

EIA Case Study of Implementing Mitigation Measures in Hong Kong

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Abstract Upon its operation in 2015, the South Island Line (East) railway (the SIL(E) project) will provide fast and reliable transport through a direct rail link between residential areas in the southern part of Hong Kong Island and the business districts on north shore of the Island. The SIL(E) will also help relieve existing road traffic congestion at critical bottlenecks, such as the Aberdeen Tunnel, and reduce the daily commute time of various road transport modes. In Hong Kong, the Environmental Impact Assessment (EIA) Ordinance came into operation in April 1998. Under the EIA legislation, the proponent of SIL(E) must go through the statutory process by getting its EIA report approved, obtain an Environmental Permit (EP), and construct and operate SIL(E) in accordance with conditions set out in the EP. The EIA has been carried out to identify potential environmental impacts from the SIL(E) project, and mitigation measures were recommended to minimize potential construction and operational environmental impacts to sensitive receivers. This paper outlines the key EIA findings and recommendations leading up to the granting of the EP with various specific EP conditions for the construction and operation of the SIL(E) project. It also describes how the various stakeholders participated in a transparent public consultation exercise, which contributed to the conditions set out in the EP. Lastly, it proposes some possible improvements in the format of the EIA report to facilitate the preparation of future EPs.

Summary Statement The EIA Ordinance is a landmark legislation that marks a major step forward in environmental protection in Hong Kong, using Environmental Permits to implement mitigation measures recommended in the EIA.

1. Introduction

Hong Kong has one of the highest population densities in the world. It faces tremendous pressure for the development of an efficient transportation network to cope with the burgeoning population and economic activities. In anticipation of the rapidly growing demand for better transport infrastructure, the Hong Kong Special Administrative Region Government completed the Second Railway Development Study (RDS-2) in 2000. The RDS-2 lays down the strategic planning and development framework for railway systems to serve Hong Kong up to 2016. One of the recommendations of RDS-2 is the South Island Line (East) (SIL(E)) railway, which is an extension of the existing mass transit railway network in Hong Kong Island, in order to relieve road traffic congestion at critical bottlenecks, such as the Aberdeen Tunnel, between the Island's southern residential areas and the central business districts on the Island's north shore.

The SIL(E) project comprises 7 km of electric railway with medium capacity 3-car trains running from the residential areas of Ap Lei Chau and Wong Chuk Hang to the existing Admiralty Station in the central business district. The construction of 5 km of tunnels, 2 km of viaducts, 4 stations, depot and ventilation facilities would involve drill-and-blast and cut-and-cover methods. The project commenced construction in 2011 for completion in 2015.

2. EIA Process in Hong Kong

In accordance with the Environmental Impact Assessment Ordinance (EIAO) of Hong Kong which commenced operation in 1998, major development projects such as railways are classified as Designated Projects (DPs). The proponent of a DP is required under EIAO to conduct an

EIA study, publish the EIA report for public consultation and obtain approval of the EIA report from the Environmental Protection Department (EPD). Subsequently, the project proponent will apply for an Environmental Permit (EP) for the construction and operation of the DP. When issuing an EP, EPD imposes conditions related to the project implementation, particularly the requirements for the project proponent to carry out the recommended mitigation measures and the monitoring works based on the approved EIA report. EPD may also impose EP conditions related to comments received in the 30-day public consultation period, during which time members of the public may send their written comments to EPD by post, fax or e-mail. The project proponent must fully comply with the conditions set out in the EP.

MTR Corporation Limited (MTRCL), as the project proponent of the SIL(E) project, completed the EIA study and, after going through the public consultation process, obtained approval on the EIA report from EPD in October 2010. In December 2010, EPD issued the EP to MTRCL for construction and operation of the SIL(E) project.

3. Environmental Permit (EP) System in Hong Kong

Prior to 1998, the administrative EIA process without statutory follow up mechanism in Hong Kong might have been considered by some as a means for project proponents to get project approvals without genuine commitment to implement mitigation measures. More important, it would be difficult, if not impossible, for the authorities to ensure that the EIA recommendations and proposed mitigation measures will be fully and properly implemented.

The statutory EIA system in Hong Kong which took effect since 1998 extends beyond the approval of projects. EPD makes use of the EP as an instrument of statutory control over the construction and operation of projects through the imposition of EP conditions which the project proponent, as a Permit Holder, must comply. Under the EIAO, anyone who fails to obtain an EP or who fails to comply with any EP condition while carrying out a DP commits an offence and is liable on conviction to a maximum fine of HK\$5 million (over US\$640,000) and up to 2 years imprisonment.

Pursuant to section 10(6) of the EIAO, EPD may include in the EP conditions relating to matters set out in Schedule 4¹ of the EIAO, which include among other things :-

- (a) design, alignment, plan, layout, physical scale, and extent of the project
- (b) construction methods, specified equipment and the operational mode of the project
- (c) restrictions on strength, rate, amount, period and duration of discharging pollutants
- (d) implementation of mitigation measures as recommended in the EIA report
- (e) submission of detailed design plans and method statements
- (f) compensation or restoration measures for the loss of environmental resources
- (g) environmental monitoring and auditing (EM&A) requirements
- (h) requirements for employment of qualified persons to carry out the project and EM&A
- (i) reports / submissions to be made under the EP and their release to the public

4. Key EIA Findings and Recommendations of the SIL(E) Project

The potential environmental impacts arising from the construction and operation of the SIL(E) have been assessed in the EIA report. The EIA study covered various aspects, including noise, ecology, waste management, water quality, air quality, visual and landscape as well as cultural heritage impacts. Some of the EIA's key findings and recommendations are outlined below.

Construction Noise Impact

Owing to the close proximity of residential buildings to some construction sites, the unmitigated construction noise impacts could reach a maximum of 99 dB(A). MTRCL proposed a package of mitigation measures, e.g. quieter construction plant, movable noise barriers, acoustic shed for

¹ The full list of Schedule 4 of the EIAO can be seen at this link: <http://www.epd.gov.hk/eia/english/legis/s4.html>

air compressor/concrete pump, silencers for fan and noise insulating fabric for pile auger etc. to alleviate the noise impacts. With the above measures, some residential buildings will still be subject to construction noise exceeding the noise criteria. At the two most affected noise sensitive receivers, the noise levels are predicted to be 7 dB(A) above the relevant standards (*i.e. 82 and 77dB(A) against the standards of 75 and 70 dB(A) for residential use and during normal school hours respectively*) during the initial rock excavation stage. With regard to factors such as magnitude, duration, frequency and size of community affected by the noise, it was decided the residual impact was acceptable. This would be further addressed in the EP as mentioned in Section 5 below.

Air-borne Operational Railway Noise Impact

The unmitigated operational railway noise is predicted to reach a maximum of 16 dB(A) above the relevant standards due to trains passing through the approximate 2 km Wong Chuk Hang viaduct section. MTRCL recommended a total of about 600 m of semi-enclosures or vertical barriers on the 2 km long viaduct to mitigate the railway noise impact. With the implementation of these recommended measures, the railway noise impacts are predicted to be within the relevant criteria.

Ground-borne Operational Railway Noise Impact

Since one of the tunnels will run close to the foundation of some residential buildings, the EIA predicts that if unmitigated the ground-borne operation noise impacts at the first floor of a residential block in Ap Lei Chau would exceed the relevant noise standards. By adopting “*Type 1a Trackform – Resilient Baseplate*”, no exceedance of relevant standards is predicted. The EIA also confirms that any additional measures (e.g. trackform design with better noise reduction performance) which may be found necessary when more definite data on the geology of the site (which affects the predicted ground-borne noise level) becomes available at detailed design or commissioning stage, could be adopted without the need to increase the size of tunnels.

Ecological Impact

Out of the 10 hectares of works areas for the Project, over 70% are in developed areas of low ecological value. Among the few exceptions is the permanent loss of around 0.43 hectare of woodland habitat, mainly located along Wong Chuk Hang Nullah and north of Sham Wan Towers near the Ap Lei Chau portal. MTRCL would fully compensate for woodland habitat loss at the existing shrubland and grassland areas in terms of area, *i.e.* not less than 0.43 hectare.

Viaduct construction along Wong Chuk Hang Nullah could affect the roosting and feeding grounds of birds such as ardeids. MTRCL would implement mitigation measures to minimize the disturbance, including (i) stop noisy construction activities at least one hour before sunset and (ii) restrict site clearance works to between March and November (*i.e.* summer time in Hong Kong) to avoid affecting the higher roosting population in winter. In addition, MTRCL would provide compensatory plantation at the downstream portion of Wong Chuk Hang Nullah and reinstate the works area with new planting along the nullah upon completion of work.

5. The EP for SIL(E) Project

For the SIL(E) project, the conditions specified in the EP followed the framework under EIAO Schedule 4 and also referred to the “Implementation Schedule of Mitigation Measures” which is part of the approved SIL(E) EIA report. In addition, the EIA report has been reviewed by the public during the 30-day public consultation period, through EPD’s website² or at specific locations such as relevant government district offices, the proponent’s office, and the EIAO Register Office. After the consultation period, EPD received 45 sets of public comments. Most of them expressed concern about the delivery routes of construction and demolition materials to and from the barging points located close to their homes and schools. This would be addressed in the EP Condition outlined below.

² <http://www.epd.gov.hk/eia>

The main body of the SIL(E) EP (the full SIL(E) EP can be downloaded from EPD’s website³) was structured into 4 parts, based on the key recommendations and mitigation measures in the approved SIL(E) EIA report as well as relevant public comments received, as highlighted in Section 4 and above, including:

Submissions or measures before commencement of construction of the project

- employment of EM&A personnel and experts before commencement of construction
- submission of construction noise mitigation plan to propose ways to further alleviate the residual construction noise impacts at initial rock excavation stage
- submission of construction and demolition materials management plan to list out the mitigation measures including designated transport routes to minimize environmental nuisance during the transport of construction and demolition materials

Submissions or measures during construction stage

- restrictions on carrying out site clearance and noisy construction activities near the ardeid roosting and feeding grounds
- transplantation of plant species of conservation interest

Submissions or measures before and during operational stage

- installation of noise barriers/semi-enclosures on the 2 km viaducts
- installation of specific railway track form
- compensation of woodland habitat upon completion of work
- adoption of specific train type and frequency

EM&A requirements

- timing for submission of baseline and EM&A reports
- set up and maintenance of project website

6. Problems and Challenges to the EP system

An EIA report typically contains numerous assumptions, recommendations and proposed mitigation measures. In Hong Kong, an EIA report typically includes an “Implementation Schedule of Mitigation Measures (IS)” in which the project proponent is required to summarize all the recommended mitigation measures, specified work procedures or equipment as well as good site practices. The IS serves as a checklist for the project proponent to state clearly which parties are responsible for implementing what measures; to what standards of compliance; at which locations and at what timing (The 5 “W”s). A sample of the IS is shown in Table 1.

Table 1. Sample IS

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Who to implement the measure ?	Location of the measure	When to implement the measure ?	What requirements or standards for the measure to achieve ?

The IS helps EPD to go through all the recommendations and proposed mitigation measures in the EIA report and to include those key recommendations as EP conditions. However, the IS does not differentiate between the crucial, project specific mitigation measures from the routine, good housekeeping measures and can get lengthy and unwieldy to use as an enforcement tool.

Moreover, from time to time, the permit holder may wish to make minor changes to the recommendations in the approved EIA report such as construction method or the form of mitigation measures, etc. during detailed design or construction stage. For the SIL(E) project, MTRCL had applied for variations to the EP, e.g. using drill and blast method in lieu of mechanical breaking for the construction of ventilation buildings / station entrances because of engineering difficulties encountered during the detailed design / construction stage.

³ <http://www.epd.gov.hk/eia/register/permit/latest/vep3842012.htm>

7. Possible Ways for Improvement

The development and implementation of EP system in Hong Kong is a continuous learning and improvement process to meet the rising expectations and aspirations from various stakeholders and the community at large. From the experience of SIL(E) project, we consider the following possible improvements could facilitate the drafting of specific conditions in future EPs and also help project proponent to fulfill the requirements under the EP system.

(a) To Enhance the Format of Implementation Schedule in the EIA report

The presentation / format of the IS could be improved by dividing it into three main parts:

- (i) **Key specific proposed measures and recommendations** - The first part includes key project specific mitigation measures and recommendations, to be translated into specific EP conditions. This could also draw the project proponent's early attention on what measures and recommendations will be stipulated as EP conditions and must be implemented.
- (ii) **Submissions required during detailed design stage** - Secondly, given some of the mitigation measures proposed at the EIA stage would be subject to changes or fine-tuning during detailed design / construction stage, the project proponent should list out the possible submissions of designs, plans, method statements, etc. to be provided at a later stage, which will also become specific EP conditions.
- (iii) **Minor recommendations, routine mitigation and good housekeeping measures** - Lastly, the standard measures and routine site practices could be summarized in the third part of the IS, and covered under the EM&A mechanism, which usually forms part of the EP under "EM&A requirements" section as mentioned in Section 5 above.

(b) To List Out the Key Assumptions in the EIA report

While the IS is useful in forming a basis for specific EP conditions, it contains no information on the key assumptions adopted in the EIA study. However, most mitigation measures are proposed as a result of environmental assessments which are based on certain assumptions for the project, e.g. the adoption of particular construction method, work sequence, procedures, location, timing during the construction stage, as well as operation hours, mode and equipment, etc. during the operational stage. By requiring a separate chapter in the EIA report on key assumptions or expanding the IS with the inclusion of design considerations, the presentation / format of the EIA report will become such that EPD may easily choose the suitable ones for translation into specific EP conditions, by referring to relevant factors listed in EIAO Schedule 4, as mentioned in Section 3 above.

8. Conclusion

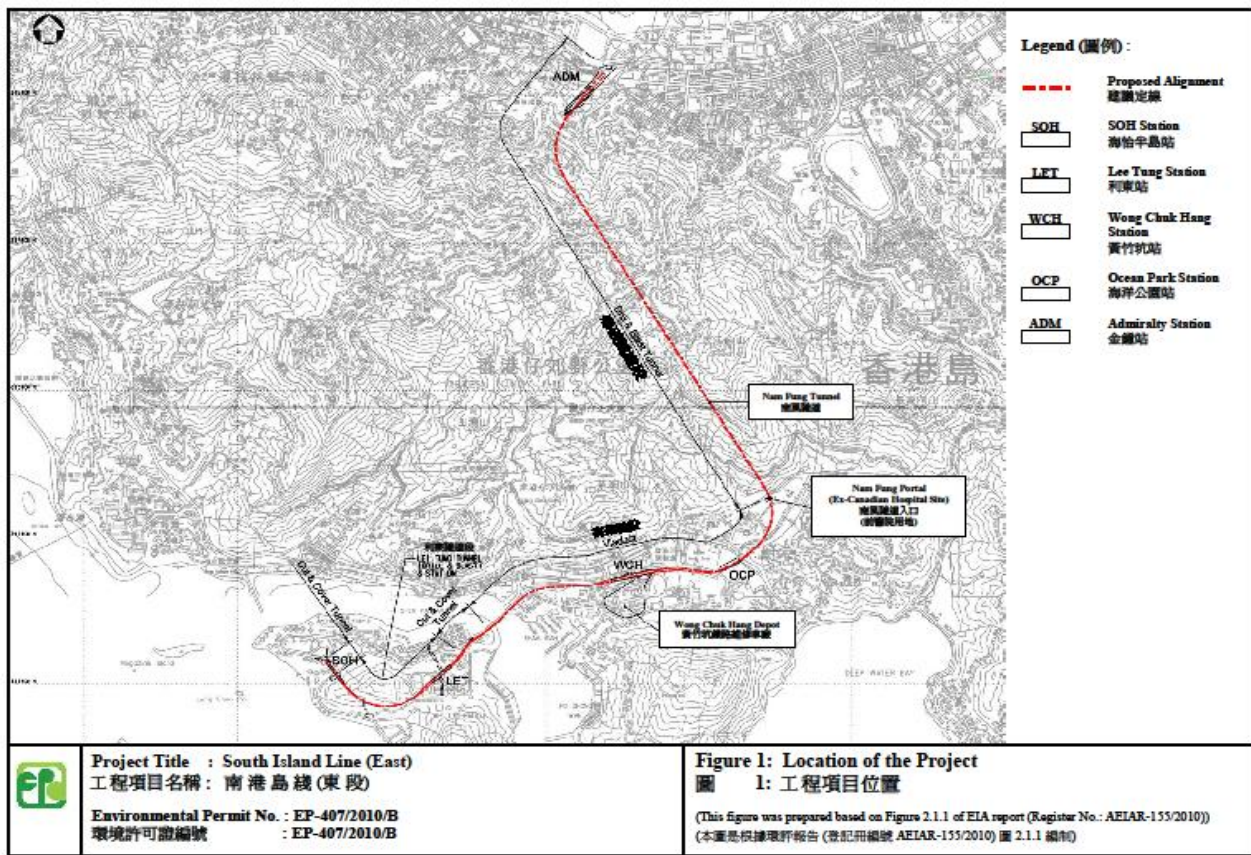
In Hong Kong, it is a statutory requirement for a project proponent to obtain an EP from EPD prior to construction or operation of a DP listed under the EIAO. The EP system in Hong Kong gives EPD the power to ensure the implementation of proposed mitigation measures and recommendations in the EIA report. Violation of EP conditions leads to enforcement action and possible cessation of the project.

While the project proponent has to comply with EP conditions for construction and operation of a DP under the law, the key challenge to the EP system is to make it more transparent, suitably flexible and easier for the project proponent to understand and comply. When drafting the EP, a certain degree of flexibility should also be given, where appropriate, to cater for minor project changes, without comprising EPD's enforcement power or the credibility of the EP system.

This paper, using the SIL(E) project as a case study, gave a brief introduction to the statutory EIA and EP system in Hong Kong and illustrated the key considerations given in the preparation of the EP. To further rationalize the translation of EIA recommendations into specific EP conditions, possible ways for improvement in the presentation / format of the IS and the EIA

report have also been proposed. A better-written EP will be a vital tool in safeguarding the environment while facilitating social development and economic growth.

Appendix



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