

Consultancy Agreement No. NEX/2213

# Environmental Impact Assessment (EIA) Study for Shatin to Central Link – Hung Hom to Admiralty Section

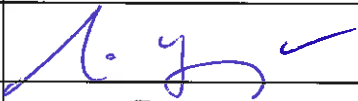



**MTR Corporation Limited**

Consultancy Agreement No. NEX/2213

**Environmental Impact Assessment  
(EIA) Study for Shatin to Central Link –  
Hung Hom to Admiralty Section****Environmental Impact Assessment Report –  
Executive Summary**

November 2011

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## 1. INTRODUCTION

- 1.1 The Shatin to Central Link (SCL) is one of the strategic railway lines recommended in the Railway Development Strategy 2000. In March 2008, the Executive Council approved the further planning and design of the SCL using a concession approach under which the project will be funded by the Government and the MTR Corporation (MTR) is entrusted with its planning and design.
- 1.2 The 17-kilometre SCL will provide 10 stations, 6 of which will be interchange stations, namely Tai Wai, Diamond Hill, Homantin, Hung Hom, Exhibition and Admiralty. The railway is of strategic importance, as it will knit the railway network into two strategic corridors, namely the East West Corridor and the North South Corridor.
- 1.3 The 57-kilometre East West Corridor, which extends Tai Wai Station of the Ma On Shan Line towards Kowloon to connect with Hung Hom Station (HUH) of the West Rail Line, will allow passengers to travel from Wu Kai Sha, via Kowloon, to Tuen Mun without interchanging.
- 1.4 The 41-kilometre North South Corridor, which extends the existing East Rail Line (EAL) from Hung Hom Station across the harbour to Admiralty Station (ADM), will allow passengers from Lo Wu or Lok Ma Chau to reach the heart of Hong Kong Island directly.
- 1.5 For the purposes of Environmental Impact Assessment (EIA), five EIA studies have been conducted to cover different sections of the SCL, which include:
- **SCL – Hung Hom to Admiralty Section [SCL (HUH-ADM)]** (hereinafter referred to as “the Project”, being considered in this EIA) – the section from North Ventilation Building, Plant Rooms and Emergency Access (NOV) in Hung Hom across the harbour to the Causeway Bay Typhoon Shelter (CBTS), Exhibition Station (EXH) and then to ADM;
  - **SCL – Mong Kok East to Hung Hom Section [SCL (MKK-HUH)]** – the realignment work for the existing East Rail Line tracks from the tunnel portal near Oi Man Estate (Portal 1A) to the proposed NOV in Hung Hom;
  - **SCL Protection works at Causeway Bay Typhoon Shelter** – the section of approximately 160m long of the SCL tunnel protection works at the crossing over Central-Wan Chai Bypass (CWB) tunnels, which would be constructed under the CWB project;
  - **SCL – Tai Wai to Hung Hom Section [SCL (TAW-HUH)]** – the extension of Ma On Shan Line from Tai Wai Station via Hing Keng, Diamond Hill, Kai Tak, To Kwa Wan, Ma Tau Wai and Ho Man Tin to Hung Hom, and link up with the existing West Rail Line along with a proposed stabling sidings option in Diamond Hill (DHS)<sup>1</sup>; and
  - **SCL – Stabling Sidings at Hung Hom Freight Yard [SCL (HHS)]** – a proposed stabling sidings option for SCL (TAW – HUH) at the former freight yard in Hung Hom<sup>1</sup>.
- 1.6 The SCL was gazetted under the Railways Ordinance in 2010, with the construction of the whole SCL project schedule to commence in 2012 and be completed in 2020. **Figure No. NEX2213/C/331/ENS/M50/001** illustrates an overview of the SCL alignment.
- 1.7 The Project covers the following designated project (DP) elements as specified under Items A.2, A.7, C.2, C.3 and C.12 in Schedule 2 Part 1 of the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499):

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<sup>1</sup> The ultimate suitability of using either the DHS or HHS or a combination of both sites for train stabling would be subject to the findings of detailed engineering and EIA studies.

- DP1 - A railway and its associated stations (EXH and ADM) under A.2 in Schedule 2 Part 1;
- DP2 - A railway tunnel more than 800m in length between portals under A.7 in Schedule 2 Part 1;
- DP3 - Reclamation works (including associated dredging works) of more than 1 ha in size with a boundary of which is less than 100m from a seawater intake point under C.2 (b) and resulting in 5% decrease in cross sectional area calculated on the basis of 0.0mPD in a sea channel under C.3 (a) in Schedule 2 Part 1; and
- DP4 - A dredging operation exceeding 500,000 m<sup>3</sup> or a dredging operation which is less than 100m from a seawater intake point under C.12 in Schedule 2 Part 1.

- 1.8 An application for an EIA Study Brief was made to the Environmental Protection Department (EPD) and the EIA Study Brief No. ESB-193/2008 for the Project has been issued under the EIAO. AECOM Asia (HK) Company Limited (AECOM) was commissioned by MTR as the Consultant to conduct this EIA study for the Project.
- 1.9 Subsequent to the issue of the EIA Study Brief, the Project title has been changed from “Shatin to Central Link – Cross Harbour Section (Phase II –Hung Hom to Admiralty)” to “Shatin to Central Link – Hung Hom to Admiralty Section” [SCL (HUH-ADM)] so as to align with the latest gazettal. The demarcation of the Project has also been slightly modified by shifting to the south of HUH. Nevertheless, the scope of issues covered under the EIA Study Brief is adequate to cover these changes.
- 1.10 The EIA studies for SCL (TAW-HUH), SCL (HHS), SCL (MKK-HUH) and SCL Protection Works at CBTS have been conducted separately under the EIA Study Brief Nos. ESB-191/2008, ESB-233/2011, ESB-192/2008 and ESB-213/2010 respectively.
- 1.11 This Executive Summary highlights the key findings of the EIA Study for the Project to comply with the EIAO.

## 2. DESCRIPTION OF THE PROJECT

### Purpose and Scope of the Project

- 2.1 As part of the SCL forming the north-south railway corridor, the objective of the Project is to extend the existing EAL from HUH to the north shore of Hong Kong Island and the Central Business District, and to provide convenient interchanges at HUH, EXH and ADM. This section of SCL alignment will be entirely underground while the associated ventilation building, shafts, plant rooms and station entrances will form aboveground structures. **Figure No. NEX2213/C/331/ENS/M50/011** illustrates the preferred alignment of SCL(HUH-ADM).
- 2.2 The Project comprises the following key elements:
- An approximately 6km extension of the EAL including a rail harbour crossing from Hung Hom across the harbour to Admiralty on Hong Kong Island;
  - A new EXH located near the Hong Kong Convention and Exhibition Centre (HKCEC);
  - An integrated ADM for the existing urban lines, the future SCL and SIL(E);
  - Ventilation building, ventilation shafts, smoke extraction facilities and other associated works of the Project; and

- Demolition of the existing Kowloon Freight Building at south of HUH to facilitate the construction of the Project though this alone is not a Designated Project under the EIAO.
- 2.3 Apart from the above key elements, barging facilities, immersed tube tunnel (IMT) casting basin, supporting works areas and access roads will be required to support the construction of the Project.
- 2.4 It should be noted that the modification works at HUH would be within the scope of SCL (MKK-HUH). The design and construction of the ADM including the parts for the SCL (HUH-ADM) will be carried out by the SIL(E) whilst the construction of the overrun tunnel beyond ADM and minor building works will be carried out under SCL (HUH-ADM).
- 2.5 Location, boundary and general layout of the Project are illustrated in **Figure Nos. NEX2213/C/331/ENS/M50/021 to NEX2213/C/331/ENS/M50/025.**

### **Benefits of the Project**

- 2.6 The SCL is an important strategic rail corridor purposed for forming an expanded railway network in Hong Kong that will bring various benefits to the community in return:
- Providing a fast, reliable and convenient mode of transport running through the northern New Territories, Kowloon and Hong Kong Island;
  - Redistributing railway passenger flows to relieve the congestion of the existing railway lines in urban Kowloon and on Hong Kong Island;
  - Improving the coverage of the railway network by placing 70% of the population and 80% of the workforce within one km of a railway station, and also by crossing the Harbour to interchange with the Tsuen Wan Line, Island Line and SIL(E) at ADM;
  - Stimulating the development of Hung Hom and Waterfront areas; and
  - Relieving reliance on road-based transport, resulting in significant reductions in roadside air pollutants, respirable suspended particulates and carbon dioxide, and providing a more environmentally-friendly public transport option in terms of energy conservation.
- 2.7 The Project provides Hong Kong with the fourth Rail Harbour Crossing which essentially relieves the existing congestion on the Tsuen Wan Line through redistributing railway passengers, and connects the new development areas in Kai Tak with Hong Kong Island.
- 2.8 More importantly, the expansion in railway network can gradually conduce a significant modal shift in passengers' travel behaviours from road-based transport to railway system, and thereby soothing the burgeoning reliance on cross harbour road tunnels, especially the demand on the Hung Hom Cross Harbour Tunnel, as well as alleviating environmental nuisance from existing road networks.
- 2.9 From the environmental perspective, the rail will be powered electrically. Railways are widely recognized as a sustainable form of transport than road transport in terms of carrying capacity and energy effectiveness and adverse environmental implications such as roadside air pollution associated with electrically-powered rail are far less in comparing to vehicle fleets. Having anticipated that the Project will increase public transport patronage and reduce the overall road traffic volumes through providing a more convenient and easily accessible transport option, the Project will bring improvements in air quality, noise pollution, on-road safety and the overall quality of the ambient environment. As the most of the rail line is underground, the visual quality, landscape character and land amenity can also be maintained whilst still providing convenient access to areas by the public.

### **Selection of the Project Scheme**

- 2.10 Various options and alternatives of project design and construction methods have been reviewed and considered in the course of development and selection of the preferred scheme for the SCL,

taking into account of engineering feasibility, site constraints, programme and environmental aspects.

- 2.11 Other factors, including geographical and geological consideration, implementation programme, interface with existing facilities, operational safety, flexibility and maintenance requirements, constructability, land acquisition and disruption to the community were also given due consideration in the selection process of alternative alignment and construction options for the Project.
- 2.12 The selected alignment and construction methods are regarded as the most appropriate and balanced scheme, which can minimise the potential environmental impacts associated with the Project and achieve the needs of the SCL project and benefit to the public:
- The Project alignment has been selected to minimise the extent and duration of construction activities within the CBTS such that environmental impacts and disturbances to the existing facilities, users and sensitive receivers could be minimised.
  - The entire track of the Project has been designed underground to minimise the potential impacts to nearby sensitive receivers. Suitable trackform has been proposed to minimise any potential ground-borne train noise impacts to the nearby structures.
  - Different alternatives of the sequence of construction works have been thoroughly scrutinized and determined with the aim to minimise the extent of cumulative environmental impacts due to interfacing with other concurrent projects.
  - Locations and design of ventilation building/ventilation shafts have been carefully selected to minimise the impacts on sensitive receivers. Forms and shapes of ventilation building/ventilation shafts have been designed for proper provision at different areas. Total footprint and height of the ventilation building have also been downsized as far as practicable to prune visual impacts and greening measures have been incorporated in the design.
  - Acoustic design specification for ventilation building and ventilation shafts has been identified such that the fixed source noise impact can be kept within the acceptable level.
  - Considerations have been given in the design to avoid the potential impact on the Leisure and Cultural Services Department (LCSD) Registered Old and Valuable Trees. All the affected trees are common species with medium to high values and would be protected in accordance with ETWB TCW 3/2006.
  - The amount of charge for drill and blast operation will be controlled to minimise the potential vibration impact on heritage buildings.

#### **Compliance with the Protection of Harbour Ordinance (PHO)**

- 2.13 The PHO Cap 531 recognizes the harbour as a special public asset and a natural heritage of Hong Kong to be protected and preserved. Judicial reviews on other projects have further clarified the legal principles behind the PHO and have established a presumption against reclamation within Victoria Harbour, irrespective if the reclamation is permanent or temporary.
- 2.14 The presumption against reclamation can only be rebutted by establishing an overriding public need for the reclamation work. Guidance for addressing the public need for reclamation (referred to as “the overriding public need test”) is provided in the Housing, Planning and Lands Bureau Technical Circular No. 1/04 (HPLB TC 1/04). This applies to all reclamations within the boundaries of Victoria Harbour and cogent and convincing materials are required to support and justify the overriding public need for reclamation.
- 2.15 A thorough examination of the SCL needs and constraints, including an exhaustive investigation into the need for reclamation for the SCL (HUH-ADM) construction and of alternative schemes that might do away with reclamation or, at least, minimise reclamation, has been carried out. A “Cogent and Convincing Materials to Demonstrate Compliance with the Overriding Public Need Test” (CCM Report for SCL), which set out the findings of the investigations and the conclusions regarding the



need for reclamation and the minimum extent of reclamation has been prepared. The CCM Report can be viewed at the website: <http://www.mtr-shatincentrallink.hk/en/construction/work-in-victoria-harbour.html>.

- 2.16 As detailed in the CCM Report, the three tests in rebutting the presumption against the reclamation as set out in the PHO have been satisfied:
- In facilitating the construction of the SCL and therefore in meeting the overriding public need for the railway, there is consequently a compelling and present need for the reclamation in the CBTS and adjacent to Hung Hom landfalls. All of the reclamation is essentially temporary and will be removed upon completion of construction, with the seabed reinstated to the original level.
  - No reasonable alternative to temporary reclamation is found for constructing the SCL (HUH-ADM) (known as SCL Cross Harbour Section in the CCM Report).
  - The extent of reclamation has been determined to be the minimum required.

### **Continuous Public Involvement**

- 2.17 After the Executive Council approved the further planning and preliminary design of SCL by the MTR Corporation in March 2008, the Government and the MTR subsequently visited the District Councils and consulted local communities on the Project. Extensive public consultation, including roving exhibitions and public forums, was conducted to further collect views from the public on the new links.
- 2.18 The majority of the public agreed that there is an overriding public need for the SCL and urged for early completion of this infrastructure. They supported the findings that there is no reasonable “zero reclamation” option, and preferred the selected scheme as it requires a shorter construction period and provides a shorter routing between HUH and EXH. Moreover, many people opined that there should be better coordination with the CWB project to minimise disturbance to the CBTS. Having considered the views of the public, as well as all other engineering and environmental factors, it is proposed that the Project is to be implemented as described above.

## **3. KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT**

- 3.1 The EIA Study was conducted in accordance with the EIAO Study Brief No. ESB-193/2008, following the guidelines on assessment methodologies in the Technical Memorandum on Environmental Impact Assessment (EIAO-TM). A summary of the environmental impacts associated with the Project is presented in **Table 3.1**. The key findings of the EIA study are summarized below.

### **Cultural Heritage**

#### Archaeology

- 3.2 A terrestrial baseline archaeological review has identified that only one site of archaeological interest, the Kellet Island Site of Archaeological Interest, is located at approximately 70m from the nearest works area and thus there is no direct impact to this site of archaeological interest.
- 3.3 Findings of literature review also indicated that any terrestrial and marine archaeological resources remains in the works areas should have been disturbed by previous dredging/reclamation works and urbanization development. As there is no terrestrial and marine archaeological potential is identified within works area, except those in Harcourt Garden, no impact on archeological remains is anticipated within the works areas. An archaeological watching brief has been recommended for Harcourt Garden during the construction of ADM undertaken by SIL (E). Since impact on

archaeological resources due to the Project is not expected, mitigation measures are not required for both construction and operation phases of the Project.

#### Built Heritage

- 3.4 Direct and indirect impacts to the built heritage resources may occur as a result of demolition and vibration arising from tunneling works respectively during construction of the Project. Potential indirect visual impact may also arise from nearby surface works areas during construction and from the aboveground structures of the Project in the operation phase.
- 3.5 Built heritage resources within Study Area have been identified and reviewed through field surveys and literature review. Identified built heritage resources within Study Area include a declared monument (i.e. Flagstaff House), 13 built heritages with existing grading and 2 with proposed grading, as well as 23 non-graded built heritages and historical landscapes. Given that the separation distance between Flagstaff House and the nearest SCL works boundary is more than 200m, there would be neither adverse vibration nor visual impacts on the declared monument.
- 3.6 Potential vibration impact to the built heritage resources due to tunnel blasting was assessed and was considered insignificant with respect to the sufficient buffer distances between the built heritage resources and the tunnel. Potential visual impact during construction and operation phases on the identified built heritage resources could be minimised with the implementation of landscape and visual impact mitigation measures, including the erection of sensibly designed screen hoardings for the proposed work areas and adoption of sympathetic design in aboveground structures. With such mitigation measures in place, no adverse visual impact on the built heritage resources is anticipated during construction and operation phases of the Project.

#### **Ecological Impact**

##### Construction Phase

- 3.7 Key marine-based works proposed under the Project includes the construction of cross harbour tunnel across Victoria Harbour, temporary reclamation at Hung Hom Landfall and CBTS, IMT casting basin at ex-Shek O Quarry and demolition of Hung Hom Freight Pier. These marine works may induce direct loss of marine habitats and indirect disturbance to marine ecology due to changes in water quality parameters. Literature review and marine ecological surveys were conducted in 2009 to obtain ecological baseline information, which covered coral, subtidal soft bottom benthic communities, intertidal communities and marine/coastal waters habitats. The identified marine habitats within the assessment area are of generally low ecological value. Apart from the two hard coral species, *Oulastrea crispata* and *Balanophyllia* sp., which are common and widespread in Hong Kong waters, no other areas or species of conservation interest were identified in the proposed works areas.
- 3.8 Intertidal habitat of approximately 300 m long artificial seawall and subtidal habitat of 17 ha seabed within the footprint of the proposed works areas in Victoria Harbour would be directly affected in different phases of marine construction works. Based on the results of field survey, the affected marine habitats are of low ecological value and there would be no loss of site of conservation interest or rare species. On account of its reversible and temporary nature, no unacceptable direct impact to the marine ecology is anticipated.
- 3.9 Construction of IMT casting basin at ex-Shek O Quarry would lead to temporary loss of the newly established marine habitat in the marine cove with a size of about 10 ha and the associated fauna. No dredging would be required for the construction of the casting basin and thereby indirect impacts on surrounding ecology would be largely avoided. The ecological value of the new marine habitat at the time of Project commencement is expected to be low in view of its young age, and reinstatement of the marine cove would be conducted after the completion of all IMT fabrication and construction works. Considering the reversible and temporary nature of the impact, significant adverse ecological impact due to the construction of IMT casting basin is not anticipated.

- 3.10 Potential short term disturbance on marine habitat and associated marine life due to deterioration of water quality would result from the proposed marine works. The indirect impacts would be temporary, and would be minimised with the implementation of recommended water quality control measures. No unacceptable impact on marine ecological resources is anticipated.

#### Operation Phase

- 3.11 During the operation phase, no maintenance dredging would be required and no cooling water would be discharged from the operation of the Project to the marine environment directly. Besides, the change in tidal flow pattern due to change in hydrographic regime in Victoria Harbour is considered insignificant (change in mean discharge through Victoria Harbour by less than 0.1%), hence no adverse direct and indirect ecological impact is anticipated during the operation phase of the Project.

### **Fisheries Impact**

#### Construction Phase

- 3.12 The proposed marine works required under the Project may result in potential impact on fisheries resources. Comprehensive baseline information on fisheries resources was elucidated via desktop review of available literatures in which no information gaps were identified. Field surveys were hence considered not necessary. The baseline review has identified no fish culture zones and important spawning or nursery grounds within or in the vicinity of the proposed marine works area.
- 3.13 The Project would temporarily occupy a maximum of approximately 5 ha of fishing area at mid Victoria Harbour due to the IMT construction works. If bedrock or boulders are encountered during tunnel laying process, underwater blasting would be required and the fisheries resource within the 1.7 ha lethal zones might be affected. Silt curtains would be deployed at near-shore to minimise damage on any fisheries resource by fencing off fish from entering the lethal zone in the course of blasting. Given the temporary nature of the proposed works and low fisheries importance of the affected area, impact on fisheries would be minor and acceptable.
- 3.14 Indirect impacts of change of water quality due to dredging and reclamation works would be temporary and localized. Water quality control mitigation measures, such as installation of silt curtains and use of closed grab dredger and reduction of dredging rate, would be implemented to protect fisheries resources. With proper implementation of these recommended mitigation measures, the impact due to water quality deterioration would be minimised. No unacceptable impact on fisheries resources is anticipated.

#### Operation Phase

- 3.15 No major operation phase impacts are expected. Despite that the protective armour rock layer covering the surface of the finished IMT would protrude above the natural seabed, it would largely be kept at a level below the existing Cross Harbour Tunnel to minimise the potential impact to fishing operations in Victoria Harbour.

### **Landscape and Visual Impact**

- 3.16 Within the Study Area, there are 27 key landscape resources (LRs) and 18 key landscape character areas (LCAs), with 12 LRAs and 6 LCAs of high sensitivity to landscape impacts. A total of 75 visually sensitive receivers (VSRs) were selected for visual assessment, of which 18 VSRs are considered to have high sensitivity to visual impacts from the Project. These are mostly commercial/residential and recreational properties along northern Wan Chai and Causeway Bay.

#### Landscape Impact

- 3.17 The Project would inevitably cause a change to the existing landscapes resources and characters during the construction and operation phases. Main potential landscape impacts would result from the demolition of existing structures, construction of new ventilation building, ventilation and tunnel shafts, stations and superstructures, cut-and-cover tunnel works for land and marine sections, operation of temporary barging points and loss of existing trees and other vegetation and change of landscape character temporarily due to construction works during construction stage.
- 3.18 Approximately 930 existing trees would be affected by the proposed works, of which 240 trees would be transplanted and 690 trees would be felled, subject to the future Tree Removal Application. None of the affected trees are Registered Old and Valuable Trees, while many of them are of semi-mature to mature size. There are no rare or endangered but only common species. Under the proposed scheme for the Project, opportunities for tree compensation within the Project boundary has been fully explored and incorporated in the proposed mitigation measures as much as practicable. Due to limited available space for tree planting within the project boundary, compensatory tree planting of a ratio of 1:1 in terms of quantity are proposed. Detailed tree removal application will be submitted in accordance with ETWB TC(W) No. 3/2006 - Tree Preservation. There will be no permanent alienation of landscape areas. All landscape areas which will be temporarily alienated will be reinstated on a like to like basis after completion of temporary works. Meanwhile, in addition to the compensated trees, new landscape resources such as horizontal greening including green roof and landscaped mound and vertical greening including vertical panel and climbers are proposed as alternative compensatory planting for the aboveground structures including NOV, SOV and EXH to optimise greening opportunities within the Project boundary. It is considered that with the proposed compensated trees and the proposed new landscape resources, the overall residual impact on existing trees and greenery would be reduced to an acceptable level.
- 3.19 Under the Project, there would not be any permanent or part loss of open space and amenity area apart from Harcourt Garden and Hong Kong Park. Some of the open space and amenity areas such as Fenwick Pier Street Public Open Space, Wan Chai Sports Ground, Tunnel Approach Rest Garden, amenity area at Gloucester Road and Cross Harbour Tunnel Entrance will be temporarily alienated during construction. A number of mitigation measures were recommended to alleviate landscape impacts during construction and operation phases, including:
- transplanting of existing trees as far as practicable;
  - compensatory planting for the affected trees as far as practicable;
  - compensatory shrub planting for the loss of shrub planting in amenity areas; and
  - reinstatement of temporarily disturbed hard and soft landscape areas during construction on like-to-like basis to the satisfaction of relevant Government Departments.
- 3.20 Since the majority of the proposed permanent works are located in the Wan Chai Civic Urban Waterfront LCA, there would still be a certain degree of residual impact due to the extensive works areas proposed in this LCA with the recommended mitigation measures in place during construction. Nonetheless, the degree of residual landscape impact would be alleviated to slight in Day 1 and further reduced to insubstantial in Year 10 of the operation, when the compensatory planting and landscape reinstatement works become mature.

#### Visual Impact

- 3.21 Potential visual impacts from the Project would mainly arise from the temporary surface works and permanent aboveground structure elements during the construction and operation phase respectively. Under the unmitigated scenario, most of the VSRs would experience slight to moderate impact during the construction phase, except at HKCEC Promenade and Wan Chai Sports Ground due to their close proximity to the temporary works at Wan Chai North and the construction of EXH; whereas in the operation phase, there would be slight to moderate visual impact on all the VSRs.

- 3.22 Mitigation measures for the construction phase including erection of decorative screen hoardings to screening of undesirable views from VSRs at low level, control on height and disposition and arrangement of all facilities on works site, as well as control of night-time lighting glare were recommended to alleviate potential visual impacts during construction stage. For VSRs on high rise development and at ground level near the construction sites and temporary works areas, there would be slight to moderate residual impacts yet temporary in nature.
- 3.23 During the operation phase, aesthetically pleasing design would be taken into consideration for aboveground structures such as station entrance, plant buildings, ventilation shafts and associated engineering facilities to blend with the adjacent visual context. Landscape design such as green roof, climbers, vertical greening, tree planting and landscape mound would also be incorporated into the above ground railway facilities to soften the structures and enhance their landscape and visual quality. As the proposed EXH including associated engineering facilities and the reprovisioning of Harbour Road Sports Centre and Wan Chai Swimming Pool would significantly alter the visual context of the area, tree plantings around these areas and a landscaped mound were proposed to screen the EXH associated aboveground structures as well as enhancing the landscape and visual amenity value.
- 3.24 With the recommended mitigation measures in place, localized residual impact on VSRs on Hong Kong Island overseeing to the EXH at high level would experience slight to moderate level of impact on Day 1 of the operation and reduced to slight to insubstantial level of impact in Year 10. Residual visual impact due to NOV, SOV, Emergency Access Point (EAP), ADM ventilation shafts, transformer rooms and cooling tower, and Hong Kong Park Ventilation Building (HKB) is considered as slight to insubstantial on Day 1 of the operation and would be reduced to insubstantial in Year 10 of the operation when the proposed landscape planting matures.
- 3.25 In view of the above, it is considered that the overall landscape and visual impact associated with the construction and operation of the Project are acceptable with the implementation of appropriate mitigation measures.

### **Construction Dust Impact**

- 3.26 Potential air quality impact from the construction works of the Project would mainly arise from excavation, materials handling, spoil removal, wind erosion, loading and unloading of excavated materials at the barging points and the operation of concrete batching plant in the Shek O casting basin.
- 3.27 Since the train to be employed for the SCL will be electrically operated, air quality impact associated with train emission is therefore not anticipated during operation phase. Exhausts for general ventilation and smoke extraction facilities will also be carefully positioned to avoid causing nuisance to the surrounding environment. Therefore air quality impact caused by the Project during operation phase is considered insignificant.
- 3.28 The operation of the concrete batching plant at Shek O is classified as Specified Process (SP), and the Contractor should apply a SP license under Air Pollution Control Ordinance (APCO) before operation. Suitable mitigation measures stipulated in the *Guidance Note on the Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2(93)* should be followed and implemented.
- 3.29 A total of 18 representative air sensitive receivers (ASRs) have been identified within 500m from the Project alignment and boundaries of all associated areas under the Project, as illustrated in **Figure Nos. NEX2213/C/331/ENS/M60/001 to NEX2213/C/331/ENS/M60/004**.
- 3.30 Under the unmitigated scenario, the predicted cumulative maximum hourly, daily and annual average Total Suspended Particulate (TSP) concentration at most of the representative ASRs would exceed the criteria stipulated in EIAO-TM and Air Quality Objectives (AQO). Proper dust mitigation measures including watering on active works areas, exposed areas and paved haul roads, enclosing

the unloading process at barging point, good site practices and mitigation measures specified in the *Air Pollution Control (Construction Dust) Regulation* should thus be implemented.

- 3.31 With the implementation of the recommended dust mitigation measures, the predicted TSP concentrations at all ASRs (cumulative maximum hourly average: 124-420  $\mu\text{g}/\text{m}^3$ , daily average: 95-239  $\mu\text{g}/\text{m}^3$  and annual average: 73.5-78.1  $\mu\text{g}/\text{m}^3$ ) would comply with the EIAO-TM hourly TSP criterion (500  $\mu\text{g}/\text{m}^3$ ), AQO daily TSP criterion (260  $\mu\text{g}/\text{m}^3$ ) and AQO annual TSP criterion (80  $\mu\text{g}/\text{m}^3$ ). No adverse air quality impact is anticipated.

### **Airborne Noise**

#### Construction Phase

- 3.32 Potential sources of noise from the construction of the Project would mainly be due to the use of powered mechanical equipment (PME) for various construction activities. Major construction works contributing to airborne noise impact include demolition of surface works for the construction of Cut-and-Cover tunnel section of the Project and the aboveground structures such as ventilation buildings and other supporting facilities. A total of 11 representative noise sensitive receivers (NSRs) have been identified within 300m from the Project works area for construction noise impact assessment. Their locations are shown in **Figure Nos. NEX2213/C/331/ENS/M52/002 to NEX2213/C/331/ENS/M52/005**.
- 3.33 Noise arising from the construction activities of the Project would have unavoidable potential impact on the NSRs located in the vicinity of the works areas. In the absence of any noise control measures, noise levels at most of the representative NSRs were predicted to exceed the EIAO-TM daytime construction noise limit of 75 dB(A).
- 3.34 Noise mitigation measures, including good site practices, adoption of quieter plant, use of movable noise barriers and noise insulating fabric, were recommended to alleviate the noise impacts at the representative NSRs due to nearby construction works. With the recommended mitigation measures in place, the predicted construction noise levels due to the Project at all representative NSRs were from 52 to 75 dB(A), and would thus fully comply with the EIAO-TM daytime construction noise criterion.
- 3.35 Several concurrent projects would be conducted in the vicinity of the Project, including SCL (MKK-HUH), SCL (TAW-HUH), Wan Chai Development Phase II (WDII) and CWB projects. Mitigated cumulative construction noise levels at the representative NSRs were predicted ranging from 52 to 76 dB(A). With the exhaustion of all practical mitigation measures to minimise the construction noise impact from the Project, residual cumulative noise impact of 1 dB(A) was predicted at NSR EX1 (Caseway Centre) for a short duration of non-persistent 2 months. It is considered that the residual cumulative noise impact would be minimised and would not be significant and considered as minor and acceptable. Good site practices shall be adopted by the Contractors to further ameliorate the noise impact.

#### Operation Phase

- 3.36 The major fixed noise sources identified in the Project would be from the operation of fixed plants in NOV, SOV, HKB and exhaust / intakes of ventilation shafts, transformer rooms and cooling facilities at the proposed EXH and ADM. A total of 8 representative NSRs have been identified within 300m from the Project works area for operation noise impact assessment. Their locations are shown in **Figure Nos. NEX2213/C/331/ENS/M52/101 to NEX2213/C/331/ENS/M52/103**.
- 3.37 The maximum allowable sound power levels (SWLs) for fixed plant noise sources, including cooling towers, transformer rooms and louvers of ventilation building, ventilation shafts and plant buildings, were determined based on their locations and proximity of NSRs. With the proper selection of plant and adoption of acoustic treatment, adverse noise impact from the operation of ventilation building, ventilation shafts and associated plant buildings of the Project is not anticipated.

- 3.38 If there is any change in engineering design information during detailed design stage or fitting-out stage, the fixed source noise design should be reviewed by engineer/contractor to ensure the Noise Control Ordinance (NCO) and EIAO criteria could be met in the future.

#### **Ground-borne Noise**

- 3.39 Construction ground-borne noise impacts would mainly arise from drill and blast, tunnel boring machine (TBM) operation for tunnelling works, as well as PME used for rock breaking/drilling including breakers, drill rigs and pipe pile rigs; while the transmitted noise from train operation through the ground and structures in close proximity to tunnels may have potential impact on NSRs. A total of 7 representative NSRs (**Figure Nos. NEX2213/C/331/ENS/M52/101 to NEX2213/C/331/ENS/M52/103**) were identified for ground-borne noise assessment.
- 3.40 The predicted construction ground-borne noise levels at all representative NSRs were from 32 to 63 dB(A), and would comply with the noise criteria. No adverse cumulative construction ground-borne noise impacts were predicted. During operation phase, predictions of ground-borne noise levels at the identified representative NSRs were performed using the methodology recommended by the US Department of Transportation. With suitable trackform, the predicted operation ground-borne noise levels at all representative NSRs were from <20 to 37 dB(A) during nighttime, and would be well below the noise criteria of 45 dB(A). Potential cumulative impact from the operation of existing/future rail lines was considered and no adverse cumulative impact is anticipated.

#### **Water Quality**

- 3.41 Water sensitive receivers (WSRs) in Victoria Harbour and its adjacent waters as well as areas within a distance of 300m from the Project boundary and works sites have been considered to evaluate the potential water quality impacts from the Project. Major marine WSRs identified within the Study Area include seawater intakes and important coral communities in the far field at Green Island as illustrated in **Figure Nos. NEX2213/C/331/ENS/M59/001 to NEX2213/C/331/ENS/M59/003 and NEX2213/C/331/ENS/M59/005**. No freshwater WSR (such as natural streams and rivers) was identified within 300 m from the boundaries of the Project works areas.

#### Construction Phase

- 3.42 Potential water quality impacts such as elevation of SS level, depletion of dissolved oxygen (DO) and increase in contaminants concentration would be associated with key marine construction works, which include the proposed dredging and filling works required for the IMT construction across the Victoria Harbour, temporary reclamation outside/within the CBTS and at Hung Hom Landfall, removal and reinstatement of the tip of Freight Pier for IMT construction and the off-site construction of Shek O casting basin.
- 3.43 The worst-case scenarios during the marine construction period, taking into account the cumulative effects from other concurrent marine works in the Harbour have been assessed. It was predicted that no unacceptable water quality impacts would arise from the Project-related construction works and due to the cumulative effects from other concurrent marine construction activities, with the implementation of good site practise and recommended mitigation measures fully in place. The predicted maximum SS concentrations would be <8 mg/l at seawater intakes, fully compliance with the water quality criteria. The key recommended mitigation measures include:
- Adopt an approach for temporary reclamation where temporary seawalls will first be formed to enclose each phase of the temporary reclamation. Installation of diaphragm wall on temporary reclamation as well as any bulk filling will proceed behind the completed seawall;
  - During construction of the temporary reclamation, temporary seawall will be partially constructed to protect the nearby seawater intakes from further dredging activities;
  - Use of closed grab dredger for dredging works;
  - Installation of silt screens at the cooling and flushing water intakes;

- Deployment of silt curtains to fully enclose the closed grab dredger during any operation;
- Bulk filling along the IMT tunnel would be carried out after the bulk dredging works are completed;
- Operate no more than two dredgers for dredging within the CBTS at any time for the tunnel construction works, with the combined dredging rate for all concurrent dredging works to be undertaken within the CBTS not exceeding 6,000 m<sup>3</sup> per day throughout the entire construction period;
- Operate no more than one closed grab dredger at the same time for IMT and SCL2 construction (temporary reclamation outside CBTS), with dredging/filling rate in open Harbour area for IMT/SCL2 construction not exceeding 2,500 m<sup>3</sup> per day, i.e. 156 m<sup>3</sup> per hour (concurrently with other dredging / filling activities in the Victoria Harbour) / 4,500 m<sup>3</sup> per day, i.e. 281 m<sup>3</sup> per hour (with no other concurrent dredging / filling activities in the Victoria Harbour); and
- No concurrent operation of dredging for SCL 2 construction and dredging / filling works for IMT construction.

3.44 The key water quality impact from the land-based construction activities would be due to the release of sediment-laden water from surface works areas, open cut excavation, tunnelling works and discharge of construction site effluent. Minimization of water quality deterioration could be achieved through implementing adequate mitigation measures and site practices in *ProPECC PN 1/94 "Construction Site Drainage"*, such as sand/silt removal facilities, provision of cover for stockpiles to minimise site runoff and proper site drainage. No unacceptable water quality impact would be anticipated from the land-based construction works with proper implementation of the recommended mitigation measures.

#### Operation Phase

3.45 Due to the change in seabed levels along the tunnel section within Victoria Harbour after the project implementation, there could be potential impact on the flow regime and the associated water quality in Victoria Harbour. In order to assess the change in the overall assimilative capacity of Victoria Harbour, the flow discharge across two cross sections at the eastern and western ends of the harbour was calculated. The model results indicated that the operation of the SCL IMT tunnel would change the mean discharge through Victoria Harbour by not more than 0.1%. Considering the marginal change in flow discharge through Victoria Harbour, no major impacts on the assimilative capacity and, thus, the water quality of Victoria Harbour is expected to occur as a result of the Project. No mitigation measures specific to operation phase hydrodynamic / hydrology impact would be required.

3.46 Other key operational impacts from tunnel/station run-off and effluent discharges from the stations and maintenance activities, which could be minimized through implementing adequate mitigation measures.

#### **Waste Management Implications**

##### Construction Phase

3.47 Different types of waste generated from the Project during construction phase would include Construction and Demolition (C&D) materials from demolition, excavation and site formation works, marine dredged sediment, general refuse from workforce, and chemical waste from the maintenance of construction plant and equipment.

3.48 The total volume of inert C&D material generated from demolition, excavation of shafts and tunnels and site formation works would be approximately 1,097,000m<sup>3</sup> (including 225,000m<sup>3</sup> of rock, 762,000m<sup>3</sup> of soft material and 110,000m<sup>3</sup> of artificial hard material (AHM)). Surplus inert C&D materials generated from the Project may be delivered to two Public Fill Reception Facilities (PFRFs) which are Tuen Mun Area 38 Fill Bank and Tseung Kwan O Area 137 Fill Bank. Opportunities in



minimization of generation and maximisation of reuse would be continually investigated during the detailed design and construction phases, and in other concurrent projects including the Hong Kong-Zhuhai-Macau Bridge (HZMB) and Hong Kong Boundary Crossing Facilities (HKBCF), the Tuen Mun-Chek Lap Kok Link (TMCLKL), CWB and WDII projects. About 30,000m<sup>3</sup> of non-inert C&D materials would be generated, which would be reused and recycled as much as possible before disposal of at the North East New Territories Landfill (NENT). Provided that these wastes are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed, adverse environmental impacts would not be anticipated.

- 3.49 The total volume of dredged/excavated sediment generated from the Project is estimated to be approximately 841,800m<sup>3</sup>. Based on the results of the chemical and biological screening, approximately 315,000m<sup>3</sup> of sediment is suitable for Type 1 – Open Sea Disposal, 14,000m<sup>3</sup> of sediment is suitable for Type 1 – Open Sea Disposal (Dedicated Sites), 496,300m<sup>3</sup> of sediment requires Type 2 – Confined Marine Disposal and 16,500m<sup>3</sup> of sediment requires Type 3 – Special Treatment/Disposal in accordance with *ETWB TC(W) No. 34/2002 - Management of Dredged/Excavated Sediment*.
- 3.50 It is proposed that the excavated Type 3 sediments are sealed in geosynthetic containers and, at the disposal site, the containers would be dropped into the designated contaminated mud pit where they would be covered by further mud disposal and later by the mud pit capping, thereby meeting the requirements for fully confined mud disposal. A proposal on the use of geosynthetic containers on Type 3 sediment should be submitted to TCO/EPD for agreement at a later stage of the Project and prior to the dredging and excavation works. With the implementation of the recommended mitigation measures and in accordance with the requirements of ETWB TC(W) No. 34/2002, no adverse environment impacts would be expected from excavation, transportation and disposal of marine sediment.
- 3.51 The construction workforce would generate general refuse with an estimated daily volume of approximately 1,853 kg which requires proper handling and disposal. With the implementation of good waste management practices on site, it is anticipated that the secondary environmental impacts from collection and handling of general refuse would be minimal. Chemical waste would also be generated from the use of cleaning fluid, fuel and scrap batteries for plant maintenance purposes. Such waste would be handled, stored and disposed of in accordance with the *Waste Disposal (Chemical Waste) (General) Regulations* to prevent adverse environmental impacts.

#### Operation Phase

- 3.52 The main waste types generated during the operation of the Project would be general refuse (from the passengers, staff and any commercial operators), chemical and industrial wastes (from the maintenance activities in stations, ventilation building and railways). It is expected that the volume of waste generation in operation phase would be insignificant. No adverse impacts to the environment would be anticipated with the implementation of the recommended mitigation measures.

#### Land Contamination

- 3.53 The land contamination assessment has examined the potential contaminating land uses within the Project area and investigated the potential impacts of the contamination on future use. The assessment involved site appraisal, site investigation, and assessment of contamination extent.
- 3.54 A Contamination Assessment Plan (CAP) was prepared according to the findings of site appraisal and has been endorsed by EPD. The approved CAP proposed sampling locations and depths for soil and groundwater at potentially contaminated sites, and specified the sampling and testing requirement for site investigation (SI) works. Stage 1 SI was conducted at three accessible sites (Kowloon Freight Building at Hung Hom, Police Officers' Club at Causeway Bay, and past marine boat basin of the War Department at Admiralty). The results show that no exceedance of the adopted Risk-Based Remediation Goals (RBRGs) guidelines was identified and hence no adverse impacts would be expected within the assessment areas. As a precaution, mitigation measures are

proposed for the excavation of soil, treatment of soil and general environmental impacts, health and safety issues on site during the construction stage.

- 3.55 Due to current land use and site constraints, SI was not conducted for the potentially contaminated site at southeast corner of Wanchai Swimming Pool (aboveground diesel storage tanks at Wan Chai Swimming Pool) under Stage 1. The investigation will be conducted in Stage 2 after decommissioning of existing buildings and access has been granted. Supplementary Contaminated Assessment Report (CAR) and if contamination is found, Remediation Action Plan (RAP) detailing the proposed remediation works will be prepared and submitted to EPD for endorsement. Based on the site appraisal conducted previously in the endorsed CAP, the potential contamination (if any found) at southeast corner of Wanchai Swimming Pool under Stage 2 SI is expected to be surmountable, with the implementation of recommended environmental precautionary measures in the EIA.

#### **Hazard to Life**

- 3.56 As there is no overnight storage of explosives, a Quantitative Risk Assessment (QRA) of the storage and transport of explosives is not required as per Section 3.4.9.2 of the EIA Study Brief No. ESB-193/2008. Mines Division will be responsible for delivering explosives directly to works areas for the rock excavation of the ADM Overrun Tunnel. The transportation of explosives by Mines Division directly to sites is under Mines Division's responsibility and falls outside the scope of this Environmental Impact Assessment (EIA). However, underwater blasting works may be required should bedrock or large boulders be encountered during the construction of the IMT tunnel, the statutory /licensing requirements with respect to explosives under the Dangerous Goods Ordinance (Cap. 295) have been described and any guidelines and/or advice obtained from relevant departments/ authorities have been documented.
- 3.57 Following a consultation with Hong Kong and China Gas Company Limited (HKCG) and a review of the relevant Ordinance, Code of Practice and other HKCG requirements, as necessitated in Section 3.4.9.3 of the EIA Study Brief, a number of protective measures have been described to avoid and minimise the hazard to life issue in relation to fuel gas safety during the construction.

#### **4. ENVIRONMENTAL MONITORING AND AUDIT**

- 4.1 An environmental monitoring and audit (EM&A) programme will be implemented during the construction and operation of the Project, to check the effectiveness of the recommended mitigation measures and compliance with relevant statutory criteria. The EM&A programme would include site inspection/audit and monitoring for construction dust, construction airborne noise, water quality, operation ground-borne noise and updating changes as necessary. Details of the recommended mitigation measures, monitoring procedures and locations are presented in a stand-alone EM&A Manual.

#### **5. CONCLUSION**

- 5.1 This EIA has been conducted in accordance with the EIA Study Brief and the EIAO-TM guidelines. Overall, the EIA Study has concluded that the Project would be environmentally acceptable, in compliance with environmental legislation and standards and provide substantive societal benefits. With the implementation of environmental control measures during construction and operation of the Project, the individual impacts are minimised, there would be no adverse residual impacts from the Project. This will be checked by a comprehensive environmental monitoring and audit programme.

**Table 3.1 Summary of Environmental Impacts associated with the Project**

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
<b>Cultural Heritage</b>					
Built heritage resources	With sufficient buffer distances between built heritages and the proposed works area, no adverse cultural heritage impact is expected.	<ul style="list-style-type: none"> <li>Guidelines for Cultural Heritage Impact Assessment</li> <li>EIAO-TM Annex 10 and Annex 19</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>No specific mitigation measure for built heritage would be required.</li> <li>The use of sensibly designed screen hoardings for mitigating landscape and visual impacts to minimise the potential visual impact on identified heritage buildings.</li> </ul>	No adverse residual impacts would be anticipated.
Terrestrial Archaeological Resources	No terrestrial archaeological resources are identified within Study Area.	<ul style="list-style-type: none"> <li>Guidelines for Cultural Heritage Impact Assessment</li> <li>EIAO-TM Annex 10 and Annex 19</li> </ul>	Not applicable	No mitigation would be required.	No adverse residual impacts would be anticipated.
Marine Archaeological Resources	No marine archaeological resources are identified within Study Area.	<ul style="list-style-type: none"> <li>Guidelines for Marine Archaeological investigation</li> <li>EIAO-TM Annex 10 and Annex 19</li> </ul>	Not applicable	No mitigation would be required.	No adverse residual impacts would be anticipated.
<b>Ecological Impacts</b>					
<i>Construction Phase</i>					
Ecological resources at and near the Project area	<u>Direct impact</u> <ul style="list-style-type: none"> <li>Temporary loss of approximately 17 ha of soft bottom and subtidal habitat and approximately 300 m long artificial seawall within Victoria Harbour.</li> </ul>	<ul style="list-style-type: none"> <li>EIAO-TM Annex 8 and Annex 16</li> <li>The Protection of the Harbour Ordinance (Cap. 531)</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>No specific mitigation measures for ecology is required.</li> <li>Implementation of water quality control measures such as installation of silt curtains</li> </ul>	<u>Direct Impact</u> <ul style="list-style-type: none"> <li>Temporary loss of the marine habitats</li> <li>All the marine habitats and associated marine life</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	<ul style="list-style-type: none"> <li>Temporary loss of approximately 10 ha of newly established marine habitat in the marine cove of Shek O Quarry site after rehabilitation.</li> </ul> <p><u>Indirect impact</u></p> <ul style="list-style-type: none"> <li>Short term indirect impact to marine habitat and associated marine life due to deterioration of water quality as a result of the proposed marine works.</li> </ul>	<ul style="list-style-type: none"> <li>The Water Pollution Control Ordinance(Cap. 358)</li> <li>International Union for Conservation of Nature and Natural Resources (IUCN) 206 Red Data Books</li> <li>The PRC National Protection Lists of Important Wild Animals and Plants</li> </ul>		<p>around dredger(s), use of closed grab dredger and reduction of dredging rate to minimise indirect impacts on marine life due to changes of water quality.</p>	<p>that would be temporarily loss are of low ecological value and the impact would be short-term and reversible. Residual impact due to the temporary loss is therefore considered acceptable.</p> <p><u>Indirect impact</u></p> <ul style="list-style-type: none"> <li>With the implementation of the proposed mitigation measures as recommended for water quality impacts, residual impact on marine ecology due to the deterioration in water quality would be minimised. In considering the low ecological value of marine habitats within or in the vicinity of the affected area and the temporary nature of the impact, the residual impact is considered acceptable.</li> </ul>
<i>Operation Phase</i>					
Ecological resources at and near the Project area	<ul style="list-style-type: none"> <li>No adverse operation phase impact on marine</li> </ul>	<ul style="list-style-type: none"> <li>EIAO-TM Annex 8</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>No mitigation would be required.</li> </ul>	No adverse residual impacts would be

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	ecology	and Annex 16 <ul style="list-style-type: none"> <li>• The Protection of the Harbour Ordinance (Cap. 531)</li> <li>• The Water Pollution Control Ordinance(Cap. 358)</li> <li>• International Union for Conservation of Nature and Natural Resources (IUCN) 206 Red Data Books</li> <li>• The PRC National Protection Lists of Important Wild Animals and Plants</li> </ul>			anticipated.
<b>Fisheries Impacts</b>					
<i>Construction Phase</i>					
Fisheries resources within Victoria Harbour	<ul style="list-style-type: none"> <li>• Temporary loss of about 1.5-5 ha of fishing area during various phases of marine works in Victoria Harbour.</li> <li>• Short term indirect impact on fisheries resources due to deterioration of water quality as a result of the proposed marine works.</li> </ul>	<ul style="list-style-type: none"> <li>• EIAO-TM Annex 9 and Annex 17</li> <li>• Fisheries Protection Ordinance (Cap. 171)</li> <li>• Marine Fish Culture Ordinance (Cap. 353)</li> <li>• The Water Pollution Control Ordinance (Cap. 358)</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>• No fisheries-specific mitigation measures would be required.</li> <li>• Water quality control measures to minimise indirect impact on fisheries due to changes of water quality.</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary loss of the fishing area. In view of the small size and low fisheries importance of the area being temporarily occupied, the residual impact is considered acceptable.</li> </ul>
<i>Operation Phase</i>					
Fisheries resources within	<ul style="list-style-type: none"> <li>• No adverse operation</li> </ul>	<ul style="list-style-type: none"> <li>• EIAO-TM Annex 9</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>• No mitigation would be required.</li> </ul>	No adverse residual

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Victoria Harbour	phase impact on fisheries resources	and Annex 17 <ul style="list-style-type: none"> <li>• Fisheries Protection Ordinance (Cap. 171)</li> <li>• Marine Fish Culture Ordinance (Cap. 353)</li> <li>• The Water Pollution Control Ordinance (Cap. 358)</li> </ul>			impacts would be anticipated.
<b>Landscape and Visual Impacts</b>					
<i>Construction Phase</i>					
Landscape Resources, Landscape Characters Areas and Visually Sensitive Receivers	<ul style="list-style-type: none"> <li>• Based on a very broad brush estimate, approximately 930 existing trees would be removed by the Project.</li> <li>• Loss of Fenwick Pier Street Public Open Space, Wan Chai Sports Ground, Tunnel Approach Rest Garden, amenity areas at Gloucester Road and Cross Harbour Tunnel Entrance</li> <li>• Substantial impact on LR14, LR15 and LR16. Impact on other landscape resources varies from moderate to insubstantial.</li> <li>• Impact on landscape characters areas varies from moderate to</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental Impact Assessment Ordinance (EIAO) (Cap. 499).</li> <li>• EIAO-TM Annex 10 and Annex 18</li> <li>• ETWB TC(W) No. 2/2004</li> <li>• ETWB TC(W) No. 3/2006</li> </ul>	Not Applicable	<ul style="list-style-type: none"> <li>• Transplanting affected;</li> <li>• Compensatory planting for the affected trees;</li> <li>• Control of night-time lighting glare;</li> <li>• Decoration of hoarding;</li> <li>• Control on the height and disposition/arrangement of all temporary facilities during construction; and</li> <li>• Reinstatement of temporary works areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary residual substantial impact on LR14, LR15 and LR16; temporary residual moderate impact on LR06, LR06a, LR12, LR13 and LR18; temporary residual slight impact on LR01, LR02 and LR03 and LR27.</li> <li>• Temporary residual moderate impact on LCA05 and LCA07; temporary residual slight impact on LCA03, LCA04, LCA11, LCA14 and LCA17.</li> <li>• Temporary residual moderate to insubstantial impact</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	insubstantial. <ul style="list-style-type: none"> <li>• Substantial impact on VSRs O3 and O4 who are close to the source of impact. Impact on other VSRs varies from moderate to slight.</li> </ul>				on VSRs adjacent to works areas..
<i>Operation Phase</i>					
Landscape Resources, Landscape Characters and Visually Sensitive Receivers	The unmitigated impact for Landscape Resources, Landscape Characters and Visually Sensitive Receivers would remain the same as the impact during construction phase.	<ul style="list-style-type: none"> <li>• EIAO (Cap. 499).</li> <li>• EIAO-TM Annex 10 and Annex 18</li> <li>• ETWB TC(W) No. 2/2004</li> <li>• ETWB TC(W) No. 3/2006</li> </ul>	Not Applicable	<ul style="list-style-type: none"> <li>• Aesthetic design for above ground structures;</li> <li>• Buffer planting to provide screening;</li> <li>• Roof greening;</li> <li>• Climbers to soften the building structure;</li> <li>• Landscape mound to provide screening; and</li> <li>• Vertical greening.</li> </ul>	<ul style="list-style-type: none"> <li>• Reinstatement of Fenwick Pier Street Public Open Space, Wan Chai Sports Ground, Tunnel Approach Rest Garden, amenity areas at Gloucester Road and Cross Harbour Tunnel Entrance on a like-for-like basis. Residual impact on open space and amenity areas would be reduced to slight to insubstantial in Year 10.</li> <li>• Impact on landscape resources and landscape character areas would become slight to insubstantial by Year 10.</li> <li>• Impact on VSRs adjacent to aboveground</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
					structures would become slight to insubstantial in Year 10.
<b>Construction Dust Impact</b>					
<p>Existing commercial, residential and recreational developments in Hung Hom, Causeway Bay, Wan Chai, Admiralty and Shek O areas and a performing art centre in Admiralty.</p> <p>18 assessment points (refer to <b>Figure Nos. NEX2213/C/331/ENS/M60/01 – 004</b>)</p>	<p>1-hour Average TSP Conc.: 160 – 5593 µg/m<sup>3</sup></p> <p>24-hour Average TSP Conc.: 96 – 1884 µg/m<sup>3</sup></p> <p>Annual Average TSP Conc.: 73.9 – 97.2 µg/m<sup>3</sup></p>	<p>EIAO-TM (hourly): 500 µg/m<sup>3</sup></p> <p>AQO (daily): 260 µg/m<sup>3</sup></p> <p>AQO (annual): 80 µg/m<sup>3</sup></p>	<p>Exceed EIAO-TM (hourly) criterion by up to 5093 µg/m<sup>3</sup></p> <p>Exceed AQO (daily) by up to 1624µg/m<sup>3</sup></p> <p>Exceed AQO (annual) by up to 17.2 µg/m<sup>3</sup></p>	<ul style="list-style-type: none"> <li>• Watering on the active works areas, exposed areas and paved haul roads to reduce dust emission</li> <li>• Enclosing the unloading process at barging point to reduce dust emission</li> <li>• Dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices would be carried out to further minimise construction dust impact.</li> </ul>	<p>No adverse residual hourly, daily and annual dust impacts would be anticipated.</p>
<b>Airborne Noise Impact</b>					
<i>Construction Phase</i>					
<p>Existing residential blocks in Hung Hom, Causeway Bay, Wan Chai, Admiralty and Shek O areas and a performing art centre in Admiralty.</p> <p>11 assessment points (refer to <b>Figure Nos. NEX2213/C/331/ENS/M52/02 – 005</b>)</p>	<p>Predicted noise levels would range from 52 to 87 dB(A)</p>	<p>EIAO-TM assessment criterion for works during non-restricted hours for domestic premises: 75dB(A)</p>	<p>Exceed the EIAO-TM noise criterion by up to 12 dB(A)</p>	<p>Adoption of good site practices, quieter plant, movable noise barriers and noise insulating fabric to minimise construction noise impact</p>	<p>Residual cumulative impact of 1 dB(A) for 2 months at NSR EX1, Block A, Causeway Centre (about 120 dwellings), due to construction induced from the Project and WDII &amp; CWB Project. It is considered that all practicable measures</p>



Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
have been exhausted to minimise the residual impact.					
<i>Operation Phase</i>					
Existing residential blocks in Hung Hom, Causeway Bay, Wan Chai and Admiralty areas.  8 assessment points (refer to <b>Figure Nos. NEX2213/C/331/ENS/M52/1 01 – 103</b> )	Maximum sound power level was predicted to meet the relevant noise criteria.	<ul style="list-style-type: none"> <li>• EIAO-TM Annex 5</li> <li>• NSRs near to NOV, SOV and EXH: ANL-5dB(A)</li> <li>• NSRs near to ADM: ANL-11 dB(A) (i.e. -5-6 dB(A))</li> <li>• NSRs near to HKV: ANL-8 dB(A) (i.e. -5-3 dB(A))</li> </ul>	No exceedance was anticipated.	Proper selection of plant and adoption of acoustic treatment	No adverse residual impacts would be anticipated.
<b>Ground-borne Noise Impact</b>					
<i>Construction Phase</i>					
Existing residential blocks, hotels and performing art centre/educational institutes in Hung Hom, Causeway Bay, Wan Chai and Admiralty areas.  7 assessment points (refer to <b>Figure Nos. NEX2213/C/331/ENS/M52/0 02 – 004</b> )	Daytime: 32 – 63 dB(A) for residential NSRs and 52 dB(A) for educational NSR	Construction ground-borne noise criteria: <ul style="list-style-type: none"> <li>• Daytime: 65 dB(A) for domestic premises, and for educational institutions 60 dB(A) during normal teaching periods and 55 dB(A) during examinations</li> </ul>	No exceedance was predicted.	No mitigation would be required.	No adverse residual impacts would be anticipated.
<i>Operation Phase</i>					
Existing residential blocks, hotels and performing art centre/educational institutes	Predicted operation ground-borne noise levels would range from <20 to 38 dB(A)	Operational ground-borne noise criterion: 55dB(A) during daytime	No exceedance was predicted.	No mitigation would be required.	No adverse residual impacts would be anticipated.

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
in Hung Hom, Causeway Bay, Wan Chai and Admiralty areas. 7 assessment points (refer to <b>Figure Nos. NEX2213/C/331/ENS/M52/1 01 – 103</b> )	during daytime & evening, and <20 to 37 dB(A) during nighttime	& evening, and 45 dB(A) during nighttime			
<b>Water Quality Impact</b>					
<i>Construction Phase</i>					
Coral communities and seawater intakes along the coastlines of Victoria Harbour (refer to <b>Figures Nos. NEX2213/C/331/ENS/M59/01 – 003</b> and <b>NEX2213/C/331/ENS/M59/05</b> )	The model results indicate that there would be exceedance in SS criteria at WSD seawater intake at Quarry Bay, Wan Chai and Kowloon Station in assessment scenario 1 (with SCL IMT construction and other concurrent marine works). In assessment scenario 2 (with SCL IMT construction alone), exceedance in SS assessment criteria is predicted at WSD seawater intake at Quarry Bay and Kowloon Station. At the far-field coral communities, both the predicted SS elevations and sedimentation rates would comply with the relevant criteria.	<ol style="list-style-type: none"> <li>1. WSD flushing water quality intake criterion for SS: &lt; 10 mg/l</li> <li>2. Target water quality objectives at coral sites for SS elevations: &lt; 30 % of the background ambient levels</li> <li>3. Sedimentation rate at corals: &lt;100g/m<sup>2</sup>/day</li> <li>4. EIAO-TM Annex 6 and Annex 14</li> </ol>	Maximum exceedance of SS would be about 10 mg/L above the assessment criteria predicted at seawater intake at Kowloon Station.	<ul style="list-style-type: none"> <li>• Use of closed grab dredger during dredging and filling operations.</li> <li>• Deployment of silt curtains around dredging areas, and installation of silt screens at selected seawater intakes during marine construction.</li> <li>• Control of dredging and filling rates for marine construction</li> </ul>	No adverse residual impacts would be anticipated.
<i>Operation Phase</i>					
Coral communities and seawater intakes along the	Operation of SCL would not cause unacceptable impacts	1. Relevant WQO for marine water	No WQO exceedance would be induced by	<u>Tunnel Run-off and Drainage</u>	No adverse residual impacts would be

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
coastlines of Victoria Harbour (refer to <b>Figures Nos. NEX2213/C/331/ENS/M59/001 – 003</b> and <b>NEX2213/C/331/ENS/M59/005</b> )	upon the water quality in Victoria Harbour.	stipulated under the WPCO 2. EIAO-TM Annex 6 and Annex 14	the Project.	Oil/grit interceptors / chambers should be provided. <u>Sewage Effluents</u> Connection of domestic sewage generated from the Project should be diverted to the foul sewer. The practices outlined in ProPECC PN 5/93 should be adopted where applicable.	anticipated.
<b>Waste Management Implications</b>					
<i>Construction Phase</i>					
Water quality, air and noise sensitive receivers at or near the Project Site, the waste transportation routes and the waste disposal site.	<u>Main waste:</u> <ul style="list-style-type: none"> <li>• Dredged marine sediment with a total volume of approximately 841,800m<sup>3</sup></li> </ul> <u>Other wastes:</u> <ul style="list-style-type: none"> <li>• C&amp;D Materials from demolition and excavation works with a total volume of approximately 1,097,000m<sup>3</sup></li> <li>• 30,000 m<sup>3</sup> of non-inert C&amp;D material</li> <li>• General refuse with a daily volume of 1,853 kg from workforce</li> <li>• Chemical waste from plant and equipment maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• EIAO-TM Annex 7 and Annex 15</li> <li>• Waste Disposal Ordinance (Cap. 354);</li> <li>• Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C);</li> <li>• Land (Miscellaneous Provisions) Ordinance (Cap. 28);</li> <li>• Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation;</li> </ul>	Not applicable.	<ul style="list-style-type: none"> <li>• C&amp;D wastes would be reused (i.e. other concurrent projects) as far as practicable before off-site disposal</li> <li>• Contaminated dredged sediment (Category M and H) would require either Type 1 – Open Sea Disposal (Dedicated Sites) or Type 2 – Confined Marine Disposal at contaminated mud pit allocated by MFC. Category L sediment is suitable for Type 1 – Open Sea Disposal at gazetted marine disposal ground allocated by MFC.</li> <li>• The handling method of dredged Type 3 sediments should adhere to the CWB project under which geosynthetic containment would</li> </ul>	No adverse residual impacts would be anticipated.

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
		<ul style="list-style-type: none"> <li>• Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N); and</li> <li>• Dumping at Sea Ordinance (Cap. 466).</li> </ul>		<p>be employed as disposal method. The sediment should be sealed in geosynthetic containers and disposed of at the designated contaminated mud pit. The pit would be subsequently capped thereby meeting the requirements for fully confined mud disposal.</p> <ul style="list-style-type: none"> <li>• Other waste reduction measures and good site practices to achieve avoidance and minimization of waste generation from the Project.</li> </ul>	
<i>Operation Phase</i>					
Water quality, air and noise sensitive receivers at or near the Project Site, the waste transportation routes and the waste disposal site.	<ul style="list-style-type: none"> <li>• Insignificant amount of chemical wastes, general refuse and industrial waste to be generated from the operation and maintenance activities of the Project</li> </ul>	<ul style="list-style-type: none"> <li>• Waste Disposal Ordinance (Cap. 354); and</li> <li>• Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C).</li> </ul>	Not applicable.	<ul style="list-style-type: none"> <li>• Follow Code of Practice on the Packaging, Labelling and Storage of Chemical Waste in handling of chemical waste.</li> <li>• Disposal of non-recyclable chemical waste at appropriate facilities like Chemical Waste Treatment Centre (CWTC) at Tsing Yi.</li> <li>• Employ licensed waste collectors for the collection of general refuse and industrial waste</li> </ul>	No adverse residual impacts would be anticipated.
<b>Land Contamination</b>					
Potential land contamination sites within the Project Area	Based on the findings from the Stage 1 Site Investigation (SI), no adverse impacts have	<ul style="list-style-type: none"> <li>• Section 3 (Potential Contaminated Land Issues) of Annex 19</li> </ul>	No exceedance identified under the Stage 1 Site	<ul style="list-style-type: none"> <li>• Based on the Stage 1 SI results, no exceedance has been found; therefore no</li> </ul>	<ul style="list-style-type: none"> <li>• No contaminants were detected in Stage 1 SI. Therefore,</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
	<p>been identified within the assessment areas.</p> <p>Remaining sites requiring SI will be investigated during Stage 2.</p>	<p>“Guidelines for Assessment of Impact on Sites of Cultural Heritage and Other Impacts” of the EIAO-TM.</p> <ul style="list-style-type: none"> <li>• Guidance Note for Contaminated Land Assessment and Remediation”</li> <li>• Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards and Car Repair /Dismantling Workshop”</li> <li>• Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management</li> </ul>	Investigation	<p>remediation actions are needed.</p> <ul style="list-style-type: none"> <li>• Precautionary measures such as visual inspection of excavated soils for discolouration and the presence of oils and odours are proposed for the construction stage for both Stage 1 and 2 SI sites.</li> <li>• Excavated soil materials suspected to be contaminated should be temporarily stockpiled, and testing should be undertaken to verify the presence of contamination.</li> </ul>	<p>no adverse residual impacts would be anticipated.</p> <ul style="list-style-type: none"> <li>• For sites under Stage 2 SI, options of remediation methods will be reviewed and implemented so that contaminants will be removed to achieve the remediation targets. After completion of soil remediation for contaminated areas (if identified), no adverse residual impacts would be anticipated.</li> </ul>