

8.0 CONCLUSIONS

The findings of the EIA Study are summarized in the following sections.

8.1 Noise

Construction Phase

Noise arising from the construction activities of the Project would have potential impact on the noise sensitive receivers (NSRs) located in the vicinity of the work sites. Unmitigated construction noise levels at the representative NSRs have been predicted for different scenarios and are in the range of 54 to 90dB(A). The results indicate that the noise levels at most of the NSRs would exceed the EIAO-TM noise criteria.

Sufficient noise control measures would be required to mitigate the noise levels to the EIAO-TM noise criteria. Mitigation measures recommended include good site practices, the use of quiet plant and movable noise barriers.

With the adoption of the recommended control measures, all the residential NSRs could be protected against the construction noise impact. Nevertheless, the noise levels at the schools during some noisy construction activities would still exceed the EIAO-TM criterion of 70dB(A) for schools by 1-4dB(A). In order to reduce the potential noise impacts at the schools, it is recommended that the particularly noisy construction activities should be scheduled to avoid examination period and concurrent operation. The on-site survey also revealed that all the affected schools have already been noise insulated. Additional noise reduction of around 10dB(A) to 15 dB(A) can be achieved depending on the type of insulation.

Operation Phase

Noise impact arising from the operation phase of the proposed road alignment would be mainly attributable to the traffic noise from the open road sections. The potential road traffic noise impacts associated with the Project have been assessed for the maximum traffic flows in 2022.

The modelling results indicate that about 2220 residential dwellings and 130 classrooms are predicted to experience noise levels exceeding the EIAO-TM traffic noise criteria, if unmitigated. Hence direct mitigation measures would be required.

The recommended mitigation measures for minimizing the traffic noise impact associated with the proposed alignment include the following:

- Two sections of canopies (about 105m) and a semi-enclosure (about 50m) for the section of Lei Yue Mun Road in front of EHC housing site Phase 1;
- A 7.7m high and 3m horizontal cantilevered noise barrier of about 115m for the northbound carriageway of Lei Yue Mun Road in front of St. Antonius Primary School;
- A 70m noise canopy for northbound of Lei Yue Mun Road leaning against the podium of Yau Tong Estate Redevelopment Phase 3; and

- Low Noise Road Surfacing on new roads.

With the implementation of the recommended mitigation measures, the mitigated noise levels from the new roads at all residential NSRs are predicted to be below 70dB(A) and the new roads contribution at most of the residential NSRs are less than 1dB(A) to the overall noise levels. On the other hand, the mitigated noise levels at the educational NSRs still exceed the noise criteria due to both existing and new road contributions. However, on-site inspection verified that all these schools have been noise-insulated with either Type I window or Type II window. It is considered that a noise reduction of less than 10dB(A) for Type I window and less than 15dB(A) for Type II window can be achieved if the windows are kept closed.

The predicted noise levels at about 540 residential dwellings and 20 classrooms could be reduced by at least 1dB(A). About 250 dwellings are likely to have the overall noise level mitigated to meet the EIAO-TM noise criterion.

The residual impacts have been assessed against the noise insulation criteria. The result shows that all residential dwellings and schools would not meet the noise insulation criteria as technical memoranda described in Section 3.2, and therefore, indirect technical remedies in the form of window insulation and air conditioning would not be required.

8.2 Air

During construction phase, adverse dust impacts are predicted, especially for those receivers immediately adjacent to Lei Yue Mun Road. Mitigation measures and comprehensive dust monitoring and audit are considered necessary.

During operation phase, no adverse air quality impact is predicted at the air sensitive areas. Therefore, no mitigation measures are required.

Under the worst case scenario, no adverse air quality is predicted inside the proposed underpass. Nevertheless, the detailed design of the underpass should ensure that the air quality inside the underpass must meet the tunnel air quality guidelines.

8.3 Landfill Gas Hazards

A qualitative risk assessment of landfill gas hazard posed by Sai Tso Wan Landfill on the proposed Project has been undertaken. Based on the available information, the results of the assessment suggest that the level of landfill gas hazard at the concerned area of the Project Site is medium.

Protection measures to minimize landfill gas hazard at the concerned area of the Project Site have been recommended. These protection measures include some safety procedures to ensure the safety of workers/personnel at the site during the construction phase and the safety of workers/personnel inside the service ducts/chambers during the operation phase. Furthermore, monitoring of methane, carbon dioxide and oxygen in excavations during the construction phase and in service ducts/chambers during the operation phase have been recommended.

8.4 Water Quality

The potential water quality impacts arising from the construction and operation of the proposed Lei Yue Mun Road underpass and associated improvement works have been assessed. Key concerns of water quality issues are mainly related to the construction phase. It is considered that construction run-off and drainage generated during the construction works for the project will have minimal impacts on the receiving waters provided that mitigation measures are implemented. With the adoption of the recommended mitigation measures, no unacceptable residual impacts on water quality impact are anticipated.

8.5 Visual and Landscape

At no stage of the project will there be any impacts on *landscape designations*.

The project's only significant impacts will occur during the **construction** stage and will therefore be temporary only. Significant construction impacts on *landscape resources* will be upon the LCSD sitting out area (moderate) and upon vegetation (moderate). Construction impacts on *landscape character* will be moderate and *visual amenity* will be medium, whilst the most significant construction impact on *key views* will be low. A relatively small number of *visual receivers* will experience moderate visual impacts during construction.

With appropriate mitigation measures, it will be possible to ensure that there are no significant landscape or visual impacts resulting from the proposed highways works, either during **operation** or at **Year 10**.

Proposed planting measures include the planting of heavy standard trees in the following locations:

- ◆ Roadside areas including the toe planter along Lei Yue Mun Road – 195 no.
- ◆ Re-provisioned sitting out area (2 sites) – 92 no.
- ◆ Amenity area – 22 no.

8.6 Summary of Environmental Outcomes

The outcomes of the EIA Study are summarised in the following sections.

Operation Phase Traffic Noise

The following direct traffic noise mitigation measures are recommended as a result of the project:

- Two sections of canopies (about 105m) and a semi-enclosure (about 50m) for the section of Lei Yue Mun Road in front of EHC Housing Development Phase 1;
- A 7.7m high and 3m horizontal cantilevered noise barrier of about 115m for the northbound carriageway of Lei Yue Mun Road in front of St. Antonius Primary School;
- A 70 m canopy for northbound of Lei Yue Mun Road leaning against the podium of Yau Tong Housing Redevelopment Phase 3;
- A semi-enclosure (about 62m) for the section of Lei Yue Mun Road in front of St. Antonius Girls College; and
- Low Noise Road Surfacing on new roads.

The environmental benefits resulting from the implementation of the above mitigation measures (in terms of the number of dwellings/classrooms with noise levels reduced by over 1 dB(A)) are summarized in the following table:

Environmental Benefits Resulting from the Implementation of the Traffic Noise Mitigation Measures

Area	Estimated Number of Residential Dwellings/Classrooms		
	Exceed the Noise Criteria¹ without the Project (2004)	Protected within the Noise Criteria¹ due to the Project	Benefitted (by ³1dB(A)) due to the Project
Sceneway Garden	350	0	5
Hong Tin Court	160	0	0
Ping Tin Estate	520	0	0
Five Districts' Business Welfare Association Szeto Ho Secondary School	25*	0	0
S.K.H. Kei Hau Secondary School	25*	0	0
Hong Pak Court	85	85	105
St. Antonius Primary School	30*	0	30*
St. Antonius Girls College	25*	0	25*
Buddhist Ho Nam Kam Prevocational College	25*	0	0
EHC Housing Development	740	160	445
Yau Tong Estate Housing Development	410	140	325
Total	1970/130*	385	880/55*

Note:

¹ 70dB(A) for residential dwellings and 65dB(A) for schools

* denotes classroom

The above table shows that the Project results in a traffic noise reduction of over 1 dB(A) for 880 dwellings and 55 classrooms of which 385 dwellings have traffic noise levels reduced to within the noise criteria.

Visual and Landscape

Proposed planting measures include the planting of heavy standard trees in the following locations:

Roadside areas including the toe planting along Lei Yue Mun Road – 195 no.
Re-provisioned sitting out area (2 sites) – 92 no.
Amenity area – 22 no.

8.7 Schedule of Recommended Mitigation Measures

A schedule of recommended mitigation measures for noise, air quality, landfill gas, water quality, visual and landscape impacts are presented in Table 8.1.

Table 8.1 Summary of Mitigation Measures

EIA Ref	EM&A Ref*	Environmental Protection Measures/Mitigation Measures	Location	Timing	Implementation Agent	Implementation Stages **				To What Requirements
						Des	C	O	Dec	
Construction Noise										
3.5	3.8	Where available, the Contract shall use quiet PMEs or model of plants that are quieter than those specified in the EPD's Technical Memorandum (GW-TM) for undertaking construction works.	At active construction locations.	During construction phase	The contractor		√			GW-TM
3.5	3.8	Where practicable, movable noise barriers should be used for hydraulic breaker, mobile crane, rock drill, excavator, backhoe, hand-held breaker, dump truck and poker vibrator.	At active construction locations.	During construction phase	The contractor		√			GW-TM
3.7	3.1-3.5	Construction Noise Monitoring	As described in the EM&A Manual	Refer to the EM&A Manual for details	The contractor and Environmental Team		√			Noise Control Ordinance
Road Traffic Noise										
3.6	3.8	Low noise road surfacing (LNRS)	Along the newly constructed open roads	Prior to commencement of operation	Highways Department/The contractor			√		Noise Control Ordinance
3.6	3.8	Two sections of canopies (about 105m) and two sections of semi-enclosure (about 112m)	Along the section of Lei Yue Mun Road in front of EHC Housing Development Phase 1	Prior to commencement of operation	Highways Department/The contractor			√		Noise Control Ordinance
3.6	3.8	A 7.7m high and 3m horizontal cantilevered noise barrier of about 115m in length	Along northbound of Lei Yue Mun Road in front of St. Antonius Primary School Along northbound of Lei Yue Mun Road fronting Yau Tong Estate Redevelopment Phase 3	Prior to commencement of operation	Highways Department/The contractor			√		Noise Control Ordinance
3.6	3.8	A 70m noise canopy		Prior to commencement of operation	Highways Department/The contractor			√		Noise Control Ordinance
3.7	3.7	Road traffic noise monitoring	As described in the EM&A Manual	Refer to the EM&A Manual	The contractor and Environmental Team			√		Noise Control Ordinance
Construction Dust										
4.5	2.8	Watering the works area at least twice a day	Work site	During construction phase	The contractor		√			Air Pollution Control (Construction Dust) Regulation

Table 8.1 Summary of Mitigation Measures (Cont'd)

EIA Ref	EM&A Ref*	Environmental Protection Measures/Mitigation Measures	Location	Timing	Implementation Agent	Implementation Stages **				To What Requirements
						Des	C	O	Dec	
4.5	2.1-2.6	Construction dust monitoring	As described in the EM&A Manual	Refer to the EM&A Manual for details	The contractor and Environmental Team		√			Air Pollution Control (Construction Dust) Regulation
Landfill Gas Hazard										
5.13	4.5	Portable gas detectors should be used to check the levels of methane, carbon dioxide and oxygen in depressions, trenches, and other excavations prior to entry and periodically.	Within the Landfill Consultation Zone	During construction phase	All contractors		√			GN-Landfill Gas Hazard Assessment
5.13	4.5	Atmosphere within manholes or chambers should be checked for methane, carbon dioxide and oxygen on a regular basis. The frequency of the monitoring shall be determined by a Safety Officer or an authorized qualified person.	Within the Landfill Consultation Zone	During operational phase	Highways Department/ Utility companies			√		GN-Landfill Gas Hazard Assessment
5.13	4.5	Adequate fire extinguisher, fire-resistant clothing and breathing apparatus should be provided on site during the construction phase	Within the Landfill Consultation Zone	During construction phase	All contractors		√			GN-Landfill Gas Hazard Assessment
5.13	4.5	Smoking, naked flames and other sources of ignition should be prohibited within 15m of any excavations and service ducts/chambers. Signs such as 'No Smoking' and 'No Naked Flame' should be in place in the vicinity of excavations and service ducts/chambers	Within the Landfill Consultation Zone	During construction and operation phase	All contractors/ Highways Department/ Utility companies		√	√		GN-Landfill Gas Hazard Assessment
5.13	4.5	Hot works such as welding and flame-cutting should only be carried out at open areas that are at 15m or more away from any excavations and service ducts/chambers unless these are controlled by a 'Permit to Work' procedure which is authorized by a Safety Officer or an authorized qualified person	Within the Landfill Consultation Zone	During construction and operation phase	All contractors/ Highways Department/ Utility companies		√	√		GN-Landfill Gas Hazard Assessment
5.13	4.5	All electrical equipment to be used in excavations and service ducts/chambers should be intrinsically safe	Within the Landfill Consultation Zone	During construction and operation phase	All contractors/ Highways Department/ Utility companies		√	√		GN-Landfill Gas Hazard Assessment

Table 8.1 Summary of Mitigation Measures (Cont'd)

EIA Ref	EM&A Ref*	Environmental Protection Measures/Mitigation Measures	Location	Timing	Implementation Agent	Implementation Stages **				To What Requirements
						Des	C	O	Dec	
5.13	N/A	Landfill gas monitoring	As described in the EM&A Manual	Refer to the EM&A Manual for details	All contractors/ Highways Department/ Utility companies		√	√		GN-Landfill Gas Hazard Assessment
Water Quality										
6.6	N/A	Follow the site practices outlined in ProPECC PN 1/94 "Construction Site Drainage"	Work site	During construction phase	The contractor		√			Water Pollution Control Ordinance (WPCO)
6.6	N/A	Collect, handled and disposed debris and rubbish generated on site	Work site	During construction phase	The contractor		√			Water Pollution Control Ordinance (WPCO)
6.6	N/A	All fuel tanks and storage areas should be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank	Work site	During construction phase	The contractor		√			Water Pollution Control Ordinance (WPCO)
6.6	N/A	Cover any open drainage channels and culverts near the works	Work site	During construction phase	The contractor		√			Water Pollution Control Ordinance (WPCO)
6.6	N/A	Employ temporary sanitary facilities on site	Work site	During construction phase	The contractor		√			Water Pollution Control Ordinance (WPCO)
6.6	N/A	The road drainage should be directed through oil and grit interceptors before entering the public storm water drainage system	Work site	During operation phase	Highways Department			√		Water Pollution Control Ordinance (WPCO)
6.6	N/A	Silt traps and oil interceptors should be regularly cleaned and maintained in good working condition	Work site	During operation phase	Highways Department			√		Water Pollution Control Ordinance (WPCO)

Table 8.1 Summary of Mitigation Measures (Cont'd)

EIA Ref	EM&A Ref*	Environmental Protection Measures/Mitigation Measures	Location	Timing	Implementation Agent	Implementation Stages **				To What Requirements
						Des	C	O	Dec	
6.6	N/A	Oily contents of the oil interceptors should be collected and transferred to an appropriate disposal facility.	Work site	During operation phase	Highways Department			✓		Water Pollution Control Ordinance (WPCO)
Landscape and Visual										
7.7	5.2 & 5.3	Screen hoarding will be used to mitigate visual impacts for those viewing the Works from ground level.	Work site	During construction phase	Highways Department		✓			N/A
7.7	5.2 & 5.3	Preservation (by transplanting if necessary) of any trees identified as being of particular landscape value.	Work site	During construction phase	Highways Department		✓			N/A
7.7	5.2 & 5.3	Protection of existing trees and vegetation to Standards defined by Government (SILTech).	Work site	During construction phase	Highways Department	✓	✓			N/A
7.7	5.2 & 5.3	The new carriageways and road structures along Lei Yue Mun Road should be designed and built to minimize excavation into the existing hillside above.	Work site	During construction phase	Highways Department		✓			N/A
7.7	5.2 & 5.3	Conservation of existing CDG or CDV recovered from the site for re-use in landscape restoration.	Work site	During construction phase	Highways Department		✓			N/A
7.7	5.2 & 5.3	Planting of stabilized slopes above Lei Yue Mun Road. Design of Slope works in accordance with latest Technical Guidelines on the Landscape Treatment and Bioengineering of Man-made slopes and Retaining Walls.	Work site	During design and operation phase	Highways Department	✓		✓		N/A
7.7	5.2 & 5.3	New street tree and roadside planting both as screening for highways structures and as replacement for roadside trees lost ;	Work site	During design and operation phase	Highways Department	✓		✓		N/A
7.7	5.2 & 5.3	Proposed sitting out area	Work site	During design and operation phase	Highways Department	✓		✓		N/A
7.7	5.2 & 5.3	Architectural design and colouring of highways structures	Work site	During design phase	Highways Department	✓				N/A
7.7	5.2 & 5.3	Architectural design and colouring of noise canopies and semi-enclosure	Work site	During design phase	Highways Department	✓				N/A
7.7	5.2 & 5.3	Architectural design and colouring of footbridge. The strict definition of utility corridors and the phrasing of structural designs of new highway features to maximize the amount of space available for planting	Work site	During design phase	Highways Department	✓				N/A
7.7	5.2 & 5.3	Design of pedestrian footpaths	Work site	During design phase	Highways Department	✓				N/A

Des – Design Phase

C – Construction Phase

O – Operation Phase

Dec – Decommissioning Phase