



Consultancy Agreement No. NEX/2301  
South Island Line (East)  
Environmental Impact Assessment

Executive Summary  
Report No.: 248137/78/C

August 2010  
MTR Corporation Limited

# Consultancy Agreement No. NEX/2301 South Island Line (East) Environmental Impact Assessment

Executive Summary  
Report No.: 248137/78/C

August 2010

MTR Corporation Limited

Fo Tan Railway House, No. 9 Lok King Street, Fo Tan, Shatin, N.T.

# Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
A	January 2010	Various	Florence Yuen	Dr Anne Kerr	To EPD
B	June 2010	Various	Florence Yuen	Dr Anne Kerr	Final to EPD
C	August 2010	Various	Florence Yuen	Dr Anne Kerr	Public Inspection

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

# Content

<b>Chapter</b>	<b>Title</b>	<b>Page</b>
1.	Introduction	1
2.	Project Description	2
2.1	Scope of the Project	2
2.2	Project Benefits	2
2.3	Project Alignment and the Surrounding Environs	3
2.4	Consideration of Railway Design Alternatives	3
2.5	Proposed Construction Programme and Sequence	4
2.6	Public Consultation	4
3.	Environmental Impact Assessment	5
3.1	Noise Impact	5
3.2	Ecological Impact	6
3.3	Water Quality Impact	7
3.4	Landscape and Visual Impact	8
3.5	Hazard to Life	9
3.6	Waste Management Implications	10
3.7	Land Contamination	11
3.8	Air Quality Impact	11
3.9	Cultural Heritage Impact	11
4.	Environmental Monitoring and Audit	13
5.	Conclusion	14

## Figures

Figure 1.1 General Layout Plan

# 1. Introduction

In December 2007, the Government gave the green light for MTR Corporation Limited (MTRCL) to proceed with preliminary planning and design of the South Island Line eastern section (SIL(E)).

The SIL(E) (hereafter referred to as “the Project”) will be a medium capacity railway that measures a total length of approximately 7 km. It will run from Admiralty to South Horizons, with three intermediate stations at Ocean Park, Wong Chuk Hang and Lei Tung. The overall plan of the proposed SIL(E) scheme is shown in **Figure 1.1**.

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

### 2.1 Scope of the Project

The Project comprises:

- Approximately 7km of railway alignment comprising underground and viaduct section from Admiralty to South Horizons;
- Construction of South Horizons (SOH), Lei Tung (LET), Wong Chuk Hang (WCH) and Ocean Park (OCP) stations as well as Admiralty (ADM) interchange station for SIL(E) and Shatin to Central Link (SCL) which includes station structures and protection works for interchange with SCL;
- Construction of tunnel sections from Admiralty to Nam Fung Portal and from Yi Nam Road to the portal at the southern side of Aberdeen Channel Bridge;
- Construction of a viaduct section from Aberdeen Channel Bridge to the tunnel entrance adjacent to Nam Fung Portal including a proposed emergency access next to Ap Lei Chau Bridge Road;
- Construction of a railway bridge alongside the existing Ap Lei Chau Bridge across the Aberdeen Channel;
- Construction of ventilation shafts associated with the proposed stations and at Hong Kong Park, Lee Wing Street and Nam Fung Road;
- Construction of a railway depot at the ex-Wong Chuk Hang Estate site;
- Provision of supporting facilities including site offices, areas for construction material storage, construction shafts, temporary barging points and temporary magazine site during construction; and
- Operation of the railway system and the depot.

The Project is classified as a Designated Project (DP) under Category A “Roads, Railways and Depots” of Part I in Schedule 2 to the Environmental Impact Assessment Ordinance (EIAO) based on the following listed categories:

- Item A.2. “A railway and its associated stations”;
- Item A.4. “A railway siding, depot, maintenance workshop, marshalling yard or goods yard”;
- Item A.7. “A road or railway tunnel more than 800 m in length between portals”.

A temporary project specific magazine is proposed to be built at Chung Hom Shan for overnight storage of explosives that will be used for construction of underground railway facilities. The magazine will consist of above ground single-storey structures. The explosives magazine is considered as a DP under Item K.10, Part I of Schedule 2 of the EIAO.

The future decommissioning of the explosives magazine is a DP under Item 11, Part II of Schedule 2 of the EIAO and an Environmental Permit will be required prior to commencement of decommissioning work.

### 2.2 Project Benefits

The proposed SIL(E) will provide a fast, convenient, environmentally friendly and reliable mode of public transport between South Horizons and the central business district of Hong Kong, as well as for cross harbour trips via the interchange with the existing railway network at Admiralty Station. The new railway line serves not only the resident population in the Southern District but also tourists heading to or returning from

the major tourist attractions located in the District. Upon completion of SIL(E) as well as the Shatin to Central Link, the railway network on Hong Kong Island will be enhanced.

Operation of the new railway line will help relieve existing traffic congestion experienced at critical bottlenecks, including the Aberdeen Tunnel and as a result journey times on the Hong Kong Island will be significantly reduced. All the travelling public, whether using the railway or other modes of transportation, will benefit either from the speedy service provided by the railway, or from the less congested road network and living quality at large.

There will be no direct emission of air pollutants from operation of the trains as they are electric powered. Reduced road traffic and congestion will also lead to improvements in local air quality.

### **2.3 Project Alignment and the Surrounding Environs**

The SIL(E) is planned for serving the Southern District of Hong Kong. The purpose of the project dictates to a certain extent the appropriate location of the stations and hence the alignment of the new railway line. The congested urban areas presented many site constraints on the location of the stations and alignment. After a detailed evaluation of various alternative options, the preferred network option involves a medium capacity system for SIL(E) that will run from Admiralty to South Horizons, via three intermediate stations at Ocean Park, Wong Chuk Hang and Lei Tung. The station locations were chosen to optimise the station catchments, while taking into account relevant site factors including environmental considerations before selecting the preferred network option and railway alignment.

The new railway line will run from the urban area of Admiralty in tunnel for a route length of about 3.5km to Nam Fung Road. The alignment will then continue on viaduct (for about 2km) past Ocean Park and through Wong Chuk Hang alongside the Staunton Creek nullah before crossing the Aberdeen Channel alongside the Ap Lei Chau Bridge. On Ap Lei Chau, the route is also in tunnel for a route length of about 1.6km from the southern side of the bridge crossing Aberdeen Channel to South Horizons according to the local topography.

### **2.4 Consideration of Railway Design Alternatives**

The alignment design, including key horizontal and vertical alignment criteria, have to largely follow the railway engineering design requirements. Design alternatives to reduce environmental impacts, where available, were identified and analyzed before determining the preferred or refined design. Amongst other site-specific factors and engineering constraints, the environmental benefits and dis-benefits of each option during both the operational and construction phases have been given due consideration as part of the evaluation of alternatives. Some of the outcomes from the options evaluation include locating the SOH station at Yi Nam Road to reduce the extent of cut-and-cover construction; opting for a deeper tunnel alignment at LET to reduce the noise and visual impacts; adopting the alignment of Aberdeen Channel Bridge parallel to the existing highway bridges to minimize the visual and water quality impacts; and locating the Nam Fung Portal at the ex-Canadian Hospital site instead of at the Wong Chuk Hang Old village site to maximise separation distance from Nam Fung Road Woodland Site of Special Scientific Interest (SSSI). Taking into account the prevailing site conditions and constraints, the viaduct option in the Wong Chuk Hang and Ocean Park area was confirmed to be more feasible after thorough alignment option review. Various adjustments have been made in the viaduct alignment to address the concerns of the public. Consideration has also been given to construction methodologies which have less environmental impact such as the use of precast segmental method for viaduct construction to minimise the extent, duration and noise generated from construction works.

## **2.5 Proposed Construction Programme and Sequence**

Construction of the SIL(E) is expected to commence in 2011 for completion in 2015.

## **2.6 Public Consultation**

MTRCL values the views of stakeholders and considers that the support of the community is important in the development of railway extensions. The Corporation together with the Southern District Council launched a public consultation programme in conjunction with the preliminary design for the SIL(E) and have continued to communicate with the local community since the detailed design commenced. The Central & Western District Council and the Wanchai Council were also consulted about the proposed arrangement of Admiralty Station and the feasibility of the provision of the Happy Valley Station. Most of the feedback received during the public consultation were requests for early completion of SIL(E) to solve the traffic problems. Suggestions received during the public consultation process in relation to the further planning of the Project, ranging from issues on station locations and design, through locations of station entrances, to alignment of the railway line have been taken into account as far as practicable in the design of the Project. The public consultation has also allowed the Corporation to give the community a better understanding of the planning of the Project and site-specific factors and constraints that have to be taken into account of in selecting the preferred alignment and design of the Project.



## 3. Environmental Impact Assessment

The EIA study was conducted in accordance with the EIAO Study Brief No. ESB-181/2008 and follows the guidelines on assessment methodologies as stipulated in the Technical Memorandum on Environmental Impact Assessment (EIAO-TM). A summary of the findings of the EIA study are presented below.

### 3.1 Noise Impact

According to the desktop review and site survey, representative noise sensitive receivers (NSRs) (both existing and planned) were selected for assessment.

#### Construction Phase

The main source of noise during the construction phase would be the use of powered mechanical equipment (PME) in various construction activities. Considerations have been given to implement the works in phases as far as practicable in order to reduce the number of PMEs required on site.

Under the unmitigated scenario for construction airborne noise, the noise criteria is exceeded by up to 24 dB(A) for nearly all NSRs. To minimise the noise impact, adoption of quieter PME and the use of noise barriers, enclosures, silencers and noise insulating fabric have been proposed. With the implementation of the proposed mitigation measures, the noise impact for the majority of NSRs can be reduced to below the noise criteria level. Residual construction noise impacts of up to 7 dB(A) are predicted at 11 NSR locations even after exhausting all direct and practicable mitigation measures. These NSRs are mostly located near Wong Chuk Hang Depot, Wong Chuk Hang Nullah and at South Horizons with the duration of exceedance from 2 to 46 weeks. To further mitigate the remaining residual noise impacts, Indirect Technical Remedies would be considered at the discretion of the Corporation.

Potential ground-borne noise impact during the construction phase could be resulted from tunnelling works and the use of PMEs such as the hydraulic breakers, hand-held breakers and rock drill for other construction activities. The predicted construction ground-borne noise levels for the unmitigated ground-borne noise impact shows compliance with the stipulated noise criteria at all NSRs except at two NSRs near the works area along LET station, which may experience 8 dB(A) ground-borne noise exceedance for 3 weeks and 1 dB(A) exceedance for 8 weeks respectively due to the tunnelling activities. As the quantity of PME to be adopted for works at this location is already considered as minimum, implementation of good site practices such as shutting down PME that is in intermittent use between work periods (or throttled down to a minimum) has been recommended to minimize the impact as far as possible.

#### Operation Phase

Operation phase airborne noise might result from the movement of trains along the viaduct sections and fixed plants from stations, depot, and ventilation and plant buildings. The operational noise assessment was carried out based on a Scenario for Existing NSRs and a Scenario for Existing and Planned NSRs. Under the scenario for Existing NSRs, the unmitigated railway noise level will exceed the noise criteria by up to 16 dB(A) at six NSRs. Under the scenario for Existing and Planned NSRs, noise criteria exceedance of up to 9 dB(A) is predicted at most of the Planned NSRs.

To mitigate these potential noise exceedances, noise barriers/ semi-enclosures were proposed along the viaduct sections. With the implementation of these mitigation measures, the results indicate that there will be no exceedance of railway noise criteria for both existing and planned NSRs.

The maximum permissible noise emission levels were determined for fixed plant noise sources, taking into account the types of fixed plant to be located at each station and plant building and the proximity of NSRs. With fixed plant properly designed to meet the maximum sound power level specified, no residual noise impacts are predicted. Nevertheless, noise reduction measures such as locating the fixed plant in walled plant rooms, implementation of a regularly scheduled plant maintenance programme, are recommended to limit noise levels as far as practicable.

Operation ground-borne noise predictions were carried out at representative ground-borne noise sensitive receivers located in Admiralty and Ap Lei Chau. The unmitigated ground-borne noise results show that the noise criteria will be exceeded for one NSR at South Horizons. With the adoption of inclined turnout and resilient trackform (Type 1a) for the concerned part of the underground section, the predicted ground-borne noise level from train operation at all ground-borne NSRs would achieve compliance with the noise criteria for both day / evening and night-time periods.

### **3.2 Ecological Impact**

Ecological baseline surveys were conducted between June 2008 and November 2009, which covered both the wet and dry season, in order to generate the ecological profile in the Project Area. Ten major habitats were identified in the Project Area, namely, woodland; degraded woodland; plantation; shrubland; marsh; hillside grassland; drainage channel; open field; wasteland; and developed area. There are also two recognized sites of conservation importance, namely Aberdeen Country Park and Nam Fung Road Woodland SSSI.

In recognition of the high ecological value of Aberdeen Country Park, the alignment was specifically planned to be entirely underground at those sections in the Country Park with no above ground structures involved. Similarly, the Nam Fung Road Woodland SSSI has been avoided by the proposed alignment with approximately 200m separation distance between the SSSI and the works areas. No adverse impacts on Aberdeen Country Park and Nam Fung Road Woodland SSSI are anticipated.

The surface works of the Project comprises site clearance, cut and cover, viaduct or railway station construction and associated infrastructure works, which would result in a permanent habitat loss of about 10 ha, of which over 70% is developed area of low ecological value. However, the impact of habitat loss for the project overall is not considered to be significant due to the limited ecological value of the majority of habitats, while the loss of woodlands of relatively higher ecological value are either temporary, or insignificant due to their fragmented profile, isolated location and limited size. Similarly, impacts to fauna communities are generally considered to be of low significance except for the ardeid night roost location at Wong Chuk Hang Nullah.

Where possible, effort would be given in the detailed design to minimise the habitat loss. Temporarily disturbed habitats would be reinstated as far as possible after the completion of works while habitat compensation in full scale is recommended for permanent woodland loss. Where floral species of conservation interest were identified within the proposed project area, transplanting has been recommended where in-situ preservation is impractical.

The construction of viaduct at WCH would cause an ecological impact to the ardeids foraging and roosting at the lower section of WCH nullah through habitat loss and off-site disturbance during construction and operation phase. Mitigation measures proposed include avoidance of the peak wintering season for sensitive works such as the pioneer site clearance and tree felling works, restricting noisy construction activities using PME between sunset to dawn (ardeid roosting period), replanting of suitable trees,

implementation of noise suppression measures during operation phase and use of coloured panels to prevent bird collision. With the full implementation of the mitigation measures, the potential impacts to the foraging and roosting ardeid would be brought to acceptable level, in considering that the Project would not bring a significant impact on the survival and reproductive success of the ardeids.

The construction and operation of the proposed magazine site at Chung Hom Shan would bring a minor disturbance to the neighbouring environment but with implementation of good site practices the impact would not be significant. No significant adverse impact on marine ecology is anticipated, as the marine benthic and coral community at Aberdeen Channel and Telegraph Bay is limited and of low ecological value, and only small scaled and mitigated dredging works are involved in the construction of the railway bridge crossing the Aberdeen Channel, and the marine piling works for the proposed Telegraph Bay Barging Point are also small in scale.

### **3.3 Water Quality Impact**

The key water sensitive receivers identified for the project are seawater intakes, cooling water intakes, typhoon shelter, nullah and a coral community at Sandy Bay.

#### **Construction Phase**

Dredging / excavation and minor seawall modification activities for the construction of pier / pier foundation of the railway bridge at Aberdeen Channel along with the installation and removal of temporary marine piles at Telegraph Bay and subsequent barging activities may result in release of suspended sediment into the surrounding water. To minimise the potential impacts on water quality, the construction works has been designed to limit the disturbance to the seabed as much as possible, and a watertight cofferdam will be used to isolate the dredging / excavation works. Silt curtains would also be deployed to enclose the seawall modification works and pile installation works, and general good site practices for operation of the barging points are recommended. With the proper implementation of the mitigation measures, water quality impact is anticipated to be insignificant.

The main potential water quality impacts that could arise from land based activities include site runoff and drainage, wastewater discharge from tunnelling and sewage effluent from the workforce. With the implementation of good site practices to control runoff and effluent release such as provision of channels, bunds or sand bag barriers to re-direct stormwater to silt removal facilities and collection and treatment of wastewater from tunnelling prior to discharge, no adverse water quality impact during construction phase is anticipated.

#### **Operation Phase**

Water quality impacts may result from a change to the flow regime and hydrology of the Aberdeen Channel and WCH nullah due to the railway bridge and viaduct structures and from the discharge of wastewater from station and depot facilities.

By aligning the pier at centre of Aberdeen Channel with the pier foundations of the two existing highway bridges with respect to the flood/ ebb tidal flow directions; adopting a hydraulically-efficient design for the nullah modification works; and implementation of recommended drainage and effluent collection and treatment, no adverse impacts on water quality during operation phase is anticipated.

Spent cooling effluent from chillers is recommended to be recycled for flushing use as far as practicable, while runoff, sewage and wastewater effluents from stations and the depot will be connected to the existing foul sewerage system. Runoff from rail tracks will also be intercepted and passed through silt traps and oil interceptors. With implementation of the recommended drainage and effluent collection and treatment, no adverse impacts on water quality during operation phase is anticipated.

### **3.4 Landscape and Visual Impact**

Within the Study Area, there are 12 key landscape resources (LRs) and 12 key landscape character areas (LCAs), with 3 LCAs of high importance. A total of 45 visual sensitive receivers (VSRs) were selected for the visual assessment, of which there are 10 VSRs considered to have high sensitivity to visual impacts from the Project. These are mostly high-rise residential properties around Ap Lei Chau, Aberdeen and Wong Chuk Hang.

#### **Landscape Impact**

The main potential impacts on existing landscape resources are due to the cut and cover tunnelling works; construction of the stations, depot, viaduct, railway bridge, tunnel portals and ventilation and plant buildings; and impacts on trees at the proposed works areas, temporary barging points and magazine site.

Given that much of the proposed works would be below ground and proposed works areas would be restored following the completion of the works, most of the landscape resources would not be significantly impacted by the Project. However, some proposed surface works and above ground stations, viaduct, and bridge structures would inevitably require a loss of trees and vegetation, resulting in a change to the existing landscapes, particularly at Hong Kong Park, Wong Chuk Hang, Aberdeen Waterfront and Ap Lei Chau, which at worst case, may experience significant and moderately adverse impacts under the unmitigated scenario.

A preliminary tree survey found approximately 5,768 trees within or located very close to the proposed works areas of the Project, including a few with protected status such as Registered Old and Valuable Trees (OVTs). Of these, it is estimated that approximately 20% including the OVTs can be retained and another 8% can be transplanted. A large number of the trees that need to be felled are of non-native roadside trees having lower individual ecological and amenity value as well as fast growing undesirable species colonised the abandoned sites. Compensatory planting utilising both ornamental and native species will be implemented as mitigation measures and it is expected that there will be a net gain of trees upon full establishment of proposed tree planting,

To minimise the potential impacts, a number of mitigation measures have been recommended during the construction phase including preservation of existing trees where possible, application of decorative screen hoarding where practicable, careful design of site lighting and layout, replanting of disturbed vegetation at the earliest possible stage, and transplanting of existing trees where practicable. During the operation phase, measures to mitigate the permanent landscape impacts include implementation of an integrated design approach to the above-ground structures with architectural design that seeks to reduce the apparent visual mass of the facilities, use of natural tones, and responsive lighting design; compensatory planting with provision of large ornamental trees for roadside and amenity planting, reinstatement and creation of open space; and implementation of a sensitive, innovative and responsive design to the proposed viaduct structures with compatible and extensive tree and shrub planting. Improvements to the existing landscape will also be made with the restoration of Harcourt Garden using a landscape deck design and provision of a new open space along the Staunton Creek Nullah that is integrated with the reinstatement of the adjacent

sloping area and provision of ornamental trees. With full establishment of the mitigation measures and maturity of the landscape planting, most of the landscape impacts will be alleviated to a slight adverse to negligible level and the proposed scheme would form a relatively small component within the future landscape context.

### **Visual Impact**

The proposed surface works and permanent structures would have significant impact on VSRs located at Ap Lei Chau, Tai Wong Ye Temple and along Heung Yip Road and Ocean Park Road under the unmitigated scenario, due to their close proximity to the works. Other VSRs may experience moderate visual impacts due to the change in visual context and temporary loss of existing landscape features.

Mitigation measures to reduce the visual impact during construction of the Project include preservation of existing trees where practicable, buffer planting, responsive hoarding, tidy site management and careful planning of the construction program. With the implementation of these mitigation measures, the visual impact will be reduced, but given the scale, complexity and site constraints of the proposed works, the majority of VSRs will still experience some temporary visual impact.

To minimise the operational visual impacts resulting from the railway structures, integrated design approach had been adopted for the above ground structures where practical and the viaduct and noise enclosure/ barrier structures have been designed as much as possible to incorporate a softer façade with use of amenity tree and shrub planting beneath the viaducts. The viaduct design incorporates relevant overseas experience and adopts appropriate mitigation measures to reduce the visual impact of the viaduct. The design has been consulted with the Advisory Committee on Appearance of Bridges and Associated Structures and the Southern District Council during the design development of the viaduct. Restoration works such as buffer planting and enhancement works such as the restoration of Harcourt Garden with landscape deck design would improve the visual amenity of those areas. With the implementation of these mitigation measures, the visual impacts of the proposed works would be acceptable.

### **3.5 Hazard to Life**

In view of foreseen ground condition and the impracticability in using other techniques, drill and blasting for rock excavation is required for some sections along the alignment. To enable a timely delivery of explosives to site and in order to meet the proposed construction work programme, an Explosives Storage Magazine (Magazine) is required. A Quantitative Risk Assessment (QRA) for the storage and transport of explosives has been carried out as per the EIA Study Brief. A robust site selection process has been undertaken for the proposed temporary magazine and two magazine sites have been identified as practicable: Chung Hom Shan and Shek O. The EIA Study Brief requirement requires the “selection of the shortest practicable road transport routes to and from the magazine” therefore Chung Hom Shan has been selected for the storage of explosives, based on the site selection process and the EIA Study Brief requirement. The criterion of the EIAO-TM for Individual Risk has been 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. As part of the ALARP assessment, a list of potential temporary magazine site candidate has been reviewed and the Chung Hom Shan has been confirmed as the most practicable site based on the shortest practicable distance to the construction site.

A QRA was also conducted for the construction and operation of those parts of the project which fall within the Consultation Zone of a Potentially Hazardous Installation (PHI). The assessment results show that the societal risk lies within the acceptable region when compared to the criteria stipulated in Annex 4 of the EIAO-TM. The criterion of the EIAO-TM for Individual Risk is met.

### **3.6 Waste Management Implications**

Waste types generated by the construction activities of the Project would include marine dredged sediment, C&D material, general refuse from the workforce, and chemical waste from the maintenance of construction plant and equipment.

The volume of C&D materials to be generated by the Project would be approximately 1,417,100m<sup>3</sup>. Opportunities to re-use materials have been fully considered. An estimated 5,000m<sup>3</sup> of materials would be reused as backfilling materials at section between Lei Tung and Aberdeen Channel Bridge. A surplus 1,412,100m<sup>3</sup> of materials would be transported off-site for beneficial use in other possible outlets, such as reuse the rock material in local projects that require public fill for reclamation and earth filling purposes, say, Hong Kong – Zhuhai – Macao Bridge in association with Hong Kong Boundary Crossing Facilities and Hong Kong Link Road, Central-Wanchai Bypass and Wanchai Development Phase II projects (subject to further coordination), dispose at the Government's Public Fill Reception Facilities (PFRFs) for beneficial use by other projects in the HKSAR, or transport to Mainland China via CEDD for use by other suitable projects in the Mainland.

In view of the geographic location of the major mucking out points, C&D material generated at Island South work sites would be transported to temporary barging points proposed at Telegraph Bay and Lee Nam Road while, C&D material generated from the Island North work sites would be transported to temporary barging point at Western District Public Cargo Working Area, proposed shared use with WIL project.

The construction workforce will generate refuse with an estimated maximum daily volume of 2,405 kg that needs to be properly managed and disposed. With the implementation of good waste management practices on site, this waste can be effectively controlled and is not anticipated to cause adverse environmental impacts. Chemical waste will also be generated from the use of cleaning fluids, lubricants and fuel. Such waste will be handled and stored in accordance with the Waste Disposal (Chemical Waste) (General) Regulations to prevent adverse environmental impacts.

Volume of marine dredged sediment generated from the Project is estimated to be less than 100m<sup>3</sup> and was classified as Type 2 – Confined Marine Disposal based on the review of the sediment quantity data. Dredged sediment will be transferred to barges for subsequent disposal and care will be taken to limit the release of dredged/excavated sediment into the surrounding water. Typically East Sha Chau mud pits are the designated disposal site for contaminated sediment and would be suitable for accepting this type of dredged material.

Provided that these wastes are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed, adverse waste management implication is not expected during construction phase.

During the operation phase, general refuse would be collected regularly and recycling containers are recommended to encourage recycling. Industrial and chemical waste would be recycled where practicable and a reputable and licensed waste collector will be employed to remove the waste. With the

implementation of the recommended mitigation measures, no adverse waste management implication during operation phase is anticipated.

### **3.7 Land Contamination**

A land contamination assessment has been carried out which included a review of historical/ current land uses, desktop review and site inspection. The results of the assessment indicated that there was no significant land contamination issue. Moreover, a prudent approach in further site investigation was adopted and soil sampling was undertaken. The site investigation results confirmed the findings of the desktop review. Therefore, no land contamination implication is anticipated.

During operation phase, defined procedures in handling chemicals for the operation of railway stations and depot would be implemented as part of the MTRCL's policy. As such, no land contamination implication is anticipated.

### **3.8 Air Quality Impact**

Potential air quality impacts from the construction works for the Project would mainly arise from construction dust generated from excavation, material handling and stockpiling, spoil removal as well as operation of crushing and barging activities.

Most of the air sensitive receivers (ASRs) will experience exceedance of the Total Suspended Particulate (TSP) criterion under the unmitigated scenario. With mitigation measures in place, a hypothetical Tier 1 screening that assumes 100% active area of construction site was carried out for short term hourly and daily TSP assessment. The purpose of Tier 1 screening is to highlight the ASRs where construction dust may potentially become an issue. The Tier 1 mitigated assessment shows that the hourly average TSP concentrations will exceed the criteria at 8 ASRs located at Wong Chuk Hang, and at 2 ASRs for the daily average TSP concentrations. Those ASRs with exceedance in the Tier 1 screening were subsequently assessed under the Tier 2 assessment which assumes 30% active works area located in the closest proximity to each ASR, which is also a very conservative approach. The results show no further exceedance of cumulative hourly and daily average TSP concentrations for any ASR. With mitigation measures in place, the predicted cumulative annual average TSP concentrations would also fully comply with the TSP criterion stipulated in EIAO-TM and Air Quality Objectives (AQO).

Mitigation measures specified in the Air Pollution Control (Construction Dust) Regulation and specific dust control measures have been recommended. These include regular water spraying on access roads, exposed earth and during handling of dusty materials; wheel washing; paving access roads; covering stockpiling area; and enclosing stone crushing facilities and concrete batching plant. With the implementation of dust suppression measures, the predicted cumulative hourly, daily and annual average TSP concentrations at the ASRs in the vicinity of the works area would fully comply with the TSP criterion stipulated in EIAO-TM and AQO. Thus, no residual air quality impact is anticipated.

### **3.9 Cultural Heritage Impact**

During the construction phase, direct and indirect impacts to cultural heritage resources may occur as a result of demolition, groundborne vibration from tunnelling activities or damage from contact with construction equipment and machinery.

#### **Archaeology**

The baseline archaeological study indicated that there were no known archaeological sites located within or in close proximity to the proposed alignment and works sites. However, some proposed works sites at Admiralty and Wong Chuk Hang were evaluated as having some archaeological potential. With the implementation of archaeological watching briefs for works sites at Harcourt Garden, south west and west of Wong Chuk Hang Tsuen and west of Wong Chuk Hang San Wai, adverse impact to potential buried archaeological deposits is not envisaged.

### **Built Heritage**

A desktop literature review and field surveys were undertaken to establish built heritage baseline conditions. Two Declared Monuments and 12 graded historical buildings exist in the vicinity of the Project and are mostly located near the Admiralty and Wong Chuk Hang project areas, along with a number of non-graded built heritage features such as temples, shrines, village structures and graves. Some of the listed resources may be indirectly impacted by ground-borne vibration arising from tunnelling and drill and blast activities. A non-graded building and a non-graded shrine in Wong Chuk Hang are located in close proximity to the construction works and may be damaged through contact with construction machinery.

With the implementation of mitigation measures including controlling the vibration levels from the tunnelling works as well as providing protective covering or buffer zone to non-graded built heritage resources in Wong Chuk Hang, no adverse impacts on the cultural heritage resources in the study area during both construction and operation phases is envisaged.



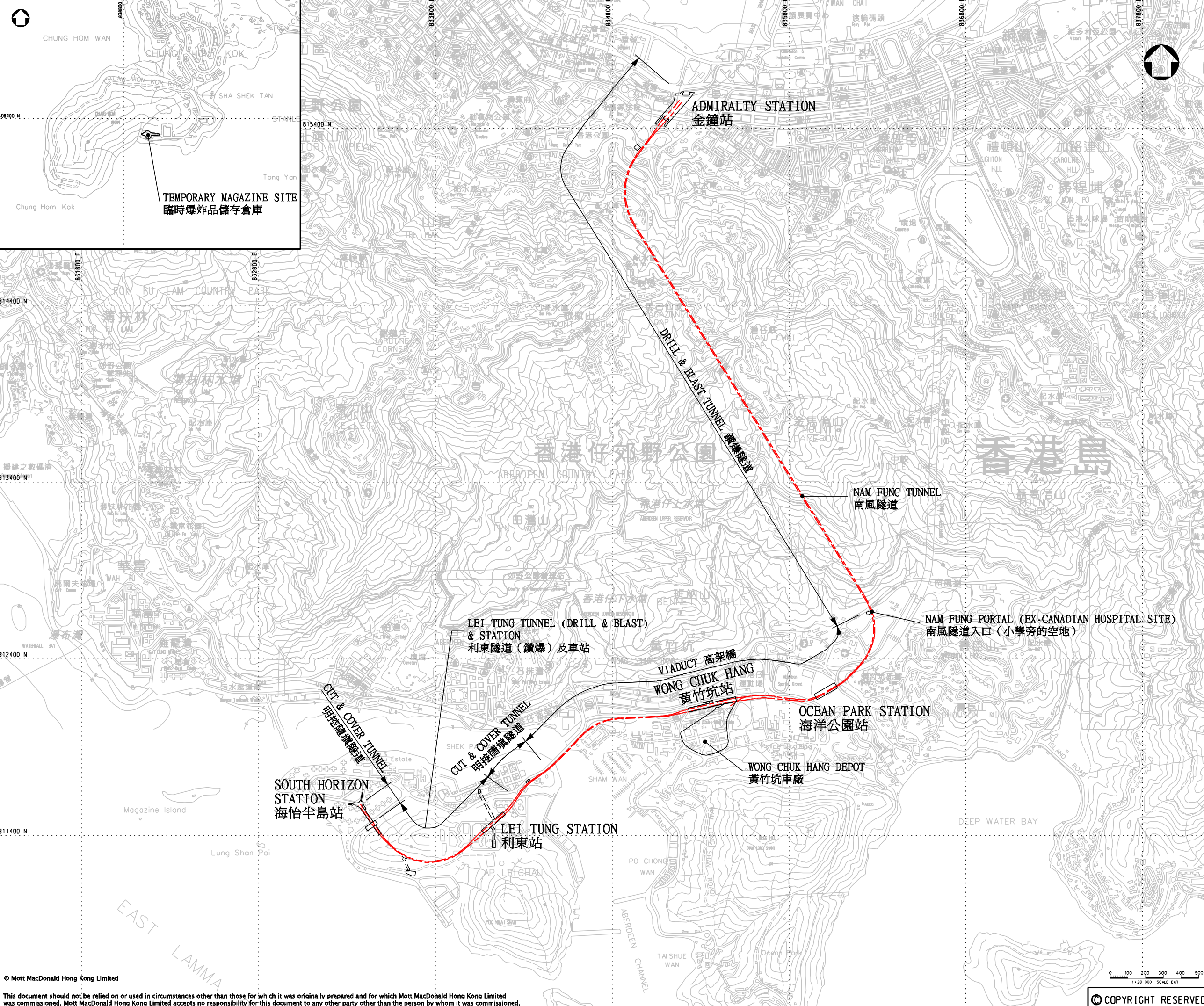
## 4. Environmental Monitoring and Audit

An environmental monitoring and audit (EM&A) programme to check the effectiveness of the recommended mitigation measures and compliance with relevant statutory requirements would be implemented.

The proposed key EM&A requirements include noise and dust monitoring at designated monitoring stations during construction phase; water quality monitoring during the course of marine construction works at Aberdeen Channel to monitor any variation in water quality from the baseline conditions and identify any exceedance of Water Quality Objectives at sensitive receivers; and regular site inspections at the works areas as part of the EM&A procedures to ensure the recommended mitigation measures are properly implemented.

## 5. Conclusion

This EIA study has identified and assessed the potential environmental impacts that may arise from construction and operation of the Project in accordance with the guidelines of the EIAO-TM and the EIA study brief. Based on the results of the assessments, the EIA study concludes that the Project would be environmentally acceptable and in compliance with the environmental legislation and standards. With the implementation of the recommended environmental mitigation measures, no significant adverse residual impacts from the Project is anticipated. A comprehensive environmental monitoring and audit programme would be implemented to check the implementation of mitigation measures and environmental compliance.



LEGEND: 圖例:

--- PREFERRED ALIGNMENT 擬建定綫

SOH 海怡半島

SOH STATION 海怡半島站

Rev	Date	Drawn/Description	Ch'kd/App'd



Project  
CONSULTANCY AGREEMENT NO. NEX/2301  
SOUTH ISLAND LINE (EAST)  
ENVIRONMENTAL IMPACT ASSESSMENT  
顧問合約編號: NEX/2301  
南港島綫 (東段)  
環境影響評估

Title  
GENERAL LAYOUT PLAN  
概覽圖

Designed	FY	Eng.Chk.	FY	
Drawn	MING	Coordination	FY	
Dwg.Chk.	FY	Approved	AFK	
Scale	1:20000@A3	Project	248137	Status
		CAD File	J:\248137\REPORT\ENV\ES\100523\FIGURE 1-1.dgn	
Drawing No.				Rev
				-