmed) shall be prepared and submitted to EPD for agreement. Supplementary RR shall also be prepared and submitted to EPD for endorsement prior to the commencement of any construction/development works within the contaminated area, if identified.

16.13 Hazard to Life

A QRA has been carried out to assess the hazard to life issues arising from the storage, transport and use of explosives during construction of the SCL (TAW-HUH) Project.

The assessment results show that the societal risk for the storage and use of explosives lies within the acceptable region, and the transport of explosives lies within the ALARP region when compared to the criteria stipulated in Annex 4 of the EIAO-TM. The criterion of the EIAO-TM for Individual Risk is met. An ALARP assessment has been carried out by identifying all practicable mitigation measures and assessing the cost effectiveness of each measure in terms of the risk reduction achieved and the cost of implementing the measures.

The location of all relevant Potentially Hazardous Installations (PHIs) have been reviewed with regards to the SCL (TAW-HUH) alignment, explosives magazines and other works areas for both the construction phase and the operation phase of the project. The only PHI that requires assessment under the conditions of the EIA Brief is the Shatin Water Treatment Works (STWTW), since the Hin Keng Station will be located on the verge of its 1000 m Consultation Zone (CZ).

A Hazard Assessment has therefore been conducted to assess the increased societal risk arising from the incremental population during construction and operational phases of SCL railway including Hin Keng Station.

16.14 Environmental Monitoring and Auditing Requirements

It is recommended to implement an EM&A programme throughout the entire construction period to regularly monitor the environmental impacts on the neighbouring sensitive receivers. All the requirements (including cultural heritage, ecology, landscape & visual, dust, airborne and groundborne noise, water quality, waste, land contamination and hazard) in the EM&A Manual shall be complied with.

An Environmental Mitigation Implementation Schedule has also be included in the EM&A Manual to summarise all the measures, the implementation location, time frame, agency etc.