

4. NOISE

4.1 Introduction

This *Section* provides an evaluation of the potential noise impacts associated with the construction and operation of the Project, including the associated works and marine activities.

4.2 Legislative Requirements and Evaluation Criteria

4.2.1 Demolition and Construction Noise

The principal legislation relating to the control of construction noise is the *Environmental Impact Assessment Ordinance (EIAO) (Cap. 499)*. The *Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)*, issued under the *EIAO*, provides guidelines and noise criteria for evaluating noise impacts. The assessment criteria are defined in *Annex 5* of the *EIAO-TM* with reference made to *Annex 13* of the *EIAO-TM* for the guidelines of noise assessment.

The *Noise Control Ordinance (NCO) (Cap. 400)* also provides statutory controls on general construction works during restricted hours (i.e. 1900 to 0700 hours Monday to Saturday and at any time on Sundays and public holidays). A number of Technical Memoranda (TMs) have been issued under the *NCO* to stipulate noise control approaches and criteria. The *Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM)*, which provides the guidelines for controlling the construction noise from the use of Powered Mechanical Equipment (PME) at the construction work sites, details the procedures that should be adopted for the assessment of noise from construction work other than percussive piling, the issuing of Construction Noise Permits (CNP), and for determining whether or not any such CNP is being complied with.

4.2.1.1 General Construction Works

Under the *EIAO*, the potential noise impact arising from general construction works during normal working hours (i.e. 0700 to 1900 hours on any day not being a Sunday or public holiday) at noise sensitive receivers that rely on opened windows for ventilation, should be assessed in accordance with the noise criteria specified in the *EIAO-TM*. The *EIAO-TM* noise standards are presented in **Table 4.1**.

Table 4.1 EIAO-TM Daytime Construction Noise Standards ($L_{eq, 30 \text{ min}}$ dB(A))

Uses	Noise Standards (dB(A))
Domestic Premises	75
Educational Institutions	70
Educational Institutions (during examination periods)	65

Notes:

- (a) The above standards apply to uses which rely on opened windows for ventilation.
- (b) The above standards shall be viewed as the maximum permissible noise levels assessed at 1m from the external façade.

It is anticipated that no works are planned during restricted hours (i.e. 1900 to 0700 hrs of the next day and any time on Sundays and public holidays) at this stage, CNP will be applied if any works will be carried out during restricted hours. When assessing a CNP application for the use of PME during the restricted hours (i.e. 1900 to 0700 hours of the next day and any time on Sundays and public holidays), the Noise Control Authority will compare the Acceptable Noise Levels (ANLs), as promulgated in *GW-TM*, and the Corrected Noise Levels (CNLs) (i.e. after accounting for factors such as barrier effects and reflections) associated with the proposed PME operations. The ANLs are related to the noise sensitivity of the area in question and different Area Sensitivity Ratings (ASRs) have been established to reflect the background characteristics of different areas. The appropriate ASR for the Noise Sensitive Receiver (NSR) is determined with reference to **Table 4.2**.

Table 4.2 Area Sensitivity Ratings (ASRs)

Types of Area Containing NSR	Degree to which NSR is affected by Influencing Factor (IF)		
	Not Affected	Indirectly Affected	Directly Affected
Rural area, including Country Parks or village type developments	A	B	B
Low density residential area consisting of low-rise or isolated high-rise developments	A	B	C
Urban area	B	C	C
Area other than those above	B	B	C

Notes:

The following definitions apply:

- (a) "Country Park" means an area that is designated as a country park pursuant to section 14 of the *Country Parks Ordinance*;
- (b) "Directly affected" means that the NSR is at such a location that noise generated by the IF is readily noticeable at the NSR and is a dominant feature of the noise climate of the NSR;
- (c) "Indirectly affected" means that the NSR is at such a location that noise generated by the IF, whilst noticeable at the NSR, is not a dominant feature of the noise climate of the NSR;
- (d) "Not affected" means that the NSR is at such a location that noise generated by the IF is not noticeable at the NSR; and
- (e) "Urban area" means an area of high density, diverse development including a mixture of such elements as industrial activities, major trade or commercial activities and residential premises.

The relevant ANLs are shown in **Table 4.3**.

Table 4.3 Acceptable Noise Levels for General Construction Works

Time period	L _{Aeq} 5min (dB(A))		
	ASR "A"	ASR "B"	ASR "C"
All days during the evening (i.e. 1900-2300 hrs) and general holidays (including Sundays) during the day and evening (ie 0700-2300 hrs)	60	65	70
All days during the night-time (i.e. 2300-0700 hrs of the next day)	45	50	55

The Noise Control Authority will consider a well-justified CNP application, for construction works within restricted hours as guided by the relevant TMs issued under the *NCO*. The Noise Control Authority will take into account the adjoining land uses and any previous complaints against construction activities at the site before making a decision. Nothing in this EIA Report shall bind the Noise Control Authority in making its decision. The Noise Control Authority may include any conditions in a CNP that it considers appropriate. Failure to comply with any such conditions may lead to cancellation of the CNP and prosecution action under the *NCO*.

4.2.1.2 Marine Traffic Noise

There is no specific requirements and noise criteria under the *NCO* and *EIAO-TM* for evaluating noise impact due to marine traffic.

4.2.2 Operation Noise

The *Technical Memorandum on Noise From Places Other than Domestic Premises, Public Places or Construction Sites (IND-TM)* issued under the *NCO* specifies the applicable ANLs for assessing potential operation noise impacts. The ANLs are dependent on the ASR and the time of the day and are presented in **Table 4.4**.

Table 4.4 Acceptable Noise Levels for Operational Noise

Time Period	L _{Aeq 30min} (dB(A))		
	ASR "A"	ASR "B"	ASR "C"
Daytime: 0700-1900 hrs & Evening: 1900-2300 hrs	60	65	70
Night-time: 2300 hrs - 0700 hrs of the next day	50	55	60

Fixed plant noise is controlled under *Section 13* of the *NCO* and the predictions will be undertaken in accordance with the *IND-TM*. The noise criteria for planning and design of Designated Projects are set out in Table 1A of *Annex 5* of the *EIAO-TM* as follows:

- The noise level at the facade of the nearest NSR is at least 5 dB(A) below the appropriate ANL (as shown in **Table 4.4**) as specified in the *IND-TM*; or
- The prevailing background noise level (for quiet areas with a noise level 5 dB(A) below the appropriate ANL).

Where the Project is located in rural areas and no influencing factors affect the NSRs, an ASR of "A" is assigned. Baseline noise measurements have been conducted to investigate the prevailing noise levels and to establish the noise limits for the assessment of the operational noise impacts. Details of the noise measurements for the Project are discussed further in **Section 4.3.4**.

The ASR assumed in this EIA Report is for an indicative operation noise 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.

4.3 Description of the Noise Environment

4.3.1 Assessment Area

In accordance with the requirements given in *Clause 3.4.4.2* and *Appendix C* of the EIA Study Brief, the Assessment Area for the noise impact assessment should generally cover a distance of 300m from the boundary of the Project, and should be expanded to include NSRs at distances over 300m from the Project which may be affected by the Project. The Assessment Area considered in the assessment is shown in **Figure 4.1**.

4.3.2 Baseline Conditions

The new OCGTs are located at LPS on the Lamma Island. Lamma Island is rural in nature and surrounded by natural terrain. To the south of LPS is open sea. Background noise at the Project site and the surround environment is dominated by the prevailing general background including sea waves and operation of the existing power station.

4.3.3 Noise Sensitive Receivers

The statutory Outline Zoning Plans (*OZP*) and other relevant development plan available from Lands Department or Town Planning Board have been reviewed with regard to the Assessment Area. The Assessment Area is located within the boundary of the existing LPS, covered by the approved *Lamma Outline Zoning Plan S/I-LI/11* under zoning 'Other Specified Uses – For "Power Station" only'. There is no existing or planned NSR identified within the 300m Assessment Area from the boundary of the Project. The first layer of NSR is at least 800m away from the Project site.

A site visit was carried out on 14 December 2020 to review the current situation for the first layer of existing NSRs near the LPS. Representative NSRs are identified and listed in **Table 4.5** and shown

in **Figure 4.1**. Photographs of the identified NSRs and the existing building structures of LPS are shown in **Appendix 4A**.

Table 4.5 Identified Representative NSRs

NSR ID	Description	Use	Approximate Distance to nearest Project Site Boundary (m)
N1	Village House at Tai Shan Central at Lamma Island	Existing Residential	810
N2	Village House at Hung Shing Yeh	Existing Residential	1,450

N1 - Village House at Tai Shan Central at Lamma Island

The Village House at Tai Shan Central at Lamma Island (NSR N1) is located approximately 810m to the northeast of the Project site. The direct line of sight of NSR N1 to the Project site is totally screened by the existing building structures of LPS and natural terrain (see **Figure 4.2**).

For NSR N1, the separation distance between the Project site and NSR N1 is about 810m, and they are screened by the natural terrain and existing building structures of LPS. Hence, unacceptable noise impact due to the Project is not anticipated. Based on this, quantitative noise impact assessment is considered not necessary at NSR N1.

N2 - Village House in Hung Shing Yeh at Lamma Island

The Village House at Hung Shing Yeh (NSR N2) is approximately 1.45km to the east of the Project site. NSR N2 is located at high level, just above the top of the small hill viewing to the west towards the LPS, and hence it is considered as a NSR that may be affected by the operation of the Project.

Summary

Despite the large separation distance of 1.45km, in view of the background noise environment at NSR N2 being typically rural in nature, and that there is only partial screening from the existing plant buildings and structures of the LPS, NSR N2 is considered as the critical NSR to the Project site. Fixed plant noise due to the operation of the Project may have potential noise impact to this NSR. Based on the above, NSR N2 is identified as the representative NSR for quantitative operational noise impact assessment to present the worst case scenario for the Project.

4.3.4 Baseline Noise Measurement

Noise measurements were taken at the Concerto Inn near NSR N2 on 14 – 15 December 2020 and 28 – 29 May 2021 to investigate the prevailing background noise levels. Due to close proximity between Concerto Inn and NSR N2, the background noise environment is considered similar at both locations. The noise measurements were conducted using a Rion NL-52 Sound Level Meter (Type 1), which had been calibrated using a 01dB-Stell CAL21 Sound Calibrator with a calibration signal of 94.0 dB(A) at 1kHz. The microphone was set at 1.2m above floor level with façade reflection. The measurements were conducted in accordance with the calibration and measurement procedures stated in the *IND-TM*.

Two (2) sets of 30-minute baseline noise measurement have been conducted at NSR N2 during each of the daytime and evening periods (i.e. 2200 – 2300 hrs within 0700 – 2300 hrs), and night-time period (i.e. 0200 – 0300 hrs within 2300 – 0700 hrs of the next day) on two different weekdays. The two aforementioned background noise measurement periods (i.e. 2200 – 2300 hrs and 0200 – 0300 hrs of the next day) are considered to be representative to reflect the minimum background noise levels of the respective daytime/evening and night-time periods. Averaged L₉₀ has been adopted as prevailing background noise levels.

The measurement location is shown in **Figure 4.3** with measured prevailing background noise levels summarised in **Table 4.6** with details shown in **Appendix 4B**.

Table 4.6 Measured Prevailing Background Noise Levels

Location	Time Periods	Averaged Measured Noise Levels (Measured Noise Levels), L ₉₀ (30min) dB(A) ^(b)	ANL-5 for ASR "A", dB(A) ^(a)	Operational Noise Criteria, dB(A) ^(a)
Concerto Inn	Daytime & Evening	53	55	53
	Night-time	52	45	45

Notes:

- (a) *IND-TM* specifies the applicable Acceptable Noise Levels (ANLs) for the operation of the Project. The noise criteria for planning and design of Designated Projects are set out in the *EIAO-TM* as follows:
- the noise level at the facade of the nearest NSR is at least 5 dB(A) below the appropriate ANL (as shown in **Table 4.4**) as specified in the *IND-TM*; or,
 - the prevailing background noise level (for quiet areas with a noise level 5 dB(A) below the appropriate ANL).
- (b) The background noise is mainly dominated by the sound of sea waves.

4.4 Potential Sources of Impact

4.4.1 Demolition and Construction Phases

4.4.1.1 Demolition and Construction Noise

Potential noise sources during the demolition and construction phases of the Project will mainly arise from Powered Mechanical Equipment (PME) operating at the Project site. The works carried out on-site are expected to be relatively small-scale and noisy activities, i.e. extensive concrete breaking and foundation works are not required. Major components of the Project will be fully assembled off-site as far as practicable to minimise assembly works to be carried on-site. The major works will include:

- Decommissioning and removal of the existing OCGTs and CCGT, including GT2, GT3, GT4, GT57 and GT6; and
- Installation of new OCGTs, including GT8, GT9, GT10 and GT11, and associated facilities.

4.4.1.2 Marine Traffic Noise

There may be potential marine traffic noise impact from delivery of construction equipment and components of the new OCGTs via marine route to the LPS jetty. Waste generated during the demolition and construction phases may also be transported off-site via marine route to the fill banks or landfills for reuse or disposal. As the demolition and construction works associated with the Project are small scale, marine traffic for equipment transport and waste disposal during the demolition and construction phases of the Project are expected to be limited, i.e. no more than 1 to 2 marine vessel trips within every 2 days during daytime period only. There will be no marine traffic associated with the demolition and construction of the Project during night-time period.

4.4.2 Operation Phase

Fixed plant noise associated with the operation of the new OCGTs, including GT8, GT9, GT10 and GT11, is the major potential noise source during operation phase of the Project. The new OCGTs would only be operated intermittently during peak-logging and emergency situations. However, the operation of the new OCGTs could occur any time of a day from Monday to Sunday, including public holidays.

4.5 Assessment Methodology

4.5.1 Demolition and Construction Phases

4.5.1.1 Demolition and Construction Noise

No existing or planned NSR was identified within 300m distance from the Project site boundary. All NSRs are located far away from the Project site (at least 810m) and noisy activities (i.e. extensive concrete breaking and foundation works) are not required. Therefore, adverse noise impact during demolition and construction phases are not anticipated and quantitative noise assessment is considered not necessary.

4.5.1.2 Marine Traffic Noise

No existing or planned NSR was identified within 300m distance from the Project site boundary. All NSRs are located far away from the LPS jetty (at least 1.6km) and further away from the marine vessel route. With no more than 1 to 2 vessel trips within every 2 days, adverse noise impact due to marine traffic during demolition and construction phases are not anticipated and quantitative marine traffic noise assessment is considered not necessary.

4.5.2 Operation Phase

No NSR was identified within the 300m distance from the Project site boundary. The nearest NSR N1 is located at approximately 810m from the Project site boundary with no direct line of sight to the OCGTs due to screening by the existing building structures of the LPS and natural terrain. Hence, noise impact due to operational activities of the Project is not anticipated at NSR N1. However, with the background noise environment typically rural in nature, the operational noise criteria are more stringent. NSR N2 is approximately 1.45km away from the Project site, with partial screening from the existing plant buildings and structures of the LPS. As a conservative assessment, a quantitative noise assessment has been carried out for the operation of the OCGTs at NSR N2, which is the nearest NSR with possible direct line of sight towards the OCGTs. With reference to the discussion in **Section 4.3.3**, a quantitative operational noise assessment for the other NSRs is considered not necessary.

The fixed plant noise sources from the OCGTs are identified as the major noise sources from the Project which may cause noise impact to NSR N2. The worst case operation mode which represents the maximum noise emission in connection with the identified fixed noise sources of the operation of the OCGTs has been assessed.

The methodology used for the quantitative fixed plant noise assessment is in accordance with the procedures outlined in the *IND-TM* and the *EIAO-TM* and is presented below:

- Identify the types of equipment and their number;
- Calculate the maximum total SWL from the OCGTs;
- Identify representative NSR as defined by the *EIAO-TM* based on existing and committed land uses that may be affected by the OCGTs;
- Calculate the distance correction factors, using a conservative approach, based on the horizontal distance between the NSR and the noise sources;
- Calculate the corrected noise levels after taking into account other corrections such as potential screening effects, if any, by adopting standard acoustics principles, and atmospheric absorption in accordance with *ISO 9613-1 Acoustics – Attenuation of Sound During Propagation Outdoors – Part 1: Calculation of the Absorption of Sound by the Atmosphere*; and
- Present the results in terms of $L_{eq, 30min}$ dB(A), as specified in the *IND-TM*.

The predicted noise levels at the NSR N2 (see **Section 4.6.2**) were compared with the criteria set out in **Table 4.6**.

As advised by HK Electric, the maximum sound power level (SWL) of each new set of OCGT (including gas turbine, generator, transformer, intake and exhaust) shall be 104dB(A). Such sound power level requirement shall be included in the HK Electric's Contract Specification for this Project. Therefore, such sound power level requirement has been adopted in the quantitative operational noise assessment for the OCGTs as presented in **Appendix 4C**. As the OCGTs may operate any time of a day, noise impact due to operation of the OCGTs during daytime/ evening period and night-time period has been assessed.

4.6 Evaluation of Impact

4.6.1 Demolition and Construction Phases

As no NSRs were identified within 300m from the Project site boundary and that the nearest representative NSR with possible direct line of sight is located approximately 1.45km away from the Project site, adverse noise impact due to the demolition and construction activities is not anticipated.

4.6.2 Operation Phase

The predicted noise levels at the representative NSR N2 due to operation of the OCGTs are summarised in **Table 4.7**. Detailed calculation of predicted noise levels are presented in **Appendix 4D**.

Table 4.7 Predicted Noise Level at the Representative NSR N2

NSR ID	Predicted Noise Level, dB(A)		Noise Criteria, dB(A) ^(b)		Compliance (Yes/No)	
	D ^(a)	N ^(a)	D	N	D	N
N2	37	37	53	45	Yes	Yes

Notes:

(a) D: Daytime and Evening, 0700-2300 hours, N: Night, 2300-0700 hours.

(b) Please refer to **Table 4.6**.

Based on the plant inventory presented in **Appendix 4C**, results of the quantitative noise assessment due to operation of the OCGTs indicate that the predicted noise levels at 1m from the façade of the NSR N2 comply with the respective noise criteria during daytime and night-time periods. Therefore, adverse noise impact due to operation of the OCGTs is not anticipated.

4.7 Mitigation Measures

4.7.1 Demolition and Construction Phases

In view of the insignificant noise impact arising from the Project, no mitigation measures are required for the demolition and construction phases. However, the following good site practices should be followed:

- Machines and construction plant that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; and
- Only well-maintained construction plant should be operated on-site and should be serviced regularly.

4.7.2 Operation Phase

The predicted noise levels based on a conservative quantitative assessment at the representative NSR N2 due to the operation of the OCGTs are well below the daytime and night time criteria as a result of the considerable separation distance between NSR N2 and the OCGTs. Therefore, no mitigation measures are required during the operation phase.

4.8 Cumulative Impact

At present, the known projects that are existing, committed and planned to be constructed and operated in the vicinity of the Project site have been considered when assessing the cumulative noise impact. The projects that may pose cumulative noise impact include the *Hong Kong Offshore LNG Terminal*, *1,800 MW Gas-fired Power Station at Lamma Extension*, *Lamma Power Station – Unit L2 Flue Gas Desulphurization Plant Retrofit Project*, *Lamma Power Station Units L4 & L5 Flue Gas Desulphurization Plant Retrofit Project* and *Improvement Dredging for Lamma Power Station Navigation Channel*.

4.8.1 Demolition and Construction Phases

According to the latest construction programme for Hong Kong Offshore LNG Terminal, the construction of Gas Receiving Station (GRS) at LPS will be completed tentatively by first quarter of 2022 before this Project commences. Therefore, cumulative noise impact from the Hong Kong Offshore LNG Terminal is not expected.

Unit L9 and L10 are currently under operation while L11 and L12 are currently under construction at LPS. In accordance with the EIA Report for *1,800 MW Gas-fired Power Station at Lamma Extension* (AEIAR-010/1999), the predicted maximum noise levels due to the construction works are 55dB(A) at NSR N1 and 62dB(A) at Hung Shing Yeh near NSR N2, which are well below noise criterion of 75dB(A).

Improvement dredging for the LPS navigation channel during construction phase is currently ongoing. In accordance with the EIA for *Improvement Dredging for Lamma Power Station Navigation Channel* (AEIAR-212/2017), the predicted maximum noise levels due to construction of the project during daytime period are 67dB(A) and 64dB(A) at NSRs N1 and N2, respectively, which are also well below the construction noise criterion of 75dB(A).

Adverse cumulative noise impact from the abovementioned projects is not expected during the demolition and construction phases of the Project.

4.8.2 Operation Phase

In accordance with AEIAR-010/1999, *Lamma Power Station – Unit L2 Flue Gas Desulphurization Plant Retrofit Project (DIR-153/2007)* and *Lamma Power Station Units L4 & L5 Flue Gas Desulphurization Plant Retrofit Project (AEIAR-098/2006)*, the predicted maximum noise levels at Hung Shing Ye near NSR N2 due to operation of existing units at LPS and proposed units at LPS Extension Site are 55dB(A) in summer and 52dB(A) in winter during daytime period, and 50dB(A) in both summer and winter during night-time period.

In accordance with the EIA Report for *Hong Kong Offshore LNG Terminal* (AEIAR-218/2018), the predicted maximum noise level due to operation of the Gas Receiving Station (GRS) at LPS is 44 dB(A) at NSR N2 during both daytime and night-time periods.

Therefore, with a predicted noise level of 37dB(A) at NSR N2 as presented in **Table 4.7**, the operation of the new OCGTs will have insignificant contribution to the cumulative operational noise impact. Adverse cumulative noise impact arising from the operation of the Project is not anticipated.

4.9 Residual Impact

No adverse residual noise impact is anticipated from the demolition/ construction or operation of the Project.

4.10 Environmental Monitoring and Audit

4.10.1 Demolition and Construction Phases

No adverse noise impact is anticipated to arise from the demolition and construction works of the Project and thus noise monitoring is considered not necessary. However, it is recommended to carry out regular environmental site inspections to ensure the implementation of the good site practices as recommended in **Section 4.7.1** throughout the demolition and construction phases.

4.10.2 Operation Phase

Adverse noise impact is not anticipated during the operation of the Project. Environmental monitoring and audit related to noise during the operation phase is considered not necessary.

4.11 Conclusion

No existing or planned NSR was identified within 300m from the Project site boundary and representative NSRs with possible direct line of sight to the Project is located at least 1.45km away from the Project site. Therefore, unacceptable noise impact associated with the demolition and construction of the Project is not anticipated.

Predicted noise levels at NSR N2 due to the operation of the OCGTs indicated full compliance with the relevant operational noise criteria during both daytime and night-time periods. Therefore, unacceptable noise impact arising from the operation of the Project is not anticipated.

Mitigation measures are not required in meeting the requirements of *Section 6 of Annex 13* of the *EIAO-TM*. Noise monitoring is also considered not necessary during both the demolition/ construction and operation phases of the Project.

Legend

- Noise Sensitive Receiver
- 300m Assessment Area
- Project Site

NSR ID	Description
N1	Village House at Tai Shan Central
N2	Village House at Hung Shing Yeh

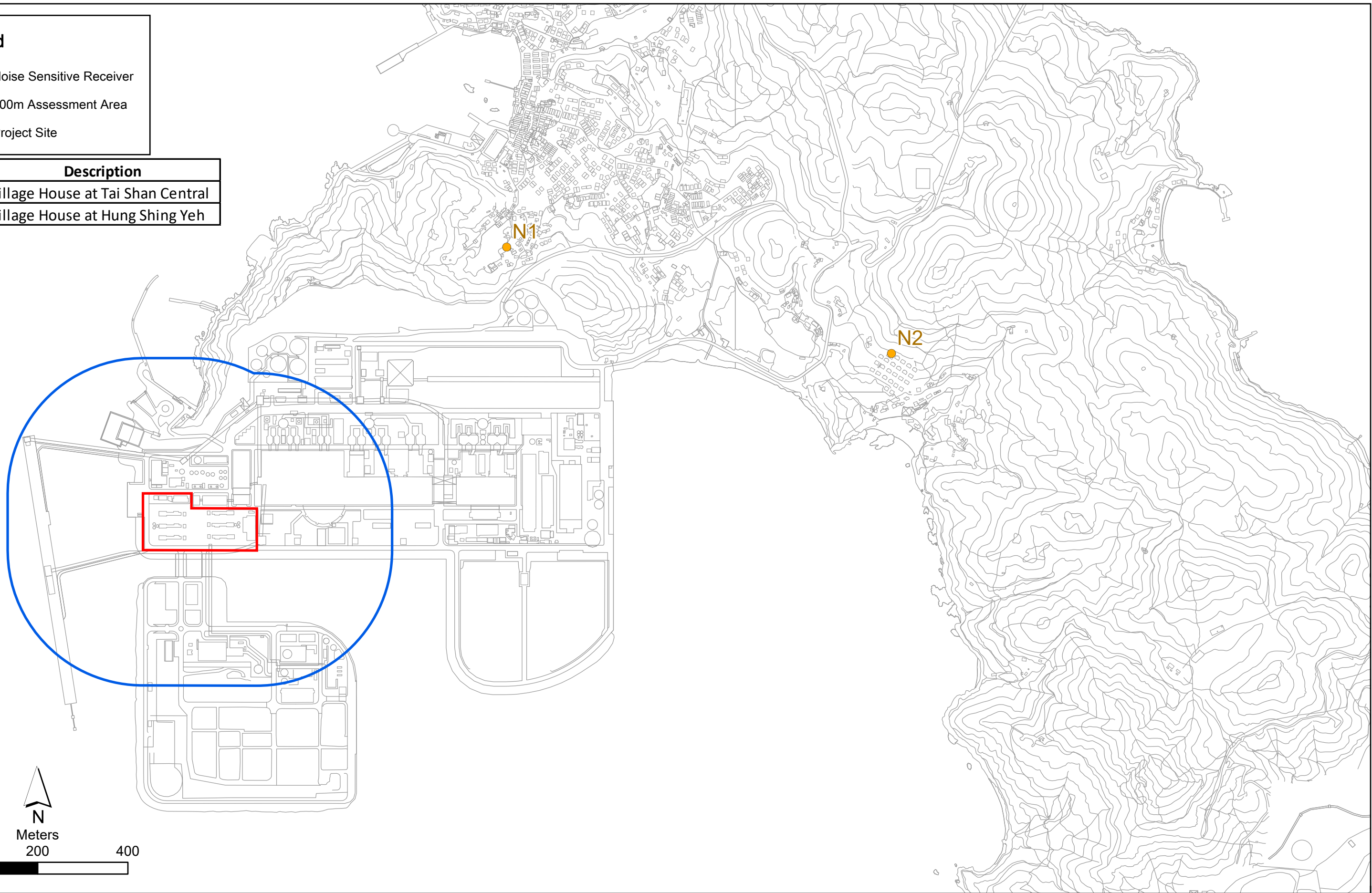
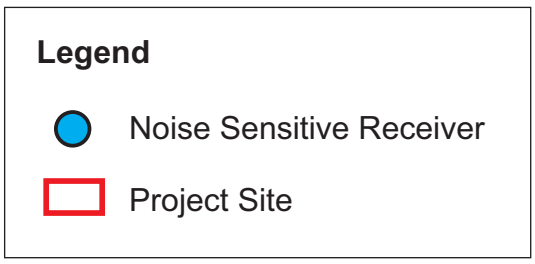
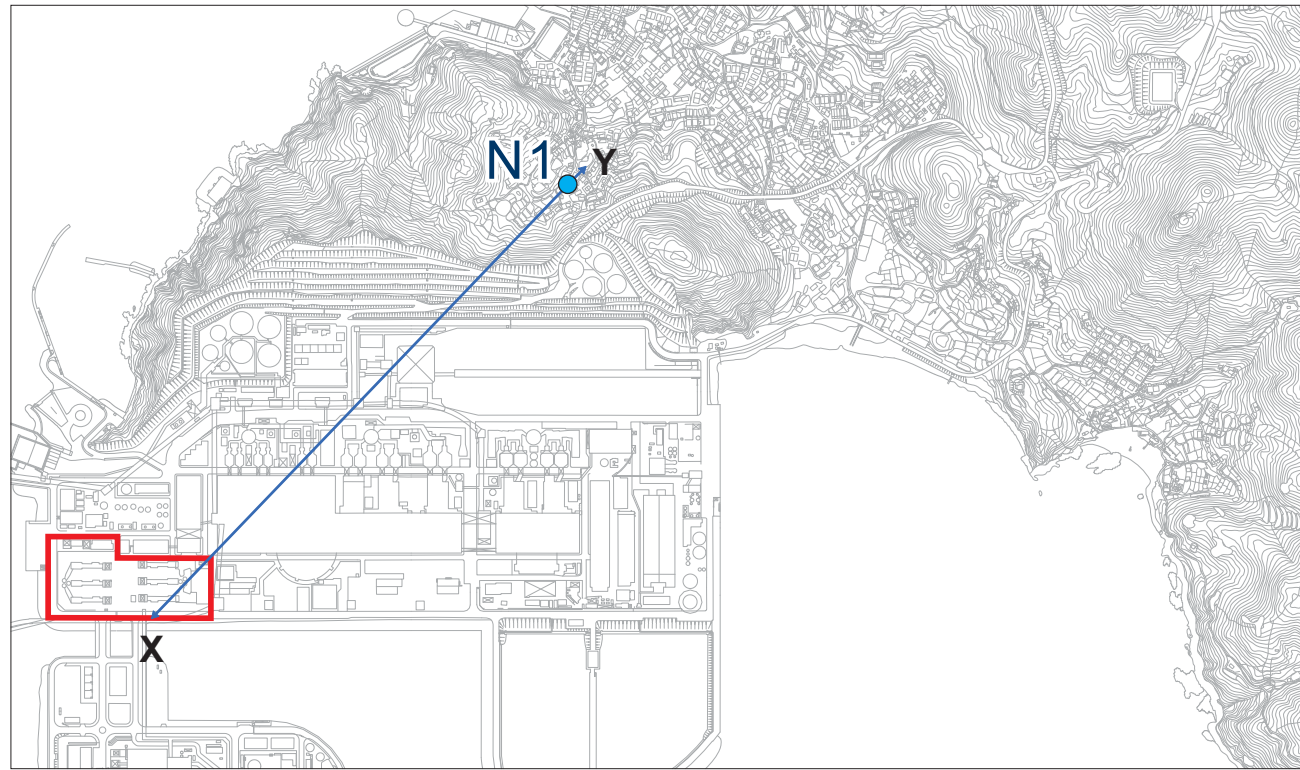


Figure 4.1

Locations of Noise Sensitive Receivers



Cross Section

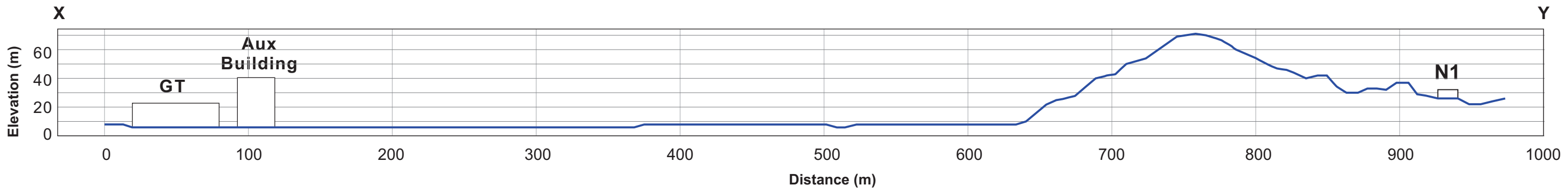


Figure 4.2

Section Plan of Lamma Power Station and NSR N1

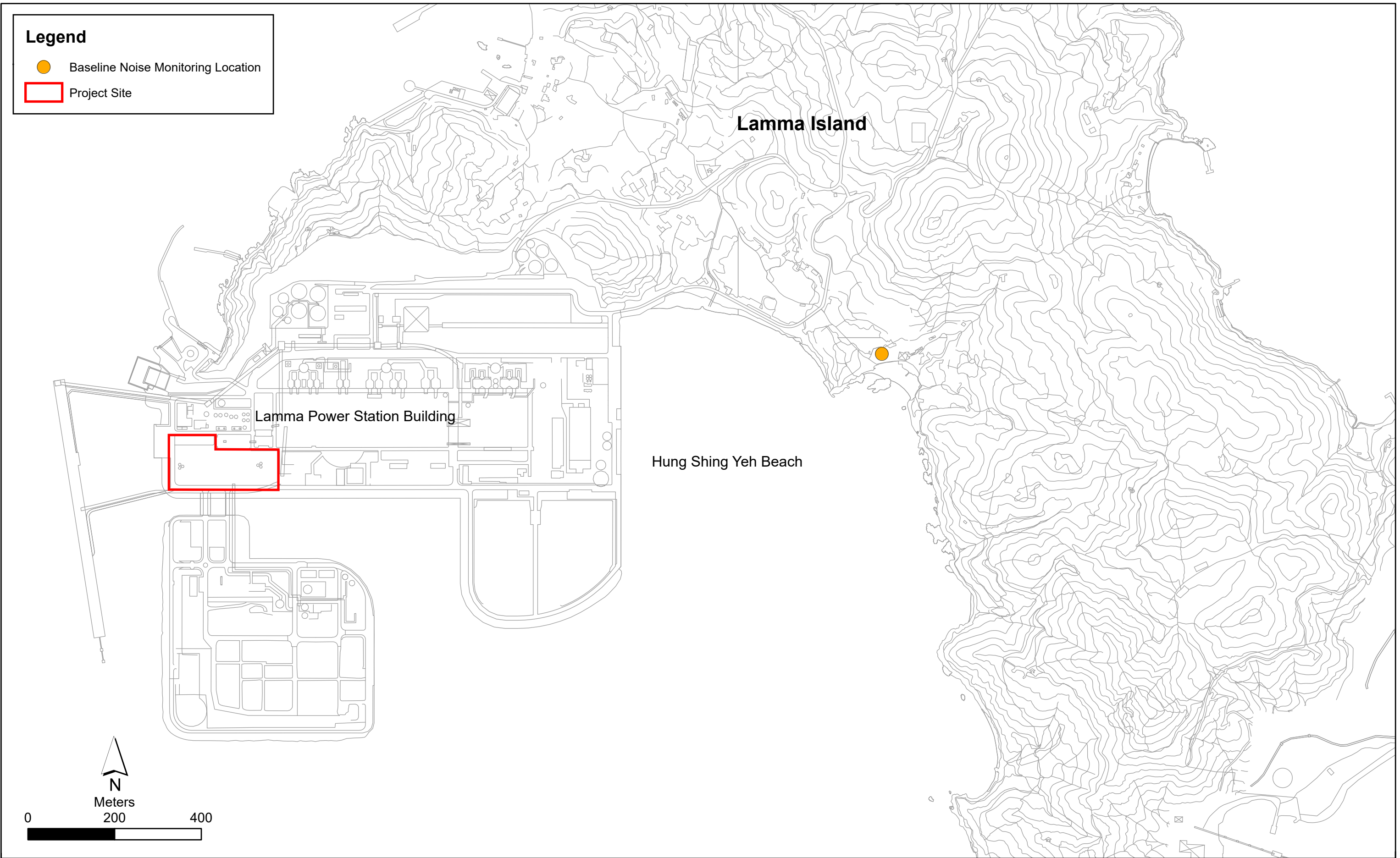


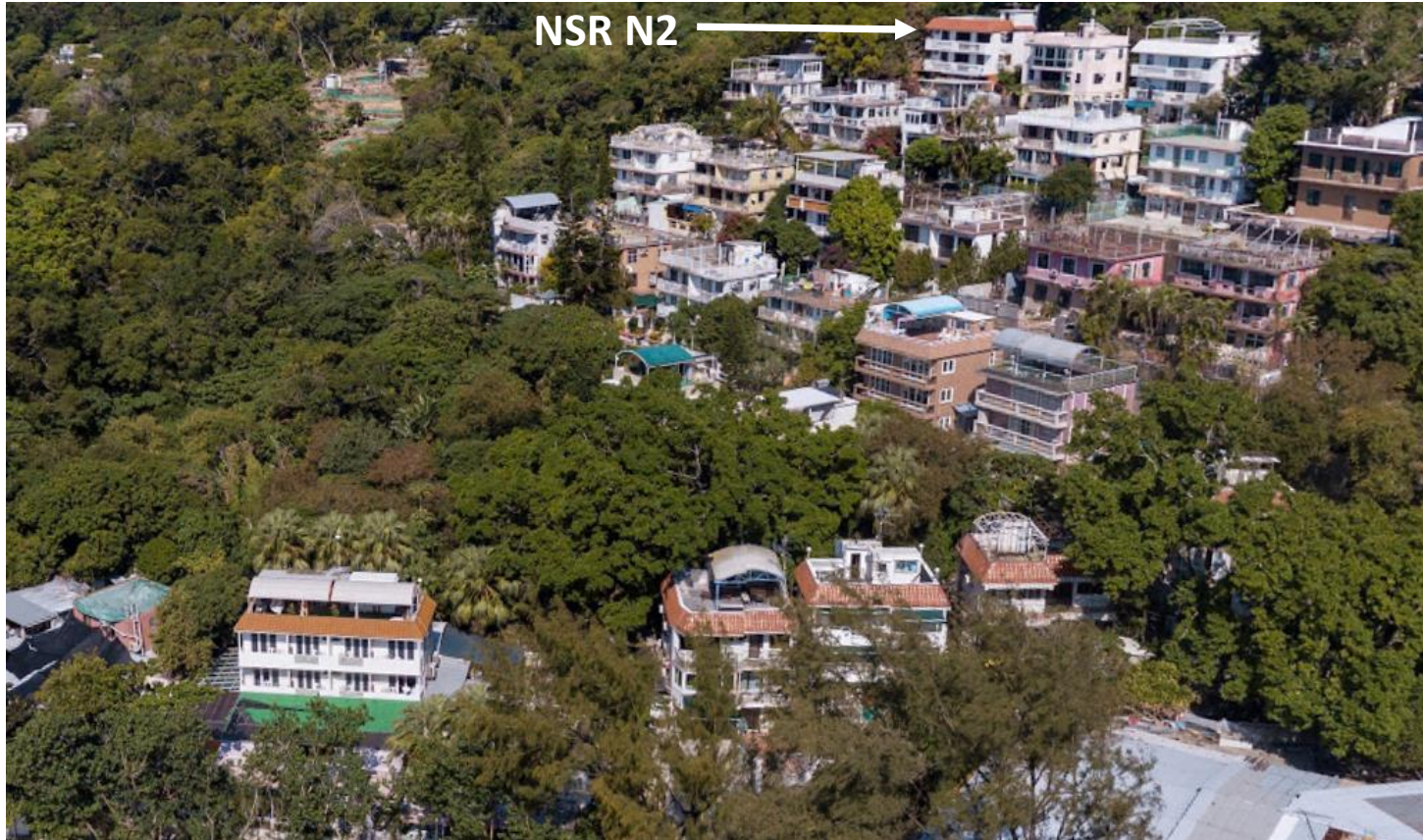
Figure 4.3

Baseline Noise Monitoring Location

**APPENDIX 4A PHOTOGRAPH OF REPRESENTATIVE NOISE SENSITIVE
RECEIVERS (NSRS)**



NSR N1 (Village House at Tai Shan Central)



NSR N2 (Village House at Hung Shing Yeh)

Note:

(a) Photograph of NSR N2 is extracted from Google



New OCGTs behind
Existing Buildings of LPS

APPENDIX 4B DETAILS OF BACKGROUND NOISE MEASUREMENT

Appendix 4B - Detailed Noise Measurement Results

Noise Monitoring Field Record Sheet

Project Name / GMS No.:	0576490 HKE LPS OCGT EIA
Date of Monitoring:	14 - 15 Decmeber 2020 and 28 - 29 May 2021
Measurement Location	Concerto Inn (near NSR N2)
Noise Monitoring Staff:	Pako Yu
Temperature:	22 °C (14-15 Dec 2020)/ 33 °C (28-29 May 2021)
Wind Speed:	<5 m/s
Noise Meter Model / Identification:	Rion NL-52/01298719
Calibrator Model / Identification:	01dB-Stell CAL21/34113606(2011)
Calibration Level before Measurement (dB(A)):	94.0
Calibration Level after Measurement (dB(A)):	94.0

Background Noise Measurement Results (dB(A)):

Date	Time	$L_{eq(30min)}$, dB(A)	$L_{max(30min)}$, dB(A)	$L_{min(30min)}$, dB(A)	$L_{10(30min)}$, dB(A)	$L_{90, 30min}$ (dB(A))	Averaged $L_{90(30min)}$, dB(A)
Daytime & Evening Period							
14/12/2020	22:00-22:30	56.3	69.6	51.7	58.8	53.6	52.6
14/12/2020	22:30-23:00	55.9	68.7	52.0	58.5	53.5	
28/05/2021	22:00-22:30	53.6	72.1	49.9	55.5	51.6	
28/05/2021	22:30-23:00	52.9	60.1	48.5	54.8	51.2	
Night-time Period							
15/12/2020	02:00-02:30	55.7	75.3	51.2	59.1	53.0	51.6
15/12/2020	02:30-03:00	55.0	74.0	51.3	57.6	52.7	
29/05/2021	02:00-02:30	51.4	56.6	47.2	53.1	49.7	
29/05/2021	02:30-03:00	51.2	58.7	46.9	52.9	49.8	

Notes:

- (a) The instruments used for the noise measurements comply with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1).
- (b) The background noise environment is mainly dominant by sea waves.



Concerto Inn – near N2

APPENDIX 4C OPERATION PLANT INVENTORY

Appendix 4C - Operation Plant Inventory

Description	Operating Hours ⁽²⁾	Total SWL, dB(A) ⁽¹⁾
OCGT Unit 8 at LPS	Intermittent	104
OCGT Unit 9 at LPS	Intermittent	104
OCGT Unit 10 at LPS	Intermittent	104
OCGT Unit 11 at LPS	Intermittent	104

Notes:

(1) Each new set of OCGT comprises of gas turbine, generator, transformer, intake and exhaust as confirmed by HK Electric. As advised by HK Electric, the maximum sound power level (SWL) of each new set of OCGT is 104dB(A) which will be included as a contractual requirement for this Project.

(2) The OCGTs will only be operated intermittently during peak-opping and emergency situations. Operation may occur any time within a day.

APPENDIX 4D OPERATIONAL NOISE IMPACT ASSESSMENT

Appendix 4D - Operational Noise Assessment

Calculation of Noise Levels at N2

Plant Item	Max. SWL, dB(A)	Distance between Source and NSR ⁽²⁾	Correction, dB(A)				CNL of individual PME, dB(A)	Overall CNL, dB(A) ⁽¹⁾	Daytime Criteria, dB(A)	Compliance	Night-time Criteria, dB(A)	Compliance
			Cdist	Barrier ⁽³⁾	Atm ⁽⁴⁾	Façade						
OCGT Unit 8 at LPS	104	1567	-72	0	-4.4	3	31	37	53	Yes	45	Yes
OCGT Unit 9 at LPS	104	1561	-72	0	-4.4	3	31					
OCGT Unit 10 at LPS	104	1554	-72	0	-4.4	3	31					
OCGT Unit 11 at LPS	104	1621	-72	0	-4.5	3	30					

Remarks:

1) Corrected Noise Level (CNL) = Max. SWL + distance correction + barrier correction + atmospheric absorption + façade correction

2) Distance adopted is the horizontal distance between the source and NSR as a worst case assessment.

3) If noise totally screened by any structure such that none of the fixed plant noise sources will be visible from the NSR, a negative correction factor of 10 dB(A) would be applied in the assessment. As the fixed plant noise sources from OCGTs are only partially screened for NSR N2, 0dB(A) was assumed in the assessment as a worst case.

4) Correction for sound absorption by the atmosphere (assumed at 500 Hz, 20°C, RH 70%) has been accounted for in accordance with ISO 9613-1 Acoustics – Attenuation of Sound During Propagation Outdoors – Part 1: Calculation of the Absorption of Sound by the Atmosphere.

Atmospheric absorption (Atm) = -2.8dB(A) x D/1000m, where D = Distance between Source and NSR