

5. Noise IMPACT ASSESSMENT

5.1 Introduction

5.1.1 This chapter presents an assessment of the potential noise impact associated with the construction and operation of the proposed extension of Public Golf Course at Kau Sai Chau, Sai Kung (the Project). Mitigation measures, monitoring and audit requirements, where necessary, are described.

5.1.2 It should be noted that there is no specific requirement under the EIA Study Brief for a noise impact assessment. This chapter is included in the EIA for completeness, and to ensure any potential impact based on the latest golf course design is evaluated and addressed.

5.2 Study Area

Noise Assessment Study Area

5.2.1 For the purpose of noise assessment, the Study Area generally covers 300 m from the boundary of the work sites of the Project. Given the remoteness of Kau Sai Chau and if no noise sensitive receivers can be found within this 300 m boundary, this Study Area would be extended further.

Baseline Conditions and Description of the Environment

5.2.2 The existing noise environment at Kau Sai Chau is quiet/rural with intermittent noise from marine traffic and from the golf course activities. Noise levels generally increase slightly during the summer months and holidays when the number of visitors and associated water (sports/leisure) activities increases. The amount of pleasure boats and ferry services (“kai-to”) in Port Shelter also increases during these periods contributing to the overall ambient noise level.

5.2.3 The major land use in Kau Sai Chau is recreational (the existing golf course), with Kau Sai Chau Village located at the southern tip of the Island. There are no schools on Kau Sai Chau. There is a campsite and an abandoned village located west northwest of Kau Sai Chau in Yim Tin Tsai. The other islands around Kau Sai Chau are uninhabited. The main populated area is in Sai Kung Town which is separated over 5 Km away across the marine water of Port Shelter.

5.3 Noise Assessment Criteria

Construction Phase

5.3.1 Under Annex 5 of the *Technical Memorandum on Environmental Impact Assessment Process* (EIA-TM), the day-time noise standard for domestic premises is 75 dB(A).

5.3.2 The principal legislation on the control of construction noise during restricted hours (i.e. 1900 to 0700 hours Monday to Saturday or at any time on Sundays and public holidays) is the *Noise Control Ordinance* (NCO) Cap. 400 and its associated Technical Memoranda. The contractor shall comply with the NCO and all relevant regulations under this Ordinance, including restrictions placed on noise from construction work and the requirements to seek Construction Noise Permit (CNP). At present, some construction works during restricted hours may be required to reduce nuisance to the golfers or to avoid interfering with the golf course operation. For works to be carried out during restricted hours, the contractor must obtain a CNP from the relevant Noise Control Authority (i.e. EPD) before the works are allowed to take place. Percussive piling works are also subjected to CNP licensing under the NCO. The contractor is required to display these permits appropriately.

5.3.3 Despite the description or assessment made in the subsequent sections, there is no guarantee that a CNP

will be issued for the project construction. The Noise Control Authority will consider a well-justified CNP application, once filed, for construction works within restricted hours as guided by the by the relevant Technical Memorandum (Memoranda) issued under the NCO. The Noise Control Authority will take into account of contemporary situations/conditions of adjoining land uses and any previous complaints against construction activities at the site before making his decision in granting a CNP. Nothing in this Report shall bind the Noise Control Authority in making his decision. If a CNP is to be issued, the Noise Control Authority shall include in it any conditions that are considered appropriate and such conditions are to be followed while the works covered by the permit are being carried out. Failure to comply with any such conditions will lead to cancellation of the CNP and prosecution action under the NCO.

Operational Phase

5.3.4 Fixed noise is controlled under Section 13 of the NCO and its associated *Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites* (TM-IND).

5.3.5 According to Table 1 of Annex 5 of the EIA-TM, fixed noise sources must be limited to 5 dB(A) below the appropriate Acceptable Noise Levels (ANLs) shown in TM-IND. Assuming an area sensitivity rating of “A”, the fixed noise criteria are shown below.

Table 5.1 Acceptable Noise Levels for the Fixed Noise Sources in the Proposed Golf Course

Time Period	EIA-TM Fixed Noise Criteria for Area Sensitivity Rating “A” (Leq 30 minutes, dB(A))
Day (0700 to 1900 hours)	55
Evening (1900 to 2300 hours)	55
Night (2300 to 0700 hours)	45

Notes:

5 dB(A) below the acceptable noise level in the Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites.

5.3.6 In any event, the area sensitivity rating assumed in this EIA report is for indicative assessment only. It should be noted that fixed noise sources are controlled under Section 13 of the NCO. At the time of investigation, the Noise Control Authority shall determine noise impact from concerned fixed noise sources on the basis of prevailing legislation and practices being in force, and taking account of contemporary conditions / situations of adjoining land uses. Nothing in this EIA report shall bind the Noise Control Authority in the context of law enforcement against any fixed noise source being assessed.

5.4 Representative Noise Sensitive Receivers

5.4.1 Figure 3.1 identifies the locations of the Noise Sensitive Receivers (NSRs) based on the information from the survey maps and site visits. There are no Outline Zoning Plans currently covering Kau Sai Chau. Table 5.2 gives the details of each of these NSRs and the type of noise sensitive land uses they represent. The only NSRs on Kau Sai Chau Island is Kau Sai Chau Village. A campsite and an abandoned village can be found in Yim Tin Tsai, to the north of Kau Sai Chau. The nearby islands of Tai Tau Chau (Um Island), Kiu Tsui Chau (Sharp Island) and Tiu Chung Chau are all uninhabited. The main populated area is in Sai Kung Town which is over 3 km from Kau Sai Chau. The existing golf course does not provide any overnight accommodation.

Table 5.2 Details of Representative Noise Sensitive Receivers

NSR	Description of Existing Use	No. of Storeys of Existing Use	Area Sensitivity Rating *	Shortest Horizontal Distance from NSR to Works Boundary (approximate, m)
Yim Tin Tsai Village	Village (abandoned)	1 to 3	A	1300
Kau Sai Village (shielded by topography)	Village	1 to 3	A	1060
Louisa Landale Campsite	Hostel / Campsite	2	A	980

* Suggested for the purpose of this Environmental Impact Assessment only, given that EPD will reserve the right to determine appropriate Area Sensitivity Ratings (ASRs) when required on a case by case basis.

5.5 Construction Noise Assessment

Potential Sources of Impact

5.5.1 The construction activities for the proposed golf course can be broadly differentiate into the following major works:

- § Mobilization / site clearance / preparation;
- § Construction of bulk irrigation supply (desalination plant and sea water pumping station);
- § Temporary works for material delivery (construction of temporary barging point);
- § Permanent bridge construction;
- § Bulk earthwork (excavation and backfilling);
- § Construction of deep drainage system;
- § Profiling, sand capping, construction of land drainage system, cart track and other ancillary facilities;
- § Turfing works; and
- § Extension of the administration building.

5.5.2 A balanced cut and fill volume (approximately 530,000 m³) can be achieved in this Project. Temporary haul road will be required within the site to transfer these cut and fill materials.

5.5.3 Blasting may be necessary during bulk excavation works. The location, timing and frequency cannot be ascertained at this stage as it will depend largely on actual geological condition of the site and contractor's working method.

Construction Schedule and Programme

5.5.4 At the time of assessment, construction works is tentatively expected to commence in February 2006 and will be completed in February 2007. Based on site condition and terrain, the construction will likely be grouped into three distinct works locations / phases; i.e. northern, central and southern areas. The actual arrangements will be subject to the contractor's working programme and method.

Construction Equipment

5.5.5 The type and quantity of Powered Mechanical Equipment (PME) likely to be used in each construction works described above and their Sound Power Level (SWL) are listed in Table 5.3. The works are standard civil engineering works and the equipment will be those typically found in similar project. This list was also reviewed against the proposed equipment submitted by the potential contractors during the tendering bid for the proposed Project. It was considered reasonable in terms of the types and numbers to be used by the contractor for satisfactory

completion of the Project based on the tentative construction programme, though there may be variation in the actual construction stage. It should be noted that this is an assumption of the most likely equipment to be used. The actual construction equipment will be determined by the contractor based on his works schedule and tasks.

Table 5.3 Tentative List of Likely Powered Mechanical Equipment to be used during Construction

Construction Works	Likely PME Used	Sound Power Level of each PME, dB(A)	Likely Quantities	Total Sound Power Level, dB (A)
Mobilisation / Site Preparation / Site Clearance	Excavator	112	2	123.6
	Dump truck	117	2	
	Bulldozer	115	2	
	Generator	100	2	
	Crane	112	2	
Bulk Irrigation Supply (desalination plant, sea water pumping station & rising mains)	Bulldozer	115	1	122.3
	Excavator	112	2	
	Crane	112	2	
	Lorry	112	1	
	Generator	100	2	
	Derrick barge	104	1	
	Concrete lorry mixer	109	2	
	Vibratory poker	113	2	
Temporary Works for Material Delivery (construction of temporary barging point)	Bored piling machine	115	1	122.9
	Derrick barge	104	1	
	Excavator	112	2	
	Dump truck	117	1	
	Crane	112	2	
	Generator	100	1	
	Concrete lorry mixer	109	1	
	Vibratory poker	113	2	
Permanent Bridge Construction	Excavator	112	1	121.7
	Dump truck	117	1	
	Crane	112	1	
	Lorry	112	1	
	Generator	100	1	
	Concrete lorry mixer	109	1	
	Vibratory poker	113	2	
Bulk Earthwork (excavation and backfilling)	Bulldozer	115	2	126.9
	Excavator	112	2	
	Dump truck	117	2	
	Crane	112	2	
	Generator	100	2	
	Vibrator roller	108	2	
	Rock crusher	121*	2	
Deep Drainage System	Excavator	112	2	122.6
	Dump truck	117	2	
	Crane	112	2	
	Generator	100	2	
	Air compressor	104	2	
	Vibratory roller	108	2	
	Submersible water pump	85	4	

Profiling, Sand Capping, Land Drainage System and Cart Track	Excavator	112	2	124.6
	Bulldozer	115	2	
	Dump truck	117	2	
	Crane	112	2	
	Generator	100	2	
	Air compressor	104	2	
	Vibratory roller	108	2	
	Grader	113	2	
Turfing	Excavator	112	2	120.1
	Lorry	112	2	
	Crane	112	2	
	Generator	100	2	
	Air compressor	104	2	
Extension of Administration Building	Excavator	112	2	122.9
	Dump truck	117	1	
	Crane	112	2	
	Generator	100	1	
	Lorry	112	1	
	Air compressor	104	1	
	Concrete lorry mixer	109	1	
	Vibratory poker	113	2	
	Bar bender and cutter	90	1	
	Concrete Batching Plant	Batching plant	108	
Conveyor belt		90	1	
Lorry		112	1	
Concrete lorry mixer		109	2	
Overall Sound Power Level, dB(A)				133

Notes:

Sound Power Level based on Technical Memorandum on Noise from Construction Work other than Percussive Piling.

* Sound Power Level of rock crusher quoted from Agreement CE 19/97: Planning and Engineering Feasibility Study for Development near Choi Wan Road and Jordan Valley - EIA Final Assessment Report (Ref. AEIAR-008/1999).

Assessment Methodology and Assumption

5.5.6 The construction noise assessment has been conducted based on standard acoustic principles, the methodology stated in Sections 5.3 & 5.4 of Annex 13 of the EIA-TM, and the *Technical Memorandum on Noise from Construction Work other than Percussive Piling* (TM-GW). Haul road noise has been conducted with reference to the *BS 5228: Part 1: 1997 Noise and Vibration Control on Construction and Open Sites, Part 1: Code of Practice for Basic Information and Procedures for Noise and Vibration Control* (BS5228).

5.5.7 The assessment has been undertaken on the basis of the assumption that all construction works and equipment will be located at a works area closest to the NSRs and are operating at the same time although some of the works will not overlap in actual construction. Such worst possible scenario would cater for all the different work packages or phases likely to be encountered throughout the construction period. Substantial shielding from the current golf course and other topographic features exist in Kau Sai Chau and its effect has been considered in the assessment. A façade correction of +3 dB(A) is added to account for sound reflection from the building's surface of the NSR.

5.5.8 Details of the estimated haul road traffic can be found in the Air Quality Impact Assessment (Chapter 4). The distance is assumed to be the shortest distance from the works boundary to the NSRs to simulate a worst case scenario. Average vehicle speed of the dump truck traveling along the haul road is assumed to be 10 km/hr.

Assessment Result

5.5.9 The predicted noise levels for general construction and haul road traffic at the NSRs is summarized below in Tables 5.4 and 5.5 respectively.

Table 5.4 Predicted Construction Noise Level

NSRs	Shortest Horizontal Distance from NSR to Works Area, m	Distance Correction, dB (A)	Topographic Shielding, dB(A)	Façade Correction, dB (A)	Predicted Noise Level, dB(A)
Yim Tin Tsai Village	1300	70	-10	+3	56
Kau Sai Village	1060	69	-10	+3	58
Louisa Landale Campsite	980	68	-10	+3	58

Notes:

Based on an overall sound power level of 133 dB(A).

Table 5.5 Predicted Haul Road Noise Level

NSRs	Number of Trips Per Hour (worst case)*	Shortest Horizontal Distance from NSR to Works Area, m	Topographic Shielding, dB(A)	Predicted Haul Road Noise Level, dB(A)
Yim Tin Tsai Village	44	1300	-10	52
Kau Sai Village	28	1060	-10	51
Louisa Landale Campsite	44	980	-10	54

Notes:

Sound power level of truck is 117 dB(A), vehicle speed is 10 km/hr. A 3 d(B)A façade correction is included.

* Details of the haul road trips assumptions and calculations can be found in Chapter 4 – Air Quality.

5.5.10 The total cumulative predicted noise level is shown in Table 5.6 below.

Table 5.6 Total Cumulative Predicted Noise Level

NSRs	Noise Source	Predicted Noise Level, dB (A)	Total Cumulative Predicted Noise Level, dB(A)
Yim Tin Tsai Village	All construction works	56	57
	Haul road	52	
Kau Sai Village	All construction works	58	58
	Haul road	51	
Louisa Landale Campsite	All construction works	58	60
	Haul road	54	

Note: EIA-TM noise standard for residential premises: Leq (30 minutes) 75 dB(A)

5.5.11 As shown in the above table, the total cumulative predicted noise levels under the worst case scenario will not exceed the 75 dB(A) day time noise standard. There are no existing schools in Kau Sai Chau. Mitigation measures are not required during construction phase of the Project.

5.5.12 The noise from blasting is audible to a varying degree depending on wind strength, direction and atmospheric conditions as well as the amount of explosives used. However, this noise is not considered to have a significant adverse noise impact due to its infrequent and instantaneous nature. Nonetheless, adequate warning should be given to the NSRs on the timing and duration of each blasting. Regulatory controls on explosives (and

blasting) are under the authority of the Mines Division of the Geotechnical Engineering Office, Civil Engineering and Development Department (CEDD). Permits for the use of explosives must be obtained by the contractor from the Mines Division of CEDD which also stipulates particular restrictions on blasting procedures.

5.6 Operational Noise Assessment

5.6.1 The number of golfers / visitors to Kau Sai Chau is expected to increase with the opening of the proposed extension. The current ferry and bus services of the golf course will be adequate to cater for the increase patronage. Land transportation to Sai Kung is by private car or public transportation and will normally be spread out at different times of the day. The expected increase in traffic is considered to be negligible in terms of the overall traffic volume in Sai Kung.

5.6.2 Pumps will be installed as part of the land drainage system of the proposed golf course to collect and divert storm water to the lakes or reservoir. All the pumps will be entirely underground and covered. The other potential fixed noise source will be the proposed desalination plant including its associated sea water pumping station. Details of the proposed desalination plant are not available at this stage. The likely location is expected to be adjacent to the existing ferry pier at the western coast of Kau Sai Chau (Figure 6.7 in Water Quality chapter). The desalination plant is expected to be a fairly small plant and be fully enclosed within a structure. The associated seawater pumping station will mostly be underground or fully enclosed. As all the fixed noise sources will be either underground or fully enclosed and since the nearest NSRs (Yim Tin Tsai Village and Louisa Landale Campsite) are at least 1 km away, noise impact is not expected.

5.6.3 Noise impact during the operation of the proposed golf course is therefore not expected.

5.7 Residual Impact

5.7.1 Given the large buffer distance between the NSRs and the proposed golf course, residual impact from both construction and operational noise are not expected.

5.8 Cumulative Impact

5.8.1 The potential concurrent project in Sai Kung area would be the DSD's Drainage Improvement Project in Sai Kung Town which is over 3 km from Kau Sai Chau. Given the large distance, cumulative impact is not expected.

5.9 Environmental Monitoring and Audit Requirement

5.9.1 Further information regarding noise monitoring and audit are described in the stand-alone Environmental Monitoring and Audit (EM&A) Manual.

5.10 Summary

5.10.1 The use of powered mechanical equipment during the construction phase of the proposed golf course extension is not expected to create noise nuisance, given the remoteness of the Project and the large buffer distance between the works and the noise sensitive receivers. Mitigation measures are therefore not required.

5.10.2 Operation of the proposed golf course is also not expected to pose noise impacts to the noise sensitive receivers.