14 Summary of Environmental Outcomes

14.1 Environmental Sensitive Areas Protected

14.1.1 Avoidance of Ecologically Sensitive Areas

The Project is located at areas of habitats with limited ecological value. Most of the Project Site is within highly disturbed/ developed habitats and most species recorded are common and widespread in Hong Kong. Any impacts on ecologically sensitive areas have been developed to minimize impacts during both construction and operational phases.

14.1.2 Minimise the Temporary Works Area and Number of Trees Affected in Diamond Hill CDA Site

The HHS is located entirely within the boundary of the existing railway facilities in Hung Hom Freight Yard. This Freight Yard is currently occupied with various railway facilities and there are limited numbers of trees within this Yard.

Works at the Diamond Hill Station would still affect some of the trees within the Diamond Hill CDA site, but the extent of temporary works site required would be much less than that if the train stabling sidings is implemented exclusively at Diamond Hill. Hence, the HHS still has an advantage when compared with accommodating the train stabling siding at Diamond Hill CDA site where more trees would inevitably be affected.

14.1.3 Minimise the Extent of Landscape Resources Affected at Diamond Hill CDA Site

Other than trees, the existing plantation at Diamond Hill CDA Site also contributes to the local landscape resources that are relatively limited within the urban context in Diamond Hill and San Po Kong. Similar to that for trees, the HHS also has an advantage when compared with accommodating the train stabling sidings at Diamond Hill CDA site where more landscape resources would inevitably be affected.

14.1.4 Minimise the Environmental Impacts

Locating the train stabling sidings underneath the existing deck at Hung Hom would minimize the adverse environmental impacts induced from construction activities of HHS. This is because construction dust and construction noise arising from the construction activities underneath the existing deck would have been substantially screened by the concrete deck already. In other words, the deck would provide a significant screening to the neighbouring environmental noise and air sensitive receivers during the construction period.

During the operational phase, the deck would also provide significant noise shielding effects to the train movement within the HHS.

14.2 Environmentally Friendly Design and Benefit

14.2.1 Use of Green Roof

The Government has been actively promoting greening in buildings to improve the environment. This includes actively implementing rooftop greening where practicable to enhance the cityscape and mitigate the heat island effect in urban areas. The Architectural Services Department completed the Study on Green Roof Application in Hong Kong in 2007 which reviewed the latest concepts and design technology of green roof and recommended technical guidelines suitable for application in Hong Kong, covering various aspects including choice of plants, waterproofing layer, thermal insulating layer, drainage layer, planting soil, irrigation as well as maintenance and repair.

According to the “Study of Green Roof Application in Hong Kong” by Architectural Services Department, the application of green roofs has the following potential benefits:

Amenity and Aesthetic Benefits	• It would contribute to aid visual green space continuity throughout urban area. • Psychological studies have demonstrated the restorative effect of natural scenery holds the viewer's attention, diverts their awareness away from themselves and worrisome thoughts and elicits a meditation-like state. The variety of sounds, smells, colours and movement provided by plants, although not quantifiable, can add significantly to human health and wellness.
Environmental Benefits	• Vegetation has a cooling effect by dissipating some for the city heat through the process of evapo-transpiration. Hence, the use of green roofs has beneficial effects in the reduction of the heat island effect. • The application of green roofs can reduce the total run-off by absorbing water and returning it to the air, reducing the amount of water available for run-off and spreading the residual run off over a longer period (by storing it for a period before it runs-off, the roof acts as a buffer between the weather and drainage systems).
Sustainability	• Green roofs can contribute to building insulation and energy efficiency. The shading effect of vegetation reduces temperatures of buildings partly through shading and partly through evapo-transpiration. The insulation benefits of green roofs can reduce solar heat gain during the day and provide savings in regular building maintenance cost and contribute to saving more energy (and hence more sustainable). • Studies have demonstrated that green roofs, when properly constructed, can extend the life of a roof. Degradation by ultraviolet light and the constant expansion and contraction caused by daily extremes of temperature are the prime cause of the disintegration, cracking, delamination and splitting of roofing materials. Green roofs insulate the materials from ultraviolet light and reduce the thermal extremes, thus prolonging roof life.

The use of green roofs has also been actively considered in the Project. According to the latest design, green roof would be implemented at ventilation shafts of HUH, KAT and DIH. These green roofs would provide significant environmental benefits to the community and the Project as noted above.

14.2.1 Minimise Direct Impact to Historical Buildings for DIH Station

The cultural significance of the 3 historical buildings within the former Tai Hom Village site has been fully recognised during the early stage of the Project. The amended location and design of DIH station box resulting from adopting the HHS option would avoid direct impact on the Stone House No 4.

The physical conditions of the Former Royal Airforce Hanger are not satisfactory for total preservation. The condition of the 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 2 historical buildings structures.

14.3 Summary of Measures Adopted to Minimize Environmental Impacts

The various chapters of this EIA Report have presented key measures to minimise the potential environmental impacts associated with the Project in the planning, design, construction and operation stages. Key measures to minimise the environmental impacts are summarised below.

14.3.1 Site Selection

Minimising environmental impacts has been one of the key design objectives throughout the planning and design process. The possibility of using exiting depots so as to avoid having a new train stabling sidings has been considered. Other than existing depots, the investigation has also considered other areas including Shatin Pass Quarry, Hin Keng, Tai Shui Hang, Wu Kai Sha CDA Site, Kai Tak, Diamond Hill CDA Site and Former Hung Hom Freight Yard. After considering the operational requirements for allowing proper function of the stabling siding (e.g. location requirements, stabling capacity, need for maintenance works, adequacy for length and width, etc), it is concluded that only the Diamond Hill CDA Site and former Hung Hom Freight Yard would be considered as feasible locations for train stabling sidings for SCL (TAW-HUH).

According to the latest design of HHS, the train stabling sidings would be constructed under the existing deck of Hung Hom Station. A fan area would need to be constructed to the north of the train stabling sidings. Some connection tracks would also be required to connect to existing and other sections of the SCL. Being within an urban context and within the demarcation of an existing railway facility, this HHS Option would have the following advantages:

- Compatible with the existing landuses, i.e. railway facilities;
- Less site formation works would be required and hence relatively less associated environmental impacts (e.g. construction noise, dust, landscape and visual, etc) would be anticipated; and
- No ecological and cultural heritage impacts for the train stabling sidings at HHS (the modifications works for Kai Tak and Diamond Hill under HHS Option would however have some impacts on ecology and landscape and visual and relevant mitigation measures are proposed herein).

14.3.2 Cultural Heritage

For the construction phase, survey-cum-excavation will be conducted prior to the construction works at the former Tai Hom Village, which is an archaeological site where presence of the sparse Tang/ Song Dynasty layer has been identified. An Archaeological Action Plan will be submitted to the Antiquities and Monuments Office for agreement.

For Lung Tsun Stone Bridge and Former Kowloon City Pier, which are also archaeological sites, a buffer zone would be maintained throughout the construction period when construction activities are required in the vicinity.

There are 3 built heritage in the former Tai Hom Village, including the Former Royal Air Force Hangar, Old Pillbox and the Stone House. The design has avoided direct impact to the Stone House. For the Former Royal Air Force Hangar and the Old Pillbox, documentation would be conducted prior to disassembling. Portions of the Hangar which is of historical interest and the Old Pill Box would be temporarily stored. The retained portions of the hangar together with a model will be displayed within the CDA site as per the conservation plan. The Old Pillbox would require reinstatement as per the conservation plan.

14.3.3 Ecology

The site selection and current design have avoided ecologically sensitive areas and the associated habitat loss is restricted only to areas of low ecological value. Tree compensation due to the Project would be implemented according to the requirements of ETWB TC(W) No. 3/2006. In addition, good site practices would also be implemented.

14.3.4 Landscape and Visual

Landscape and visual impacts arising from the construction works would be minimized with the implementation of the following recommended mitigation measures:

- Erection of decorative screen during construction stage;
- Management of facilities on work sites; and
- Transplanting of trees with medium to high survival potential that may be affected by the works.

During operational phase, the following mitigation measures would be implemented to minimize the landscape and visual impacts.

- Compensation tree planting proposed for felled trees;
- Buffer tree planting to provide screening to ventilation shafts/plant, engineering structures and associated facilities;
- Reinstatement of landscape areas temporarily disturbed during construction phase;
- Aesthetic landscape and architectural treatment on stations / entrances/ ventilation shafts;
- Reinstatement of excavated area due to temporary works;
- Aesthetic landscape and architectural treatment for DIH;
- Roof greening of large built structures; and
- Aesthetic design on noise barriers.

14.3.5 Construction Dust

The extent of temporary works sites that may generate fugitive dust have been reduced to minimize the dust impacts as much as practicable. However, given the relatively short separation with receivers in the urban context, dust suppression measures such as frequent watering would be implemented to minimize the potential construction dust impact and comply with the regulatory requirements.

In addition, other dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices would be in place to further minimize construction dust impact. Some examples of these good site practices include:

- Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading;
- Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;
- A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones;

- The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle;
- Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores; and
- When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period.

14.3.6 Airborne Noise

The extent of temporary works sites where construction plant would be operating has been reduced to minimize the airborne construction noise impacts as much as practicable. However, given the relatively short separation with receivers in the urban context, extensive mitigation measures would be required. Further measures that had been considered throughout the design process to minimize the construction noise impacts include:

- Use of quiet plant and working methods; and
- Use of temporary noise barriers, and enclosures for relatively static plant etc.

However, cumulative construction noise impacts at a receiver that are close to the temporary works sites (see **Sections 8.5.8**) would still exceed the construction noise criteria but the impacts have been minimized with implementation of all practicable mitigation measures.

For the operational phase, the airborne railway noise impacts have been reduced in the first place by locating the train stabling siding underneath the Hung Hom Station. The trains running in the fan area and along the connection tracks to the north would however still generate certain noise impacts. In order to control the noise impacts to acceptable levels, it has been recommended to construct a 7m tall semi-noise enclosure over the fan area and two 5m tall vertical noise barriers along certain sections of the connection track.

14.3.7 Groundborne Noise

The predicted groundborne noise levels would comply with the statutory requirements and impacts are considered insignificant. Additional noise mitigation measures are therefore not required.

14.3.8 Water Quality

Good site practices such as temporary drainage, dike or embankment for flood protection, efficient silt removal facilities, covering exposed areas with tarpaulin, vehicular washing facilities at construction site exits, oil interceptors etc would be implemented to minimize water quality impacts during the construction phase. Examples of mitigation measures during construction and operation phases are presented below.

For the construction phase, the following measures would be implemented:

- Cut-&-cover/ open cut tunnelling work should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season as far as practicable;

- During tunnelling work, uncontaminated discharge should pass through sedimentation tanks prior to off-site discharge;
- During tunnelling work, the wastewater with a high concentration of SS should be treated (e.g. by sedimentation tanks with sufficient retention time) before discharge. Oil interceptors would also be required to remove the oil, lubricants and grease from the wastewater; and
- During tunnelling work, direct discharge of the bentonite slurry (as a result of D-wall and bored tunnelling construction) is not allowed. It should be reconditioned and reused wherever practicable. Temporary storage locations (typically a properly closed warehouse) should be provided on site for any unused bentonite that needs to be transported away after all the related construction activities are completed.

For the operational phase, the following mitigation measures would be implemented:

- Track runoff from train stabling sidings (covered section) and tunnel should pass through oil/grit interceptors/chambers to remove oil, grease and sediment before being pumped to the public foul drainage system;
- Track runoff from the fan area and launching/ retrieval tracks (open track section) should pass through oil/grit interceptors/chambers to remove oil, grease and sediment before being pumped to the public storm water drain system;
- The silt traps and oil interceptors should be cleaned and maintained regularly; and
- Oily contents of the oil interceptors should be transferred to an appropriate disposal facility, or to be collected for reuse, if possible.

14.3.9 Waste Management

The amount of C&D material that would need to be transported off site has been minimised as far as practicable in the design. The opportunity for re-using C&D material has been fully considered and will be implemented where practicable. Good site practices have been recommended for chemical waste, general refuse and disposal of chemical waste will follow the relevant ordinances.

14.3.10 Land Contamination

The design has avoided encroaching into any land with land contamination identified and hence mitigation measures are not required.

14.3.11 Environmental Monitoring and Auditing

In addition to the mitigation measures as described above (see more details in the Environmental Mitigation Implementation Schedule), a comprehensive environmental monitoring and auditing programme would be implemented to cover various aspects of concern. An Independent Environmental Checker would also be employed to ensure that all the necessary mitigation measures are implemented in a timely and orderly manner.

14.3.12 Overall

Mitigation measures and good site practices to minimize the environmental impacts were recommended throughout the impact assessments of air quality, noise, water quality, waste management, landscape and visual, and ecology. These measures were consolidated in an Implementation Schedule which specifies the responsibility, methodology and timing of implementation, such that effective and appropriate implementation of the measures can be assured.