

Consultancy Agreement No. NEX/2213

Environmental Impact Assessment (EIA) Study for Shatin to Central Link - Mong Kok East to Hung Hom Section



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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 Corporation 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 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 from Hung Hom Station across the harbour to Admiralty Station, 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 - Mong Kok East to Hung Hom Section [SCL (MKK-HUH)]** (hereinafter referred to as “the Project” being considered in the EIA) – The realignment work for the existing EAL tracks from the tunnel portal near Oi Man Estate (Portal 1A) to the proposed North Ventilation Building, Plant Rooms and Emergency Access (NOV) 1 in Hung Hom;
 - **SCL – Hung Hom to Admiralty Section [SCL (HUH-ADM)]** – The section from proposed NOV in Hung Hom across the harbour to the Causeway Bay Typhoon Shelter (CBTS), EXH and then to ADM, namely “SCL – Hung Hom to Admiralty Section” [SCL (HUH-ADM)];
 - **SCL Protection works at Causeway Bay Typhoon Shelter** – A 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; and
 - **SCL Tai Wai to Hung Hom Section [SCL (TAW-HUH)]** – The extension of the 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)²; 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 Hom².
- 1.6 The SCL was gazetted under the Railways Ordinance in 2010, with the construction of the whole SCL project scheduled to commence in 2012 and be completed in 2020. [Figure No. NEX2213/C/361/ENS/M50/500](#) illustrates an overview of the SCL alignment.
- 1.7 The Project would cover the following designated project (DP) elements as specified under A.1, A.2 and A.7 in Schedule 2 Part 1 of the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499):
- Item DP1: A railway and its associated stations under A.2 in Schedule 2 Part 1, i.e. railway from Portal 1A to the new NOV and the HUH;
 - Item DP2: A railway tunnel more than 800m in length between portals under A.7 in Schedule 2 Part 1, i.e. from Chatham Road Interchange to the new NOV; and

¹ The future North Ventilation Building, Plant Rooms and Emergency Access at Hung Hom will be constructed under the Shatin to Central Link - Hung Hom to Admiralty Section [SCL(HUH – ADM)]

² 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.

- Item DP3: A road which is an expressway, trunk road, primary distributor road or district distributor road including new roads, and major extensions or improvements to existing road under A.1 in Schedule 2 Part 1, i.e. realignment of the existing Cheong Wan Road which is a district distributor.
- 1.8 An application for an Environmental Impact Assessment (EIA) Study Brief was made to the Environmental Protection Department (EPD) and the EIA Study Brief No. ESB-192/2008 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 SCL (MKK-HUH). The potential environmental impacts associated with the SCL (HUH-ADM), SCL Protection Works at Causeway Bay Typhoon Shelter, SCL (TAW-HUH) and SCL (HHS) have been assessed and presented in the other 4 standalone EIAs under the EIA Study Brief No. ESB-193/2008, ESB-213/2010, ESB-191/2008 and ESB-233/2011 respectively.
- 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 I – Mong Kok East to Hung Hom)” to “Shatin to Central Link – Mong Kok East to Hung Hom Section” [SCL (MKK-HUH)] 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 This Executive Summary highlights the key findings of the EIA study for the Project to comply with the EIAO.

2. PROJECT DESCRIPTION

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 realign the rail section of the existing EAL from the tunnel portal near the Oi Man Estate to the HUH, and to provide convenient interchange at HUH. [Figure No. NEX2213/C/361/ENS/M50/504](#) and [NEX2213/C/361/ENS/M50/505](#) illustrate the preferred alignment of SCL (MKK-HUH).
- 2.2 The Project comprises the following key elements:
- An approximately 1.2km realigned and modified railway section from Portal 1A to HUH;
 - Provision of Noise Mitigation Measures at Portal 1A to reduce the operation noise impact to the surrounding sensitive receivers;
 - New platforms at the existing HUH providing an integrated HUH for the existing urban lines and the future SCL;
 - Realignment of the existing Cheong Wan Road;
 - Ventilation shafts, cooling tower and other associated works of the Project; and
 - Slightly modification works on the existing Homantin Siding and Mong Kok Freight Terminal at MKK.
- 2.3 Apart from the above key elements, barging facilities, supporting works areas and access roads will be required to support the construction of the Project.
- 2.4 Location, boundary, general layout and associated works of the Project are illustrated in [Figure No. NEX2213/C/361/ENS/M50/506](#).

Benefit of the Project

- 2.5 The SCL is an important strategic rail corridor forming an expanded railway network in Hong Kong that will bring various benefits to the community, including:
- Providing a fast, reliable and convenient mode of transport running through the northern New Territories, Kowloon and Hong Kong Island;
 - Redistributing of railway passenger flows to relieve the existing railway lines in urban Kowloon and on Hong Kong Island;

- Relieving road-based public traffic in the existing developed areas, and alleviating the traffic congestion and environmental nuisance on existing road networks, including the demand on the Hung Hom Cross Harbour Tunnel;
 - Stimulating the redevelopment of Hung Hom and Waterfront areas; and
 - Providing more environmentally friendly public transport in terms of energy conservation and gas emissions.
- 2.6 The Project improves the accessibility to the harbour by providing a direct link between Hung Hom and Hong Kong Island. With this link, there will be increased opportunities for the public to access the areas and enjoy the harbour and the promenade area of Tsim Sha Tsui East. This would produce more possibilities for the planning and development of leisure and tourism.
- 2.7 More importantly, the expansion in railway network can gradually lead to a significant modal shift in passengers' travel behaviours from road-based transport to railway system, and thereby alleviating environmental nuisance from existing road networks.
- 2.8 From the environmental perspective, the rail will be powered electrically. Railways are widely recognized as a more 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 comparison to road-based transport. 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.

Selection of the Project Scheme

- 2.9 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 engineering feasibility, site constraints, construction programme and environmental aspects.
- 2.10 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.
- 2.11 The selected alignment and construction methods are regarded as the most appropriate and balanced scheme, which can minimize 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 minimize the extent and duration of construction activities such that environmental impacts and disturbances to the existing facilities, users and sensitive receivers could be minimized.
 - Majority of the track of the Project has been designed underground to minimize the potential impacts on nearby sensitive receivers. Suitable trackform has been proposed to minimize any potential air-borne and ground-borne train noise impacts on the nearby sensitive receivers.
 - Different alternatives of the sequence of construction works have been thoroughly scrutinized and determined with the aim to minimize the extent of cumulative environmental impacts due to interfacing with other concurrent projects.
 - Locations and design of ventilation shafts have been carefully selected to minimize the impacts on sensitive receivers. The ventilation shafts for the reconfigured HUH have been grouped along the north and south sides of the existing HUH podium edge to reduce visual impacts and greening measures have been incorporated in the design.
 - Acoustic design specification for 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 LCSD Registered Old and Valuable Trees. All the affected trees are common species with low to high amenity values, and would be protected in accordance with Environment, Transport and Works Bureau (ETWB) Technical Circular (Works) (TC(W)) No. 3/2006.

Continuous Public Involvement

- 2.12 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, public and professional forums, seminars, was conducted to further collect views from the public on the new link.
- 2.13 The majority of the public agreed that there is an overriding public need for the SCL and urged for early completion of this infrastructure. 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-192/2008, following the guidelines on assessment methodologies in the Technical Memorandum on Environmental Impact Assessment (EIAO-TM). Cumulative impacts with other concurrent projects have been taken into account in the assessment.
- 3.2 This Executive Summary highlights the key identified impacts, potential sensitive receivers and proposed mitigation measures for each of the environmental issues. 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.

Landscape and Visual Impact

- 3.3 The Project will inevitably result in some landscape and visual impacts in the Hung Hom area during construction and operation phase. These impacts have been minimized through careful consideration of alternatives, minimization of works areas, incorporation of aesthetic external designs and landscape treatments of proposed structures which include Cooling Tower, North and South Side Ventilation Shafts, Realignment of Cheong Wan Road and Noise Mitigation Measures at Portal 1A.
- 3.4 The current and planned land uses in the vicinity of the Project have been taken into account during the railway development. In general, the proposed Project would fit in well with the current use as well as the urban design scheme under the Hung Hom District Study.
- 3.5 Approximately 640 existing trees will be affected by the proposed works, of which approximately 30 trees will be transplanted and approximately 610 trees will be felled. Many of the affected trees are of heavy standard to mature size but none of these are Registered Old and Valuable Trees. There are also no rare or endangered species 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 TCW 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. In addition to the compensated trees, new landscape resources such as horizontal greening including green roof, screen planting; vertical greening with climbers; and slope greening with woodland whip trees and shrubs planting are proposed as alternative compensatory planting to optimize 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.

- 3.6 The road works proposed for the Project, located in an area with character dominant by railway development, is compatible with the existing landscape settings. There will be moderate impact on Hung Hom Transportation Corridor Landscape Character Area due to the significant change in the character of the areas by the erection of large Noise Mitigation Measures at Portal 1A during construction phase. With the aesthetic chromatic design to blend in the structures with the adjacent landscape character, there will still be slight residual impact in Day 1 and Year 10 during operation.
- 3.7 Changes in the visual context of the areas in the vicinity of the Project are anticipated. There will be slight residual visual impact on the adjacent Visual Sensitive Receivers at high level during the construction phase. With the implementation of proposed mitigation measures for the proposed Noise Mitigation Structures at Portal 1A, Cooling Tower, North and South Side Ventilation Shafts and realignment of Cheong Wan Road, the residual impact on adjacent VSRs would be slight on Day 1 and in Year 10 of Operation Phase.
- 3.8 Cumulative landscape and visual impacts during the construction and operation phases from other concurrent projects which include SCL (HUH – ADM), SCL (TAW – HUH) and KTE were assessed. These concurrent projects would not cause any insurmountable cumulative landscape and visual impacts.
- 3.9 As a whole, the residual landscape and visual impacts of the proposed Project are considered acceptable with mitigation measures implemented during construction and operation phases.

Air Quality

Construction Phase

- 3.10 Potential air quality impacts from the construction phase would mainly be related to construction dust from excavation, spoil removal and wind erosion as well as materials handling at barging point. A total of 14 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 No. NEX2213/C/361/ENS/M60/501](#).
- 3.11 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.
- 3.12 With the implementation of mitigation measures in the *Air Pollution Control (Construction Dust) Regulation*, proposed dust suppression measures, and good site practices, the predicted cumulative TSP concentration at all ASRs would comply with the EIAO-TM hourly TSP criterion ($500 \mu\text{g}/\text{m}^3$) and AQO daily and annual TSP criteria ($260 \mu\text{g}/\text{m}^3$ and $80 \mu\text{g}/\text{m}^3$).

Operation Phase

- 3.13 As the train will be electrically operated, air quality impact is therefore not anticipated during operational phase. Besides, no adverse air quality impact is expected from the operation of realigned Cheong Wan Road Viaduct and reduction in the number of diesel locomotives (for maintenance trains/intercity) along the existing EAL. Exhausts for general ventilation and smoke extraction facilities will also be carefully positioned to avoid nuisance to the surrounding environment.

Airborne Noise

Construction Phase

- 3.14 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 such as construction of Cut-and-Cover tunnel section and other supporting facilities for the Project. A total of 9 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 No. NEX2213/C/361/ENS/M52/501](#).

- 3.15 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. The predicted unmitigated construction noise levels due to the Project at the representative NSRs are in the ranges of 48 to 83 dB(A) and 63 to 75 dB(A) during non-restricted hours and restricted hours respectively.
- 3.16 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 the representative NSRs are in the ranges of 32 to 73 dB(A) and 43 to 55 dB(A) during non-restricted hours and restricted hours respectively, and would thus fully comply with the construction noise criteria.
- 3.17 Several concurrent projects would be carried out in the vicinity of the Project including SCL (HUH – ADM), SCL (TAW – HUH) and KTE. The mitigated cumulative construction noise levels at the representative NSRs were predicted to range from 34 to 78 dB(A). Noise exceedances were predicted at Carmel Secondary School and Wing Fung Building.
- 3.18 At Carmel Secondary School, exceedances of 1-4dB(A) for non-persistent 5 months during examination period were anticipated. Liaison between the contractor and school headmaster should allow scheduling of noise intensive operations away from the examination period. In addition, the school is noise insulated with air conditioners installed and therefore, by keeping the windows closed during construction activities, noise impacts at the indoor environment can be minimised.
- 3.19 At Wing Fung Building, exceedance of 1-3dB(A) for non-persistent 8 months was anticipated predominately due to concurrent works with SCL (TAW–HUH) and close proximity with the works area. Communication with the concerned parties on the residual impacts during the construction and consideration of other initiatives, if required, will be undertaken.
- 3.20 All practical direct mitigation measures have been exhaustively investigated and the construction noise criteria have been met as far as practicable. The residual impacts have been minimised and are only temporary, reversible and unlikely to induce public health concern and as such, are considered to be minor and acceptable.

Operation Phase

- 3.21 The major operational noise sources identified in the Project would be from the railway noise in the section between the Portal 1A and Chatham Road South, exhaust / intakes of ventilation shafts and cooling facilities at the HUH. A total of 9 representative NSRs have been identified within 300m from the Project works area for operational noise impact assessment. Their locations are shown in [Figure No. NEX2213/C/361/ENS/M52/601](#).
- 3.22 Under unmitigated scenario, rail noise exceedance is anticipated from the operation of the Project at the Shun Man House North and South Blocks during night-time. Noise mitigation measure has therefore been proposed in order to minimise the exposure of NSRs to airborne rail noise. The measure proposed is the installation of a 150m long noise enclosure at Portal 1A. With the above noise mitigation measures, the cumulative contribution from the Projects, SCL (TAW – HUH) and KTE at all NSRs are more than 10dB(A) below the noise criteria. Adverse impact from the Project is hence not anticipated.
- 3.23 Regarding the fixed plant noise, the maximum sound power levels allowed to be emitted from each louver of ventilation shafts and cooling tower were predicted. With the proper selection of plant and adoption of acoustic treatment, adverse noise impact from the operations of ventilation shafts and cooling tower is not anticipated.

Groundborne Noise

Construction Phase

- 3.24 Construction ground-borne noise impacts would mainly arise from the use of PME for excavation and rock chiselling works for diaphragm wall construction. 1 representative NSR was identified for the assessment and its location is shown in [Figure No. NEX2213/C/361/ENS/M52/501](#). The predicted construction ground-borne noise at the representative NSR (i.e. Metropolis Residence) was from 48 to 50 dB(A), and would comply with the noise criteria stipulated in the EIAO.

Operation Phase

- 3.25 The major operational ground-borne noise source is from the noise transmitted from train through the ground and structures to the NSRs in close proximity to tunnels. A total of 4 representative NSRs were identified for the noise assessment and their locations are shown in [NEX2213/C/361/ENS/M52/601](#). With a large setback distance of 90m, the predicted ground-borne noise levels at all representative NSRs were <20 dB(A), and would be well below the night-time noise criteria of 45 dB(A). No adverse cumulative impact from the operation of existing/future rail lines is anticipated.

Water Quality

Construction Phase

- 3.26 The key water quality issue during the construction phase is the potential for release of sediment-laden water from surface works areas and open cut excavation. Minimisation of water quality deterioration from land-based construction activities could be achieved through implementing adequate mitigation measures. The site practices outlined in ProPECC PN 1/94 "Construction Site Drainage" should be followed as far as practicable to minimise surface run-off. With proper implementation of the recommended mitigation measures, adverse water quality impact is not anticipated.

Operation Phase

- 3.27 During operation phase, potential impacts on water quality are anticipated to involve tunnel / station effluent discharges from the HUH and general maintenance activities. For handling, treatment and disposal of other operation stage effluent, the practices outlined in ProPECC PN 5/93 should be adopted. Track drainage channels discharge should pass through oil/grit interceptors/chambers to remove oil, grease and sediment before being pumped to the public storm drainage/foul sewerage systems. The silt traps and oil interceptors should be cleaned and maintained regularly. With proper implementation of the recommended mitigation measures, adverse water quality impact is not anticipated.

Waste Management Implications

Construction Phase

- 3.28 The types of waste generated during construction phase of the Project would include Construction and Demolition (C&D) materials from demolition, excavation and site formation works, sediment, general refuse from workforce, and chemical waste from the maintenance of construction plant and equipment.
- 3.29 The total volume of inert C&D material generated from demolition, excavation of shafts and tunnels and site formation works would be approximately 386,000m³ (including 2,000m³ of Rock, 368,000m³ of Soft material and 16,000m³ of Artificial Hard Material). Surplus inert C&D materials generated from the Project may be delivered to two Public Fill Reception Facilities operated by CEDD which are Tuen Mun Area 38 Fill Bank and Tseung Kwan O Area 137 Fill Bank. Opportunities in minimization of generation and maximization 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 and Hong Kong Boundary Crossing Facilities, the Tuen Mun-Chek Lap Kok Link, Central – Wai Chai Bypass and Wan Chai Development Phase II projects. About 8,000m³ of non-inert C&D materials would be generated, which could be reused and recycled as much as possible before disposal at the North East New Territories Landfill. 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.
- 3.30 Methods to minimise the volume of sediment generated have been explored and recommended. The total volume of dredged/ excavated sediment generated from the Project is estimated to be approximately 99,200m³. Based on the results of the chemical and biological screening, approximately 62,200m³ sediment is suitable for Type 1 – Open Sea Disposal and 37,000m³ sediment requires Type 2 – Confined Marine Disposal. The final disposal sites for the sediments will be determined by the Marine Fill Committee (MFC) and a dumping licence will be obtained from EPD prior to the commencement of the dredging/ 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.

- 3.31 The construction workforce would generate general refuse with an estimated daily volume of approximately 550 kg which requires proper handling and disposal. With the implementation of good waste management practice 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 maintenance and servicing of construction plant. Such waste would be handled, stored and disposed of in accordance with *the Waste Disposal (Chemical Waste) (General) Regulations* to prevent adverse environmental impacts.
- 3.32 Asbestos waste is categorized as chemical waste under the *Waste Disposal (Chemical Waste) Regulation*. The Project Proponent should conduct an asbestos investigation by a registered asbestos consultant prior to demolition of existing building structure. Asbestos waste will be handled in accordance with the Code of practice on the Handling, Transportation and Disposal of Asbestos Waste issued by the EPD.

Operation Phase

- 3.33 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 shafts and railways). The handling, collection, transportation and disposal practices of the identified waste generated should follow the current practices at other operating railway lines. Adverse impacts are not anticipated with the implementation of good waste management practices.

Land Contamination

- 3.34 Land contamination assessment has been conducted to examine the potential contaminating land uses within the Project area and investigated the potential impacts of the contamination on future use. A total of 231 soil and 20 groundwater samples had been collected and analyzed as per the Contamination Assessment Plans (CAPs) which had been submitted and endorsed by the EPD. Based on the analytical results, no exceedances of the adopted Risk Based Remediation Goals (RBRG) have been identified and therefore, remediation for soil and groundwater is not required.
- 3.35 For conservative purposes, visual inspection should be performed during demolition/excavation for signs of soil and groundwater contamination, for example, discolouration and the presence of oils and odours. If contamination is suspected, further sampling and testing, and remediation (if contamination found) should be carried out.
- 3.36 Based on the desktop study conducted in the endorsed CAPs, the potential contamination (if any found) in the study areas is expected to be surmountable, with implementation of the proposed mitigation measures.

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, operation groundborne noise and updating changes as necessary. Details of the recommended mitigation measures, monitoring procedures and locations are presented in a standalone 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 and 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)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Landscape and Visual Impacts					
Landscape Resources, Landscape Character Areas, Visual Sensitive Receivers	<ul style="list-style-type: none"> Based on a very broad brush estimate, approximately 640 existing trees will be removed by the Project. There will be moderate impact on LCA06 – Hung Hom Transportation Corridor LCA due to the significant change in the character of the areas by the erection of Noise Mitigation Measures during operation phase. 	<ul style="list-style-type: none"> EIAO (Cap. 499). EIAO-TM Annex 10 and Annex 18 ETWB TC(W) No. 2/2004 ETWB TC(W) No. 3/2006 	Not applicable	<p>Construction Phase</p> <ul style="list-style-type: none"> Transplanting affected trees in accordance with ETWB TC(W) No. 3/2006; Compensatory planting for the affected trees and shrubs; Control of night-time lighting glare; Decoration of Hoarding; Control of height and disposition/ arrangement of all temporary facilities in works areas; and Reinstatement of temporarily disturbed hard and soft landscape areas. Among the approximately 640 existing trees to be affected by the project, approximately 	<ul style="list-style-type: none"> There would be slight residual impact on LCA06 – Hung Hom Transportation Corridor LCA. There would be slight residual impact on the adjacent VSRs who can see the proposed Noise Mitigation Structures at Portal 1A, Cooling Tower, North and South Ventilation Shafts and Realignment of Cheong Wan Road. Overall, it is considered that the residual landscape and visual impact due to the Project is considered to be

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				<p>30 trees will be transplanted and approximately 610 trees will be felled. Felled trees will be compensated in accordance with ET WB TC(W) No. 3/2006 – Tree Preservation.</p> <p>Operation Phase</p> <ul style="list-style-type: none"> • Design aesthetics for above ground structures; • Climbers to soften the proposed structures; • Tree and Shrub Planting to enhance the landscape and visual amenity value of the area; • Screen planting to screen views to the Cooling Tower from future Hung Hom Promenade; and • Roof Greening to Cooling Tower. 	<p>acceptable with mitigation measures.</p>
Air Quality Impact					
Construction Phase					

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Existing commercial, residential, recreational and government/institution/community developments in Ho Man Tin and Hung Hom 14 assessment points (refer to Figure No. NEX2213/C/361/ENS/M60/501)	1-hour Average TSP Conc.: 252 - 2515 µg/m ³ 24-hour Average TSP Conc.: 118 - 754µg/m ³ Annual Average TSP Conc.: 76.0 – 97.8µg/m ³	EIAO-TM and AQO 1-hour Average TSP Conc.: 500 µg/m ³ 24-hour Average TSP Conc.: 260µg/m ³ Annual Average TSP Conc.: 80 µg/m ³	Exceed EIAO-TM (hourly) criterion by up to 2015 µg/m ³ Exceed AQO (daily) by up to 494 µg/m ³ Exceed AQO (annual) by up to 17.8 µg/m ³	General works area: <ul style="list-style-type: none"> Watering on active construction areas. Barging facilities: <ul style="list-style-type: none"> All road surfaces within the barging facilities would be paved and watering along the haul road would be provided; The unloading process would be enclosed; Vehicle wheel washing facilities provided at site exit. Dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices would be carried out to further minimize construction dust impact.	No adverse residual hourly and daily dust impacts would be anticipated.
Operation Phase					
As the train will be electrically operated, air quality impact is therefore not anticipated during operation phase. Besides, no adverse air quality impact is expected from the operation of realigned Cheong Wan Road Viaduct and the diesel locomotive (for freight/maintenance/intercity trains) along the existing EAL. Exhausts for general ventilation and smoke extraction facilities will also be carefully positioned to avoid nuisance to the surrounding environment.					

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Airborne Noise Impact					
Construction Phase					
Existing residential blocks in Ho Man Tin and Hung Hom, areas. 9 assessment points (refer to Figure Nos. NEX2213/C/361/ENS/M52/501)	<p><u>Non-restricted hours</u> Predicted noise levels would be in the range of 48 to 83 dB(A)</p> <p><u>Restricted hours</u> Predicted noise levels would be in the range of 63 to 75 dB(A)</p>	<p><u>Non-restricted hours</u> Domestic premises: 75dB(A) Educational institutions: 70 dB(A) during normal teaching periods & 65dB(A) during examinations</p> <p><u>Restricted hours</u> Domestic premises: Area Sensitive Rating B Evening: 65 dB(A) Night-time: 50dB(A)</p>	<p><u>Non-restricted hours</u> Exceed the EIAO-TM noise criterion by up to 8 dB(A)</p> <p><u>Restricted hours</u> Exceed the construction noise criterion by up to 20 dB(A)</p>	<ul style="list-style-type: none"> Implementation of good site practices, use of quiet equipment, movable/temporary noise barriers and noise insulating fabric to minimise construction noise impact 	<p><u>Non-restricted hours</u> Residual impact of 1-4 dB(A) exceedances for non-persistent 5 months at Carmel Secondary School (OM4a) during examination periods due to the cumulative impacts of the Project and KTE.</p> <p>Residual impact of 1-3 dB(A) exceedances for non-persistent 8 months at Wing Fung Building (HH2) due to cumulative impacts of the Project, SCL (TAW-HUH) and KTE. The construction noise criteria are met as far as practicable. All</p>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
		Area Sensitive Rating C Evening: 70 dB(A) Night-time: 55dB(A)			practical direct mitigation measures have been exhaustively investigated and residual impact is minimised. <u>Restricted hours</u> The predicted noise levels at all NSRs would comply with the construction noise criterion.
Operational Phase (Railway Noise)					
Existing residential blocks in Ho Man Tin and Hung Hom, areas. 6 assessment points (refer to Figure Nos. NEX2213/C/361/ENS/M52/601)	<u>Daytime & Evening</u> Predicted noise levels would be in the range of 36 to 65 dB(A) <u>Night-time</u> Predicted noise levels would be in the range of 35 to 64 dB(A)	Area Sensitive Rating C Daytime & Evening: 70 dB(A) Night time: 60dB(A)	<u>Daytime & Evening</u> All predicted Noise levels are within Noise Control Ordinance (NCO) criteria. <u>Night time</u> Exceed the noise criteria by up to 4 dB(A)	<ul style="list-style-type: none"> 150m long natural ventilated noise enclosure extending from Portal 1A 	No adverse residual impacts would be anticipated.
Operational Phase (Fixed Plant Noise)					
Existing residential blocks in Ho Man Tin and Hung Hom, areas.	Maximum sound power level was predicted to	ANL-5 dB(A)	No exceedance was	<ul style="list-style-type: none"> The exhaust of the ventilation system and 	No adverse residual impacts would be

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
3 assessment points (refer to Figure Nos. NEX2213/C/361/ENS/M52/601)	meet the relevant noise criteria.		predicted.	any opening of the building should be located facing away from any NSRs; and • Proper selection of plant and adoption of acoustic treatment.	anticipated.
Ground-borne Noise Impact					
Construction Phase					
Existing residential block in Hung Hom area. 1 assessment point (refer to Figure Nos. NEX2213/C/361/ENS/M52/501)	<u>Daytime</u> Predicted noise levels would be in the range of 48 to 50 dB(A)	Domestic premises, hotels and service apartments: 65 dB(A) for Daytime (0700 – 1900 hrs)(except General Holidays & Sunday)	No exceedance was predicted.	No mitigation would be required.	No adverse residual impacts would be anticipated.
Operational Phase					
Existing residential blocks in Ho Man Tin and Hung Hom, areas. 4 assessment points (refer to Figure Nos. NEX2213/C/361/ENS/M52/601)	Predicted ground-borne noise levels were <20 dB(A)	Domestic premises, hotels and service apartments: 55 dB(A) [for day and evening time (0700 – 2300 hrs) and 45dB (A) for	No exceedance was predicted.	The predicted operation ground-borne noise at all identified representative NSRs would comply with the noise criteria. No mitigation measure is therefore deemed necessary.	No adverse residual impacts would be anticipated.

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
		Night-time]			
Water Quality Impact					
Construction Phase					
Cooling water intakes within 300m area from the Project boundary	Deterioration in water quality would be caused.	<ul style="list-style-type: none"> • EIAO-TM; • Water Pollution Control Ordinance (WPCO); • Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS); • Waste Disposal Ordinance (WDO); and • Practice Note for Professional Persons (ProPECC) PN 1/94 	No exceedance was predicted.	<p><u>Construction Site Run-off and General Construction Activities</u> The site practices outlined in ProPECC PN 1/94 “Construction Site Drainage” should be followed as far as practicable.</p> <p><u>Accidental Spillage</u> The Waste Disposal Ordinance (Cap 354) and its subsidiary regulations in particular the Waste Disposal (Chemical Waste) (General) Regulation should be observed and complied with for control of chemical wastes.</p> <p><u>Sewage Effluent from Construction Workforce</u> All the sewage generated from the workforce should be discharged into the public foul sewers. If</p>	No unacceptable water quality impacts would be anticipated.

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				<p>disposal of sewage to public sewerage system is not feasible, appropriate numbers of portable toilets shall be provided to serve the construction workers over the construction site.</p> <p><u>Excavation Activities</u> The construction programme should be properly planned to minimise soil excavation, if any, in rainy seasons. Good site practices should be implemented.</p> <p><u>Diaphragm Wall</u> The mitigation measures as outlined in the ProPECC PN 1/94 should be implemented.</p> <p><u>Groundwater Seepages</u> A cofferdam wall should be built as necessary to limit groundwater inflow to the excavation works areas. Groundwater pumped out from the works areas or from</p>	

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				<p>dewatering process should be discharged into the storm system via silt removal facilities.</p> <p><u>Change of Hydrology and Groundwater Level</u></p> <p>Toe grouting should be applied beneath the toe level of the temporary/permanent cofferdam walls as necessary to lengthen the effective flow path of groundwater from outside and thus control the amount of water inflow to the excavation. Recharge wells should be installed as necessary outside the excavation areas. Water pumped from the excavation areas should be recharge back into the ground. Suitable water control strategies should initially adopt as far as practicable while undertaking the excavation works. In the event of</p>	

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				excessive drawdown being observed within the ground water table, post-grouting should be applied as far as practicable. <u>Barging Point</u> <ul style="list-style-type: none"> • Good site practices should be applied. 	
Water Quality Impact					
Operation Phase					
Cooling water intakes within 300m area from the Project boundary	Deterioration in water quality would be caused.	Relevant standards / criteria stipulated under the EIAO-TM, WPCO, TM-DDS and ProPECC 5/93	No exceedance was predicted.	<u>Tunnel Run-off and Drainage</u> Oil/grit interceptors/chamber 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.	No unacceptable water quality impacts would be anticipated.
Waste Management Implications					
Construction Phase					
Water quality, air, and noise sensitive receivers at or near the	<ul style="list-style-type: none"> • Inert C&D Materials from demolition and 	<ul style="list-style-type: none"> • Waste Disposal 	Not applicable	<ul style="list-style-type: none"> • C&D wastes would be reused as far as 	No adverse residual impacts would be

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Project site, the waste transportation routes and the waste disposal site.	excavation works with a total volume of approximately 386,000m ³ <ul style="list-style-type: none"> • 8,000 m³ of non-inert C&D material • General refuse from workforce • Asbestos waste from building demolition • Chemical waste from plant and equipment maintenance • Dredged marine sediment with a total volume of approximately to be 99,200 m³. 	<ul style="list-style-type: none"> • Ordinance (Cap. 354) • Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C) • Land (Miscellaneous Provisions) Ordinance (Cap. 28) • Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation • Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N) • Dumping at 		practicable before off-site disposal. <ul style="list-style-type: none"> • Contaminated sediment (Category M) would require Type 2 - Confined Marine Disposal at contaminated mud pit allocated by Marine Fill Committee. • Category L sediment is suitable for Type 1 - Open Sea Disposal at gazetted marine disposal ground allocated by MFC • Other waste reduction measures and good site practices to achieve avoidance and minimization of waste generation from the Project are discussed in detail in Section 9.70 – 9.103. 	anticipated

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
Sea Ordinance (Cap. 466)					
Operation Phase					
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"> • Chemical waste from maintenance activities • General refuse from staff and passengers and any commercial operators • Industrial waste from maintenance activities 	<ul style="list-style-type: none"> • Waste Disposal Ordinance (Cap. 354) • Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C) • Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation 	Not applicable	<ul style="list-style-type: none"> • Waste reduction measures and good site practices to achieve avoidance and minimization of waste generation from the Project are discussed in detail in Section 9.104 – 9.120. 	No adverse residual impacts would be anticipated
Land Contamination					
Potentially contaminated sites identified within the assessment area	No soil or groundwater contamination was identified and therefore, no remediation is required.	<ul style="list-style-type: none"> • EIAO TM; • Guidance Note for Contaminated Land Assessment 	No exceedances of the adopted Risk Based Remediation Goals (RBRG) have been identified at all sampling locations..	<ul style="list-style-type: none"> • Visual inspection should be performed during demolition and excavation for signs of soil and groundwater contamination. If 	No adverse residual impacts would be anticipated

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
		Remediation <ul style="list-style-type: none"> • Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards and Car Repair / Dismantling Workshop • Guidance Manual for Use of Risk-based Remediation Goals for Contamination Management 		contamination is suspected, further sampling and testing, and remediation (if contamination found) should be carried out.	
Construction workers during the construction and decommissioning stages	No soil or groundwater contamination was identified.	Occupation Safety and Health Ordinance and its subsidiary Regulations	No exceedances of the adopted Risk Based Remediation Goals (RBRG) have been identified at all sampling locations.	Workers should employ personal protective equipment correctly / appropriate to the task being performed and adopt institutional controls when carrying out the excavation / demolition works as recommended.	No adverse residual impacts would be anticipated

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Relevant Standards / Criteria	Extents of Exceedances (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After Implementation of Mitigation Measures)
				Adequate washing and cleaning facilities should be provided on site.	