



Consultancy Agreement No. NOL/ERL-300

Environmental Impact Assessment of Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link



Environmental Impact Assessment Report
Executive Summary

May 2009

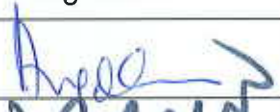

MTR Corporation Limited

Consultancy Agreement No.
NOL/ERL-300

**Environmental Impact Assessment of
Hong Kong Section of
Guangzhou-Shenzhen-Hong Kong
Express Rail Link**

Executive Summary

May 2009

	Name	Signature
Prepared & Checked:	Angela Tong	
Reviewed & Approved:	Josh Lam	

Version:	A	Date: 22 May 2009
----------	---	-------------------

The information contained in this report is, to the best of our knowledge, correct at the time of printing. The interpretation and recommendations in the report are based on our experience, using reasonable professional skill and judgment, and based upon the information that was available to us. These interpretations and recommendations are not necessarily relevant to any aspect outside the restricted requirements of our brief. This report has been prepared for the sole and specific use of our client and AECOM Asia Co. Ltd. accepts no responsibility for its use by others.

This report is copyright and may not be reproduced in whole or in part without prior written permission.

AECOM Asia Co. Ltd. (Integrating the operation of ENSR Asia (HK) Ltd.)
11/F, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, NT, Hong Kong
Tel: (852) 2893 1551 Fax: (852) 2891 0305
www.aecom.com

TABLE OF CONTENTS	Page
1. INTRODUCTION.....	1
2. PROJECT DESCRIPTION.....	1
Scope and Nature of the Project	1
Purpose and Benefit of the Project.....	2
Selection of the Project Scheme	2
Major Facilities of the Project	2
Construction Activities.....	3
Preliminary Construction Programme.....	3
Public Consultation	3
3. ENVIRONMENTAL IMPACT ASSESSMENT	3
Ecological	3
Fisheries.....	4
Airborne Noise	5
Ground-borne Noise	5
Landscape and Visual.....	6
Cultural Heritage.....	6
Land Contamination.....	7
Waste Management.....	8
Water Quality.....	8
Air Quality.....	9
Hazard to Life	9
Landfill Gas Hazard	9
Impact on the Restored Ngau Tam Mei Landfill.....	10
4. ENVIRONMENTAL MONITORING AND AUDIT	10
5. CONCLUSION	10

Figure

NOL/ERL/300/C/XRL/ENS/M50/001	Overall View of Alignment
NOL/ERL/300/C/XRL/ENS/M50/002	Overall View of Alignment
NOL/ERL/300/C/XRL/ENS/M50/003	Overall View of Alignment

1. INTRODUCTION

- 1.1 In April 2008, the MTR Corporation Limited (MTRC) was requested by Hong Kong Special Administration Region (HKSAR) to proceed with further planning of the proposed Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL).
- 1.2 The Hong Kong Section of the XRL (hereinafter referred to “the Project”) is a 26 km long underground railway running from West Kowloon to boundary at Huanggang, as shown in **Figure Nos. NOL/ERL/300/C/XRL/ENS/M50/001 to 003**. The two termini of the XRL will be at West Kowloon in Hong Kong and Shibi in Guangzhou. Boundary crossing facilities will be provided in the West Kowloon Terminus (WKT).
- 1.3 This Executive Summary highlights the key findings of the Environmental Impact Assessment (EIA) for the Project to comply with the EIA Ordinance (EIAO).

2. PROJECT DESCRIPTION

Scope and Nature of the Project

- 2.1 The Project comprises the following key elements:
- Approximately 26km of underground railway running from the terminus in West Kowloon to the boundary at Huanggang;
 - A terminus in West Kowloon, and its associated building elements such as ventilation facilities, public transport interchange, traction sub-station, and seawater cooling facility;
 - Seven tunnel ventilation buildings at Mai Po, Ngau Tam Mei, Pat Heung, Shing Mun, Kwai Chung, Nam Cheong and Mong Kok West; and an Emergency Access Point (EAP) at Tai Kong Po;
 - Stabling sidings and maintenance facilities located at Shek Kong (Shek Kong Stabling Sidings (SSS)) to provide for train stabling, minor maintenance and cleaning; and
 - An emergency rescue station (ERS) located next to the SSS.
- 2.2 Apart from the key elements above, supporting works areas, access roads, barging facilities, site explosive magazine and nursery sites will be required to support the construction of the Project.
- 2.3 The Project is a designated project (DP) under the EIAO with the following DP elements:
- A railway and its associated station (Item A.2 of Part I of Schedule 2 of the EIAO);
 - A railway siding and maintenance workshop (Item A.4 of Part I of Schedule 2 of the EIAO);
 - A railway tunnel more than 800m in length between portals (Item A.7 of Part 1 of Schedule 2 of the EIAO); and
 - Project includes works partly or wholly in a country park or special area, a conservation area, and a site of special scientific interest (Item Q.1 of Part 1 of Schedule 2 of the EIAO).

Purpose and Benefit of the Project

- 2.4 The XRL will form part of the national high-speed railway network, connecting Hong Kong with Guangzhou, with intermediate stations at Futian, Longhua and Humen, outside of Hong Kong. The XRL will provide a fast and convenient railway service linking the cities, with the journey time between Hong Kong and Guangzhou reduced from about 100 minutes as at present to about 50 minutes.
- 2.5 With the XRL Mainland section connected to the Beijing-Guangzhou Passenger Line and the Hangzhou-Fuzhou-Shenzhen Passenger Line, Hong Kong can be connected directly with major Mainland cities, such as Beijing and Shanghai, as well as other major cities in the Pearl River Delta via the Intercity Rapid Rail.
- 2.6 The XRL will help to promote Hong Kong as the gateway to the Pearl River Delta area, further strengthen the economic ties and cooperation between Hong Kong and the Mainland, promote mutual economic prosperity and development, and raise the competitiveness of the region as a whole. The Project will not only allow Hong Kong to have better social and economic integration with cities in the Pearl River Delta and other major cities in the Mainland, but will also facilitate and promote business and tourism.
- 2.7 In addition, transportation by rail is considered to be more environmentally friendly in terms of energy conservation and pollution reduction. During the operation of the Project, the public will be encouraged to use this environmentally friendly public transport which will reduce problems related to air and noise pollution as well as other associated deleterious effects generated by automobile usage.

Selection of the Project Scheme

- 2.8 In the alternative alignment schemes and construction options selection process, significant environmental resources, e.g. Mai Po Inner Deep Bay Ramsar Site, Country Parks, Declared Monument and graded historical buildings were avoided, and other factors such as geographical and geological consideration, land resumption, site constraints, constructability, operation flexibility and maintainability and disruption to the community were also considered.
- 2.9 The selected Project alignment scheme is a feasible design solution offering clear benefits in terms of operations, environment, construction and land related issues.

Major Facilities of the Project

- 2.10 The West Kowloon Terminus (WKT) will be located in immediately north of the proposed West Kowloon Cultural District (WKCD) between Kowloon Station of Airport Express Line (AEL) on the west and Austin Station of Kowloon Southern Link (KSL) on the east. The WKT will not only form an integrated railway/transport/development hub in West Kowloon, providing point-to-point connection via the existing MTR network, but could also enhance the WKCD as a regional cultural hub. WKT will be developed as a gateway to the Mainland, with distinctive architectural and landmark features.
- 2.11 A total of seven tunnel ventilation buildings will be provided, five in the New Territories and two in the western side of Kowloon. A ventilation building will also be provided to the north of WKT to serve for both terminus and track fan ventilation. In addition to the air exchange route for the railway system, ventilation buildings will be an essential component for the tunnel smoke control system and will serve as an access point for rescue operation as well as a fire escape from the tunnel in an emergency situation, such as train fire.
- 2.12 Stabling sidings is required to fulfill the operational and maintenance requirements, by providing stabling facilities, serving as a small scale engineering depot with engineering trains for necessary maintenance facilities (e.g. maintenance of permanent-way, overhead line, signalling and control, etc), as well as handling of emergency situation such as derailment or emergency servicing.
- 2.13 The ERS is required for fire fighting and should be located approximately at the mid-point of the tunnel

alignment. The ERS is designated as a place for trains to stop and to discharge passengers either to another train in the event of mechanical problems or evacuation to ground level in the event of a train fire. The ERS will be a depressed box with an open top for safety reason. Firemen's lifts and staircases will be provided to allow ease of access for the rescue team.

Construction Activities

- 2.14 As the Project is an underground railway, major construction works are tunnelling works and cut-and-cover works at shafts, ERS and WKT. Drill and blast construction method will be adopted for rock tunnels while bored tunnelling method will be adopted for mixed and soft ground tunnels. Cut-and-cover construction method will be adopted for few tunnel sections which require this conventional method.
- 2.15 Marine works have been avoided except minor dredging works required for the construction of the barging facility in Lung Kwu Sheung Tan.

Preliminary Construction Programme

- 2.16 The proposed construction is scheduled to commence in late 2009, for completion in 2015.

Public Consultation

- 2.17 MTRC considers that the views and the support of the community are important in the planning and design of the Project. Extensive public consultation has been conducted since the planning stage of the Project, including meetings with District Councils (DCs), Rural Committees (RCs), local residents along the Project alignment and a series of roving exhibitions. A total of 33 and 29 meetings/consultations were conducted with DCs/RCs and local residents respectively. The public generally supports the development of the Project and their views have been considered in the planning and design process.
- 2.18 For the EIA Study, continuous dialogue with Non-Government Organizations (NGOs) has been conducted.

3. ENVIRONMENTAL IMPACT ASSESSMENT

- 3.1 The EIA Study was conducted in accordance with the EIAO Study Brief No. ESB-197/2008, following the guidelines on assessment methodologies in the Technical Memorandum on Environmental Impact Assessment (EIAO-TM). The main findings of the EIA study are summarized below.

Ecological

Terrestrial Ecology

- 3.3 A literature review and ecological field surveys have been conducted. Potential impacts on significant ecological resources, such as Wetland Conservation Area and Country Park, have been avoided in the alignment scheme and construction method selection process. Through underground tunneling construction methods, above-ground works are minimized and only several areas in the northern section of the Project have more natural habitats.
- 3.4 In these works areas, the identified habitats are generally of low ecological value, and flora and fauna recorded are predominantly common species in Hong Kong. There would be approximately 53 ha of low value habitats lost, 60% of which are developed area / wasteground, and the direct ecological impact from the Project is considered to be low.
- 3.5 Potential impacts on watercourse habitats at the SSS have been minimized, through the use of a flood bypass and incorporation of ecologically friendly channel features, such as natural stream bed

substrate and vegetated stream banks, into the SSS open drainage channel sections to provide aquatic habitats for wildlife use.

- 3.6 No direct impact to significant areas nor species of conservation interest are anticipated from the Project. Potential impacts on hydrology would be avoided through the implementation of precautionary design measures during tunneling and shaft construction works to prevent/minimise groundwater leakage into the tunnel/works areas and any significant groundwater drawdown. A program will be implemented to monitor groundwater levels.
- 3.7 There would be low potential indirect construction and operation impacts to habitats and associated wildlife adjacent to the Project, with mitigation measures such as hoarding, run-off control, use of non-reflective building facade, reinstatement of works area, and good construction site practices.

Marine Ecology

Lung Kwu Sheung Tan

- 3.8 Marine works would be conducted to form a berthing area for upgrading the barging facility in Lung Kwu Sheung Tan (LKST). The works have been minimized and would last for approximately three months involving a small area of dredging (about 0.65 ha).
- 3.9 No species of conservation interest were found in the sub-tidal and intertidal marine ecological field surveys. The LKST barging point area is not a habitat of high importance for Chinese White Dolphins and the potential impact to the dolphins and their habitats is considered to be low. There is no recent record of horseshoe crabs in LKST, and no significant impact on their potential habitats due to the proposed works is anticipated. Given the low ecological significance of the impacted area and with the implementation of precautionary control measures such as deployment of silt curtain, limited marine ecological impact is expected.

West Kowloon

- 3.10 The impact on low value sub-tidal habitats due to replacement of vertical seawall for the intake and outfall seawall structures would be minimal. Based on water quality modeling of the operation of the water cooling system, potential marine ecological impacts would be minor and localized.

Fisheries

Pond Fisheries

- 3.11 Potential impacts on significant fisheries resources have been avoided through alignment selection process for the Project. There would be no direct impact to habitat loss nor disturbance of both active and inactive fishponds and their pond bunds. Indirect impacts to fishponds in Mai Po and Ngau Tam Mei, such as construction dust and site runoff, would be negligible with implementation of good site practices.

Marine Fisheries

- 3.12 No fish culture zones nor important spawning / nursery grounds were identified in the vicinity of the Project area at the LKST and Tsing Chau Tsai barging points, and WKT seawater cooling system. There will be no marine works at Tsing Chau Tsai and West Kowloon. The only potential impacts would be minor and localized, temporary loss of low value marine area within the LKST dredging area.

Airborne Noise

Construction Phase

- 3.13 The potential source of noise arising from the construction phase of the Project would mainly be the use of powered mechanical equipment (PME) for the construction activities. In the absence of any control measures, construction noise levels exceeding the noise criteria of EIAO-TM would be expected at a number of noise sensitive receivers (NSRs) due to their proximity to the works areas.
- 3.14 To alleviate the construction noise impacts, considerations including minimization of construction plants, works in phases and avoidance of simultaneous operation of PME, have been taken into account as far as practicable to develop a feasible construction plant inventory and programme. Further mitigation measures such as quieter plant, silencer, movable noise barrier, noise insulating fabric and acoustic enclosure have been recommended, taking account of site constraints, to achieve the EIAO-TM daytime construction noise criteria, and no adverse residual impacts are anticipated.
- 3.15 Potential cumulative noise impacts with concurrent major works in the assessment area were considered and significant impacts were not expected.

Operation Phase

- 3.16 During the operation phase, trains passing through the ERS at high speed, as well as the reverberant noise built up inside the ERS, would be the main source of airborne noise impact. Other airborne noise sources in Shek Kong would be train movements and trains idling in the maintenance shed within the SSS, and fixed plant provision at the SSS.
- 3.17 The worst case scenario of train frequency based on the maximum line operational capacity of XRL has been developed for the assessment. Operational airborne railway noise assessment has been conducted and noise exceedances at the NSRs located close to the SSS and ERS are predicted, if unmitigated. Therefore, noise control measures, including a 8m high noise barrier next to ERS and absorptive panels inside the ERS, have been recommended to comply with the EIAO noise criteria.
- 3.18 A 5.5m high barrier is also recommended to be erected next to the maintenance train's shed for mitigating the potential impact from the operation of the SSS. Fixed plant noise such as from air compressor and chillers in SSS, tunnel ventilation and WKT would be controlled by appropriate treatment to allowable maximum sound power levels, for complying with EIAO noise criteria at NSRs.
- 3.19 The relevant guidelines of the Hong Kong Planning Standards and Guidelines have been adopted as far as practicable to alleviate the potential noise impact from the proposed public transport interchange (PTI) in West Kowloon. The potential impact is expected to be minimized, with the provision of landscape deck and by locating the ingress and egress points away from sensitive receivers.

Ground-borne Noise

Construction Phase

- 3.20 Potential construction ground-borne noise would arise from the use of tunnel boring machine (TBM) and PME for construction of tunnel and adits. Ground-borne construction noise assessment based on worst case scenario indicates that the noise impacts on neighbouring noise sensitive receivers would comply with the EIAO noise criteria. There may be, however, small exceedance of the criteria at several representative sensitive receivers in West Kowloon and Shek Kong due to the TBM operation for a short period of about two or three days, based on the TBM operation data from the Sheung Shui to Lok Ma Chau Spur Line Project. Monitoring of TBM operation is recommended to monitor and confirm the ground-borne noise levels. Scheduling of works and close liaison with the affected receivers would be conducted during the TBM operation to minimize any potential disturbance.

Operation Phase

- 3.21 Operation phase ground-borne noise levels have been predicted based on the maximum operation capacity of railway system and the use of standard resilient baseplates. Assessment results indicate that the predicted ground-borne noise levels at the sensitive receivers would comply with the stipulated noise criteria. Therefore no mitigation measures would be required along the alignment during the operation phase, but low noise mitigation trackform has been proposed to further minimize the noise levels. Provision proposal for installation of low noise trackform will be reviewed based on the updated ground-borne noise levels.
- 3.22 With the predicted low ground-borne noise levels at the sensitive receivers, it is anticipated that there would be no cumulative effect from other rail lines, including Kowloon Southern Link, Tung Chung Line, Airport Express Line and Tsuen Wan Line.

Landscape and Visual

- 3.23 The XRL will be largely constructed underground, and therefore potential landscape and visual impacts have been minimized and confined to above-ground works.
- 3.24 The key sources of impacts during operation phase are confined to above-ground structures including SSS, WKT and ventilation buildings/EAPs at Mai Po, Ngau Tam Mei, Tai Kong Po, Shek Kong, Pat Heung, Shing Mun, Kwai Chung, Nam Cheong, Mong Kok West and West Kowloon. Considerations of potential visual impacts were taken into account in the development of the aesthetic architectural design of these structures.
- 3.25 The key sources of impact during construction stage are from activities associated with the construction of the above-ground structures within the works areas of the Project. The surface works would inevitably affect existing landscape resources such as trees. Potential impacts have been considered during the preliminary design of the Project to minimize works areas and avoid direct impacts on significant landscape resources. No Champion Trees nor Registered Old and Valuable Trees will be affected by the Project. All the affected trees are common species with an average of medium to low amenity value. A total of approximately 5,200 trees would be retained on-site, approximately 1,100 trees would be transplanted, and around 5,500 trees would be felled. Detailed tree felling application and compensatory planting proposals will be prepared and submitted to seek approval from relevant authorities in accordance with ETWBTC 3/2006 requirements, prior to construction of the Project.
- 3.26 It is considered that the landscape and visual impacts associated with the construction and operation of the Project are considered to be acceptable with the implementation of the appropriate mitigation measures, such as landscape planting, green roof on facilities buildings, green landscape podium on WKT, and natural drainage channel at SSS. The visual impact of the ventilation shafts at a prominent location within WKCD would be dependent on the final design and the manner in which it may be integrated with the future buildings in WKCD, and therefore the significance of visual impact cannot be determined at this stage. The scale, location, disposition, design and integration strategies of the ventilation shafts would however be further refined in the detailed design stage such that their visual impacts would be minimal.

Cultural Heritage

Terrestrial Archaeology

- 3.27 Direct impact on known archaeological sites has been avoided during the selection of the Project alignment. A desktop review and field walks were conducted to identify areas with archaeological potential. The findings indicate that the works areas in Tai Kong Po, Shek Kong and Pat Heung may have archaeological potential, and an archaeological investigation was therefore conducted at these works areas.

- 3.28 Some archaeological artefacts were discovered at the southern portion of the SSS, therefore a rescue excavation is recommended to be conducted prior to commencement of construction works at this area to preserve any artefacts by detailed records.
- 3.29 There are inaccessible sites in the works areas that may also have archaeological potential, but currently being occupied and disturbed by different land uses, such as pig and chicken farms, open storage and garages. To investigate whether there is any archaeological remains in these inaccessible areas, a further archaeological investigation is recommended to be conducted upon the completion of land resumption and prior to the construction works at these areas, identifying mitigation measures as necessary, in liaison with the Antiquities and Monuments Office. Other mitigations such as watching brief, site audit and restriction of works area would also be adopted to minimize the potential impact on terrestrial archaeology.

Marine Archaeology

- 3.30 A desktop review was conducted to investigate any marine archaeological potential in the proposed dredging area in LKST. There has been extensive reclamation on the area adjacent to the LKST barging point. These disturbances caused by the previous marine works would have potentially damaged submerged archaeological resources, if any. No impact on the affected seabed with low archaeological potential is anticipated. A marine archaeological investigation was conducted and the findings have confirmed that there are no archaeological remains in the proposed dredging area.

Built Heritage

- 3.31 A desktop literature review and field surveys were undertaken to establish built heritage baseline condition. Significant resources including Declared Monuments and graded buildings such as Yi Tai Study Hall and Lai Ancestral Hall have been avoided during the selection of the Project alignment. The only direct impact is that local earth shrines at Nam Hing Lei, Leung Uk Tsuen and Tai Kong Po Tsuen would be affected. Following liaison with the local villagers, the affected shrines would be relocated by the villagers in Shek Kong and Tai Kong Po.
- 3.32 There may be potential indirect vibration impact on the heritage resources induced by blasting. Mitigation measures such as control of vibration levels by adjusting appropriate quantity of explosives and vibration monitoring at Ex-Lai Chi Kok Hospital are recommended. With these measures in place, it is anticipated that the Project would have no adverse impacts on cultural heritage resources during construction phase.
- 3.33 With the rail alignment located in deep underground tunnel and incorporation of aesthetic design for the above-ground structures, significant indirect vibration and visual impacts to built heritage during the operation phase are not envisaged.

Land Contamination

- 3.34 The land contamination assessment has examined the potential contaminative landuses within the works areas and their potential impacts to future use. A desktop study and site inspections were conducted to identify works areas with potential land contamination issues, such as vehicles repair workshop, scrap yard and former oil depot. A Contamination Assessment Plan (CAP) was prepared, based on which site investigation (SI) works were undertaken in these areas.
- 3.35 Based on the SI results, a Contamination Assessment Report (CAR) was prepared. Assessment indicates that soil samples collected at only two sampling sites were found to have bis-(2-Ethylhexyl)phthalate exceeding the relevant Risk-based Remediation Goals. A Remediation Action Plan (RAP) for the localized soil contamination was prepared to identify appropriate soil remediation methods, handling and disposal of contaminated soil. The volume of contaminated soil required for remediation is estimated to be small, around 90m³ and will be treated and reused on-site as far as practicable. All groundwater samples comply with assessment criteria, and therefore no contamination of groundwater were found.

- 3.36 Further SI works for inaccessible sites during the EIA stage will be conducted, upon completion of land resumption and prior to the commencement of construction works at these sites. Depending on the schedule of land resumption and the commencement of the construction works for each works area, revised CAPs, supplementary CARs and/or RAPs will be prepared and submitted in separate packages to Environmental Protection Department (EPD) for endorsement.

Waste Management

- 3.37 Construction waste of the Project would include construction and demolition (C&D) materials such as excavated materials and materials from site formation and demolition works, sediment, general refuse and chemical waste from maintenance of construction plant and equipment.
- 3.38 Methods in minimisation of waste generation were considered in the preliminary design of terminus, tunnels and ventilation buildings. These have reduced the volume of total waste generation of the Project by 1,000,000 m³ down to approximately 9,800,000 m³.
- 3.39 Opportunities to re-use materials have also been fully considered. An estimated 619,900 m³ of material would be reused as backfilling materials at Mai Po, Tai Kong Po, Nam Cheong and West Kowloon while 89,600 m³ of materials generated from demolition works could be reused on-site.
- 3.40 A surplus 9,100,000 m³ of materials would be transported off-site for beneficial use in other possible outlets, such as the man-made island of the Hong Kong-Zhuhai-Macao Bridge, concrete batching plant and Public Fill Reception Facilities in Hong Kong, and Tai Shan in China.
- 3.41 The total volume of dredged/excavated sediment generated from the Project is estimated to be about 238,500 m³. Approximately 99,100 m³ sediment would be suitable for Type 1 – Open Sea Disposal, 136,800 m³ sediment requires Type 2 – Confined Marine Disposal, and 2,600 m³ sediment for Type 3 – Special Treatment/Disposal, in accordance with Practice Note for Authorized Persons and Registered Structural Engineers PNAP 252 (PNAP 252). The materials will be disposed of to the designated mud pits in Hong Kong following the PNAP 252 in consultation with the Marine Fill Committee and EPD.
- 3.42 The main types of waste generated during the operation of the Project would be general refuse from passengers, staff and commercial operators at the WKT/SSS; industrial waste from maintenance activities and chemical waste from operational activities. The handling, collection, transportation and disposal practices of the identified waste generated will follow the current practices at other operating railway lines.

Water Quality

Construction Phase

- 3.43 During the construction phase, water quality impacts from land-based construction activities would be related to potential release of sediment-laden run-off from surface works areas, open cut excavation and tunnelling works. Impact on water quality would be insignificant, with the implementation of control measures and good site practice, such as sediment trap, provision of cover for stockpiles to minimize site runoff, and proper site drainage.
- 3.44 Hydrological Impact on groundwater system has been conducted for the Project. Assessment results indicated that the proposed tunnelling works would cause no unacceptable impacts to the groundwater regime with proper implementation of the recommended mitigation measures.
- 3.45 The water quality impact during the proposed dredging works for the LKST Bargaining Point has been quantitatively assessed. The impact generated from the dredging works would be localized and minor, thus would unlikely contribute any significant cumulative water quality impact. To minimize the water quality impact, mitigation measures such as silt curtain and closed grab dredger have been adopted.

Operation Phase

- 3.46 The main operational impacts from the Project would come from tunnel seepage and effluent discharges from the terminus, ventilation buildings and maintenance activities. These could be minimized through control measures such as provision of silt trap and proper sewerage system. The water quality impact from the proposed seawater cooling system on the harbour water was modeled and predicted to be localized and minor, in compliance with the Water Quality Objectives.
- 3.47 A sewerage impact assessment has been conducted for the Project. Assessment results indicate that sewerage facilities will be provided in accordance with regulatory requirements and there would be no adverse impacts to the existing sewerage systems.

Air Quality

Construction Phase

- 3.48 Potential air quality impacts from the construction works for the Project would be mainly related to construction dust from excavation, materials handling, spoil removal and wind erosion, as well as operation of concrete batching plant, temporary stockpiles and barging facilities.
- 3.49 Mitigation measures specified in the Air Pollution Control (Construction Dust) Regulation and specific dust control measures for the concrete batching plant and barging facilities have been recommended, e.g. regular watering, covering dusty material storage area, provision of dust collectors. With the implementation of the dust suppression measures, the dust levels at Air Sensitive Receivers (ASRs) would comply with the dust regulatory criteria.

Operation Phase

- 3.50 As XRL trains are electrically powered, there would not be any emissions of air pollutants generated from the trains and exhausted through ventilation buildings to outside nearby ASRs. As such, no air quality impact is envisaged.
- 3.51 The mechanical air ventilation system for the proposed PTI in West Kowloon has been designed in accordance with EPD Practice Note for Professional Persons – Control of Air Pollution in Semi-Confined Public Transport Interchange (ProPECC PN1/98), and air quality impact during its operation is therefore not anticipated.

Hazard to Life

- 3.52 The storage and transport of explosives for the Project construction have been assessed in a Quantitative Risk Assessment. The criterion of the EIAO-TM for Individual Risk is met. The assessment results show that the societal risk lies within the As Low As Reasonably Practicable (ALARP) region when compared to the criteria stipulated in Annex 4 of the EIAO-TM. An ALARP assessment has been carried out by identifying all practicable mitigation measures and assessing the cost effectiveness of each measure in terms of the risk reduction achieved and the cost of implementing the measures. The results show compliance with the ALARP principles and Risk Guidelines (EIAO-TM Annex 4) provided recommendations are implemented.

Landfill Gas Hazard

- 3.53 A section of the XRL alignment will be located underneath the Ngau Tam Mei Landfill (NTML), and the Barging Point in Kwai Chung and the Nursery Site in Siu Lang Shui will be located within the Consultation Zones of the Gin Drinkers Bay Landfill (GDBL) and Siu Lang Shui Landfill (SLSL), respectively. In accordance with the requirements of Annex 7 of the EIAO-TM, a qualitative assessment of the potential hazards associated with landfill gas migration from NTML to the XRL tunnels, GDBL to the Barging Point and SLSL to the Nursery Site has been conducted.

- 3.54 All three restored landfills are considered as a “medium” source of gas migration. The source-pathway-target analysis shows that landfill gas risk posed by NTML to the XRL tunnels during both construction and operation phases is medium while the landfill gas risk posed by the GDBL and SLSL to the Barging Point and the Nursery Site during the construction phase, respectively, will be very low.
- 3.55 Landfill Gas protection measures and monitoring requirements have been recommended for the Project. It is expected that with the proposed protection measures in place, the potential risk of landfill gas migration to the Project will be minimal.

Impact on the Restored Ngau Tam Mei Landfill

- 3.56 An assessment was performed to identify the potential impacts due to the construction and operation of the proposed XRL on the restored NTML, particularly slope stability, settlement, and groundwater/leachate levels and flow; and conversely to determine the potential impacts of the NTML on the proposed XRL tunnels, specifically the groundwater/leachate quality.
- 3.57 The assessment concluded that the construction and operation of the XRL will not have adverse impact on the restored NTML. Analysis of the groundwater quality suggested that groundwater will not have adverse impact on the tunnel concrete. Hence, no measures will be required to mitigate the potential impact of the XRL tunnel on the NTML and vice versa.

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 effectiveness of the recommended mitigation measures and compliance with relevant statutory criteria.

5. CONCLUSION

- 5.1 This EIA study has identified and assessed potential environmental impacts of the Project, in accordance with the EIA study brief and EIAO-TM guidelines. Overall, the EIA study has concluded that the Project would be environmentally acceptable, in compliance with environmental legislation and standards. With the implementation of environmental control measures during construction and operation phases, there would be no adverse residual impacts from the Project. This will be checked by a comprehensive environmental monitoring and audit programme.