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Environmental Impact Assessment Study for Construction of Helipads at Peng Chau and Yung Shue Wan, Lamma Island
興建坪洲直升機升降坪及南丫島榕樹灣直升機升降坪環境影響評估研究

Helipad at Yung Shue Wan, Lamma Island
南丫島榕樹灣直升機升降坪

Executive Summary
行政摘要

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1 PROJECT HISTORY AND SITE SELECTION

1.1 General

1.1.1 In August 2002 BMT Asia Pacific Limited (BMT) was awarded the contract for Agreement No. CE 18/2002: *Environmental Impact Assessment Study for Construction of Helipads at Peng Chau and Lamma Island / Investigation* by the Civil Engineering Office, Civil Engineering and Development Department (CEDD).

1.1.2 The Agreement requires the completion of Environmental Impact Assessment (EIA) studies for the construction and operation of two proposed permanent helipads: one at Peng Chau and one Yung Shue Wan, Lamma Island. This report is the Executive Summary for the proposed Yung Shue Wan Helipad.

1.2 Project Background

1.2.1 The Project is 'designated' under Item B.2, Schedule 2 of the *EIA Ordinance* (EIAO) by virtue of being: "*A helipad within 300m of existing or planned residential development*". Accordingly, an Environmental Permit is required for the Project.

1.2.2 The Project is required solely by the Government Flying Service (GFS) for transporting North Lamma residents to urban areas for medical treatment in emergency situations, and is not for commercial use.

1.2.3 The previous Yung Shue Wan helipad ceased operation in May 1998 as it was in a congested area without clear approach and departure paths. Since this time there has been no permanent, dedicated helipad serving the local community. The community was until recently using the helipad at The Hongkong Electric Co. (HEC) Ltd's Lamma Power Station – a distance of 2.75 km and a typical trip time of around 20 minutes by mini-ambulance from the North Lamma Clinic. As a more acceptable interim measure, the Home Affairs Department (HAD) commissioned the development of a temporary helipad that been in operation at Yung Shue Wan since October 2003, pending the construction of a permanent helipad to serve the local community.

1.3 Project Characteristics and Site Location

1.3.1 The Project will be constructed by small diameter pre-bored piling in coastal waters at Kam Lo Hom (North), Yung Shue Wan [*Figure 1.1*]. The helipad deck will be located approximately 25 metres from the existing formed land, and an extension to the existing Emergency Vehicular Access (EVA) will be constructed to link with the proposed helipad.

1.3.2 The Project location and construction method were selected as the preferred options after due consideration of each of 7 site options / alternatives [*Figure 1.2*]. *Table 1.1* presents a summary of the helicopter site option evaluation. The construction programme can be broadly summarised as presented by *Table 1.2.*

Table 1.2 Summary of Yung Shue Wan Helipad Construction Programme

Construction Activity	Construction Period
Site Clearance	16-May-2006 to 22-Jul-2006
Mobilisation	24-May-2006 to 16-Aug-2006
Pile Installation	17-Aug-2006 to 27-Jan-2007
Helipad Construction	29-Jan-2007 to 22-Jun-2007
E&M Works	30-May-2007 to 5-Jul-2007
Demobilisation	6-Jul-2007 to 30-Jul-2007

1.3.3 Key Project details include: piling of approximately twenty-six piles 610 mm in diameter; and construction of a 25 metres long and 3.5 metres wide EVA; and a 25-metre diameter helipad. *Figure 1.3* presents two views of the proposed Yung Shue Wan helipad.

1.4 Design Refinements

1.4.1 Measures incorporated into the project design to avoid / reduce environmental impacts include construction by small diameter pre-bored piling, as opposed to dredging and reclamation, which practically eliminates concerns over potential waste management, water quality and marine ecology impacts; and reducing the width of the EVA from the standard 4.5m to 3.5m, with the effect that construction material requirements for the Project will be minimised.

1.4.2 As regards the operational project, helicopter noise is the main concern and in this regard the preferred site is relatively remote from the built environment yet still readily accessible from the local Clinic, while the angle of the helicopter flight path has been refined to avoid residual noise impacts on residences.

1.5 Cumulative Effects

1.5.1 One project identified in the vicinity that may contribute to cumulative effects is the construction of Drainage Services Department's *Yung Shue Wan Sewage Treatment Works* (STW), due to commence in August 2007 for a 3-year construction period. However, if the proposed helipad is still being constructed at the time that the STW construction commences, the existing temporary helipad will need to move back to the Lamma Power Station, and this will cause a delay in emergency service. As such, CEDD and DSD have agreed to avoid overlapping these two projects. Therefore, there would unlikely be any cumulative construction impacts.

1.5.2 According to the latest available programme, the *Phase 2 Yung Shue Wan Development Engineering Works* will commence in Year 2008 and have no potential cumulative effects. Maintenance dredging for the *HEC Lamma Power Station Navigation Channel Improvement* was completed in early 2004, while marine works for *HEC's Lamma Power Station Extension Works* were complete in 2003 prior to dredging for the navigation channel improvement.

Table 1.1 Summary Matrix for Evaluation of Helipad Site Options & Alternatives

Option / Alternative	Location *	Key Environmental Benefit(s)	Key Environmental Dis-benefit(s)	Other Key Considerations (e.g., safety & access)	Conclusion
A	Yung Shue Wan North	• No key environmental benefits.	• Residual helicopter noise impacts from approach / departure to and from the helipad (i.e., *flight path* noise).† • Residual helicopter noise impacts from helicopter *manoeuvring* at the helipad.‡ • Construction noise impact.	• Helicopter flight safety concerns due to proximity to built-up area in Yung Shue Wan. • Potential limitations on land accessibility from Clinic due to the narrow and sometimes busy Yung Shue Wan Main Street.	Unacceptable in terms of flight safety and residual helicopter noise impacts.
B1	Kam Lo Hom North	• No significant construction phase impacts (noise assessment in Section 3). • No helicopter *flight path* noise impact (Section 4 refers).	• Helicopter *manoeuvring* noise impact (Section 4 refers).	• Joint-closest to the Clinic (i.e., highly accessible).	Residual helicopter *manoeuvring* noise impact, but no construction or access concerns.
B2	Kam Lo Hom North (EVA Extension)	• No helicopter *flight path* or *manoeuvring* noise impacts due to remote site location.	• Potentially significant visual impact from 270m long marine EVA.	• Easy access from Clinic. • Marine safety risk (vessel collision) concerns due to EVA length.	Residual helicopter noise impacts unlikely to be significant, but unacceptable marine risk concerns.
C	Kam Lo Hom (South)	• No significant construction phase impacts (land already formed). • No helicopter *flight path* or *manoeuvring* noise impacts due to remote site location.	• No key environmental dis-benefits.	• Joint-closest to the Clinic (i.e., highly accessible). • Land required for proposed Sewage Treatment Works (STW).	Residual helicopter noise impacts unlikely to be significant, but site required for proposed STW development.

* Figure 1.2 refers.

† Flight Path noise is the noise from the helicopter while in flight approaching to or departing from the helipad.

‡ Manoeuvring noise is the noise from the helicopter while manoeuvring on or directly over the helipad.

Option / Alternative	Location *	Key Environmental Benefit(s)	Key Environmental Dis-benefit(s)	Other Key Considerations (e.g., safety & access)	Conclusion
D	Ferry Pier	• No key environmental benefits.	• Helicopter *flight path* and *manoeuvring* noise impacts as close to residences. • Construction noise impacts as close to residences.	• Marine vessels by the ferry pier may infringe upon safe helicopter access / egress. • Potential limitations on land accessibility from Clinic due to the narrow and sometimes busy Yung Shue Wan Main Street.	Unacceptable in terms of flight safety and residual helicopter noise impacts.
E1	Kam Lo Hom West (Marine EVA)	• No helicopter *flight path* or *manoeuvring* noise impacts due to remote site location.	• Potential impacts on hard corals found along the sloping boulder seawall due to construction and operation of the marine EVA..	• Easy access from Clinic. • Prevents marine access to proposed STW; interferes with sewage outfall construction & maintenance.	Residual helicopter noise impacts unlikely to be significant, but unacceptable in terms of access to proposed STW and sewage outfall.
E2	Kam Lo Hom West (Land EVA)	• No helicopter *flight path* or *manoeuvring* noise impacts due to remote site location.	• Ecology impact from secondary woodland clearance.	• Easy access from Clinic.	Residual helicopter noise impacts unlikely to be significant, but unacceptable ecology impacts.

* Figure 1.2 refers.

2 CONSTRUCTION DUST

2.1.1 Through proper implementation of dust control measures as required under the *Air Pollution Control (Construction Dust) Regulation*, construction dust can be controlled to acceptable level and no significant impacts are anticipated with the implementation of standard dust control measures.

3 CONSTRUCTION NOISE

3.1.1 During the construction phase of the helipad, Powered Mechanical Equipment used for the helipad construction will be the primary noise sources. The key noise generating activities include site clearance for the erection of site office, hoarding and fencing; temporary staging construction and demolition; pile installation, and construction of the helipad and EVA.

3.1.2 The potential noise levels arising from daytime construction activities were evaluated at both existing and planned representative noise sensitive receivers (NSRs), as illustrated by *Figure 3.1*.

3.1.3 Based on the construction schedule and plant inventory given, the highest unmitigated construction noise level was 74 dB(A) at NSR4. This level is does not exceed the daytime noise standard of 75 dB(A) as stipulated in Table 1B, Annex 5 of EIAO-TM. While no mitigation measures are required, it is recommended that the Contractor adopt good working practices in order to minimise construction noise as far as possible.

3.1.4 There shall be no overlap with the construction of the proposed STW, and hence cumulative construction noise impacts are not anticipated.

4 HELICOPTER NOISE

4.1 Impact Assessment

4.1.1 The sole noise source during the operational phase of the project will be from helicopter activities. At any one time, the helipad may be used by either one of two helicopter types deployed by Government Flying Service (GFS) for emergency casualty evacuation: *Eurocopter Super Puma AS332 L2* and *Eurocopter EC155 B1*.

4.1.2 Helicopter noise will be generated when the helicopter is approaching and departing the helipad, and when it is manoeuvring on and over the helipad (i.e., hovering over the helipad; touchdown on the helipad; idling on the ground; and lift-off from the helipad surface to achieve a hover).

4.1.3 Based on the worst case scenario, the results show the highest predicted L_{max} during the *manoeuvring* mode will be at NSR4. A worst-case L_{max} of 90 dB(A) is predicted when a 'Super Puma AS332 L2' is 'hovering', while a worst-case L_{max} of 87 dB(A) is predicted when the 'EC155 B1' is in 'lift off' mode. Neither helicopter would exceed the L_{max} limit of 85 dB(A) during the 'idling' phase. The duration of residual impact during manoeuvring for both helicopter models would be very short (< 10 seconds).

4.1.4 In consultation with GFS, the angle of the flight path for the 'EC 155 B1' helicopter has been reduced to 80 degrees, whilst the flight path angle for the 'Super Puma AS332 L2' has been reduced to 70 degrees. Accordingly, with flight confined within these ranges the predicted noise levels during helicopter *approach* / *departure* are able to comply with the L_{max} 85 dB(A) limit, i.e., there is no helicopter flight path noise impact.

4.1.5 With reference to actual 'casevac' helicopter usage, and following the current trend as displayed by *Table 4.1*, GFS has agreed to give priority to the quieter 'EC155 B1' type helicopter whenever possible. Use of the 'Super Puma AS332 L2' will be restricted to special emergency situations only when a larger capacity helicopter is required. As such, under normal operation there will only be a minor residual impact associated with manoeuvring by the 'EC155 B1'.

Table 4.1 Helicopter Use for Yung Shue Wan 'Casevac' Operations during years 2000 – 2004

Year	Total No. of Casevac from 0700 to 2200 hours[1]	Total No. of Casevac from 2200 – 0700 hours[2]	No. of Casevac Training Flights[3]
2000	51 (1)	30	3
2001	69 (7)	39	4
2002	104 (13)	37	6
2003	92 (7)	34	5
2004	66 (1)	29	4

Notes:

1. *The figures in brackets ( ) are the number of casevac flights carried out by Super Puma (or Sikorsky prior to 2004).*
2. *Since 2003, all nighttime casevac has been undertaken using the EC155 B1 type helicopter only, although for the purpose of this noise impact assessment it cannot be discounted that the Super Puma may be required for nighttime casevac in future years.*
3. *Five 'casevac' training flights were conducted to the Yung Shue Wan helipad in 2003 (i.e., an additional 4% of the total casevac flights). As no such data is available for other years, the number of casevac training flights for 2000-2002 and 2004 have been calculated using the same % contribution. It should be noted that GFS does not anticipate any increase in training flights in the short to medium term as the helicopter fleet was upgraded in 2001/02 and there are no plans to add additional types of helicopters.*

4.2 Impact Mitigation Assessment

4.2.1 Realignment of the helicopter has enabled the avoidance of residual helicopter *approach / departure* noise impacts on approximately 420 dwellings from operation of the 'EC155 B1' type helicopter, and approximately 300 dwellings from operation of the 'Super Puma' type helicopter [*Figure 4.1*].

4.2.2 However, as noise levels from helicopter *manoeuvring* were predicted to exceed the L_{max} 85 dB(A) limit at some NSRs for both helicopter types, the feasibility of adopting various mitigation measures was investigated.

4.2.3 The option of further extending the EVA to locate the helipad further offshore and further from the built environment was considered, however the EVA would need to be extended by approximately 270 metres for manoeuvring noise levels from both helicopter types to comply with the 85 dB(A) limit [*Figure 1.2*; '*Alternative B2*']. As advised by the Marine Department, such as scenario was not preferred as the extension would reduce the area of navigable water between the '*Alternative B2*' site and the existing ferry pier, and thereby increase the proximity of marine traffic in those waters and hence increase the risk of vessel collision. The Marine Department is also of the view that in order to minimise the traffic risk the proposed helipad location should not be extended any further offshore from the proposed '*Alternative B1*' location.

4.2.4 Consideration was given to relocating the helipad approximately 150m further to the southwest [*Figure 1.2*; '*Alternative E1*'] to eliminate residual helicopter noise impacts. However, such relocation via a marine EVA would place the EVA across the proposed marine outfall from the proposed Yung Shue Wan Sewage Treatment Works [*Figure 1.2* refers]. Such an arrangement is not supported by the Drainage Services Department, as it would impede outfall construction and maintenance. A land-based EVA [*Figure 1.2*; '*Alternative E2*'] would encroach on undisturbed woodland at the foot of Kam Lo Hom and would require tree feeling and land clearance, and such a scenario is not supported by the Agriculture, Fisheries & Conservation Department in terms of ecology / nature conservation.

4.2.5 In the case of the Yung Shue Wan helipad, physical structures such as noise barriers / enclosures cannot be constructed to provide effective noise shielding of the helicopter noise. This is because the noise is airborne (at an elevation of approximately 17 mPD) and will be emitted when the helicopter is at a linear distance of approximately 30 metres from the helipad. Constructing a noise barrier / enclosure to shield the anticipated helicopter noise is not practicable in terms of both engineering and flight safety.

4.2.6 Finally, consideration was given to the application of indirect mitigation measures that would require installation of acoustic insulation into all NSRs at which the predicted L_{max} exceeds 85 dB(A). Effective indirect mitigation would require that NSR occupants comply with a 'closed-window' living environment during helicopter manoeuvring. However, it was considered that such measures would not be effective as occupants would receive no prior notice of an impending helicopter arrival, and because the noise impact duration would be so short (< 10 seconds) the impact event would be over by the time a response could be made.

4.3 Evaluation of Residual Helicopter Noise Impacts

4.3.1 Based on GFS data for the year 2000 - 2004, after taking into account all the practicable direct mitigation measures the residual impact from an 'EC155 B1' type helicopter would involve a 1-2 dB(A) exceedance of the 85 dB(A) limit approximately every 2.8 days. It is estimated that approximately 75 dwellings within 276 metres, and with a direct line of sight, of the helipad would be affected during 'lift-off' of the 'EC155 B1' type helicopter. The residual impact from the 'Super Puma AS332 L2' type helicopter would involve a 3-5 dB(A) exceedance of the 85 dB(A) limit approximately every 24.3 days, affecting approximately 360 dwellings within the affected area of 386 metres from the helipad [*Figure 4.2*].

4.3.2 For both helicopter types the impact duration would last for 5-10 seconds per event, and the predicted magnitude, frequency and duration of residual impacts would not give rise to serious long-term environmental implications.

4.3.3 Residual noise may be audible during night-time from 7pm to 7am. Following research undertaken to identify a suitable local or international standard to govern helicopter noise at night, it was identified that most literature on aircraft noise concerns relates to *commercial* airplane and helicopter noise. However, during the public consultation exercise for the United States of America Federal Aviation Agency Hearings on [Non-military Helicopter Noise], there was a wide consensus among parties consulted that noise from emergency medical helicopter service is a tolerable necessity.

4.3.4 There is no standard on emergency helicopter noise at night, although under the Civil Aviation (Aircraft Noise) Ordinance (Cap 312) administrative means can be used to reduce the noise impact of helipad operations on NSRs. However, restrictions on the number of helicopter flights during night time or restrictions on helipad operating hours are not practicable as the use concerned is for emergency service which will be on an as needed basis that cannot be controlled.

4.3.5 The best helicopter route over the least densely populated areas will be used for the proposed new helipad. Considering that the helipad is for emergency service and this is a tolerable necessity, the construction of the helipad at the proposed location would therefore be acceptable.

4.3.6 In addition, GFS has agreed to avoid the use of the 'Super Puma AS332 L2' type helicopter whenever practicable, although should the need arise, the local community may lodge noise complaints with the Islands District Office by the following means: (Fax) 2815 2291; (e-mail) dois@had.gov.hk; or (Post) Islands District Office, Harbour Building, 20th Floor, 38 Pier road, Central.

5 WASTE MANAGEMENT

5.1 Construction Phase

5.1.1 The waste management assessment analysed the type of activities associated with the construction of the helipad and the likely types of waste to be generated in order to outline measures to minimize impacts to the surrounding environment and where possible to minimize generation in the first place.

5.1.2 The waste volumes generated from Project construction will be small, with approximately 200m^3 of uncontaminated silty-mud excavated from within the mini-bored pile casings between August 2006 and January 2007 likely to be transported by barge for marine disposal at the South Cheung Chau Spoil Disposal Area. There will also be approximately 80m^3 of construction waste, 480 litres / month of chemical waste and 127 kg/week of general refuse generated throughout the construction period.

5.1.3 Through good practice and the mitigation measures that have been proposed for ensuring proper handling, storage, transportation and disposal of various types of waste / materials throughout the construction phase, no significant adverse impacts from waste management are anticipated.

5.2 Operational Phase

5.2.1 Organic (vegetation) waste is anticipated to be the only form of waste generated due to the operation of the helipad (from intermittent maintenance works). However, the volume of such waste is expected to be negligible, and no adverse environmental impacts are anticipated during the operational phase.

6 WATER QUALITY

6.1 Construction Phase

6.1.1 The helipad and access link will be built using small diameter pre-bored piles, and there will be no dredging or reclamation works. Piling may cause some localised disturbance to the seabed sediment in the immediate vicinity of the works, although there will be no significant water quality impacts. A silt curtain shall be implemented as good practice measures.

6.2 Operational Phase

6.2.1 Hydrodynamic effects of the constructed Project will be negligible, while there will be no operational discharges that could potentially translate into impacts on the marine environment.

7 ECOLOGY

7.1 Construction Phase

7.1.1 As the Project is of a small scale and is to be constructed by small diameter pre-bored piling, it will not result in any significant sub-tidal habitat loss, while there will be no loss at all of either inter-tidal or terrestrial habitat. The area of sub-tidal habitat permanently lost will be limited to the cumulative footprint area of the piles that support the access road link and the helipad – approximately 16 m^2.

7.1.2 As determined through the water quality impact assessment, no significant water quality-induced ecological impacts are anticipated given the construction method, small scale of works and the weak tidal circulation around Yung Shue Wan that will promote rapid re-settlement of marine sediment. Furthermore, there is not anticipated to be any impact on the hard coral community identified along the artificial boulder seawall from pile installation provided good working practices are followed.

7.1.3 Accordingly, no specific mitigation measures are necessary, although the use of a silt curtain and other good practice measures to further minimize the potential for water quality-induced ecological impacts have been recommended. The good practice measures include, for example, locating materials storage areas well away from the seawall, and ensuring the seal of the excavator used to remove sediment from within the bored pile casings is tightly closed to prevent 'leakage'.

7.1.4 No terrestrial ecology impacts are anticipated given the construction method and distance to sensitive receivers.

7.2 Operational Phase

7.2.1 While the operational helipad will be a source of noise when in use that has the potential to disturb birds, and potentially affect butterflies through air turbulence, the helipad will be located approximately 50 metres from the nearest vegetated habitat where wildlife observations were made. Furthermore, the absence of suitable shoreline in the vicinity of the Project area means that bird activity is very limited, and no observations were made of birds on the artificial sloping seawall or on the rocky shore to the west of the Project. Birds observed around Yung Shue Wan to the east and southeast would be able to freely move inshore (within the bay) if disturbed by helicopter noise. As such, no significant ecological impacts are anticipated during the operational phase of the Project.

8 CULTURAL HERITAGE

8.1 Construction Phase

8.1.1 Marine geophysical survey identified three 'items' of potential marine archaeological value. However, further evaluation concluded that all three items were associated with recent dredging for the seawall construction: (1) a drag mark associated with the dredged channel, (2) sediment deposits or a local depression from past dredging, and (3) either sediment deposits or a local depression from past dredging, and / or boulders. The potential for submerged cultural remains in the vicinity of this dredged area is minimal, and no further field investigation was deemed necessary.

8.1.2 Evaluation of terrestrial cultural heritage in and around the study area at Yung Shue Wan revealed no archaeological sites, historic buildings or structures that could be impacted by the helipad development.

8.2 Operational Phase

8.2.1 The operational phase will not give rise to any cultural heritage impacts.

9 CONCLUSION

9.1.1 The Project involves the construction and operation of a permanent helipad at Kam Lo Hom (North), Yung Shue Wan and is required mainly for transporting North Lamma residents to urban areas for medical treatment in emergency situations. Residents until recently had to 2.75 km (or 20 minutes journey time) from the North Lamma Clinic to use the helipad at HEC's Lamma Power Station, although a temporary helipad now operates adjacent to the proposed permanent site as an interim measure.

9.1.2 The Project will be constructed by small diameter pre-bored piling, with the effect that material and waste handling requirements are minimised. There will also be only highly localised and insignificant water quality and aquatic ecology impacts. No dust or noise impacts are anticipated during the construction phase, and no impacts on cultural heritage are anticipated.

9.1.3 Helicopter noise is the main operational concern. Of all 7 sites considered, the proposed one is optimally located in terms of accessibility from the local Clinic, avoidance of emergency vehicle travel through the built environment and the speed by which the permanent helipad can be developed and made available to the local community. The helicopter flight path has been refined to avoid flight path noise impacts on residences.

9.1.4 A residual helicopter noise impact is predicted during manoeuvring at the helipad, although under normal operating conditions the impact level is predicted to be 1-2 dB(A), occurring approximately every 2.8 days. The impact duration would last for less than 10 seconds per event, and the predicted magnitude, frequency and duration of residual impacts would not give rise to serious long-term environmental implications.

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1 工程歷史和選址

1.1 簡介

1.1.1 香港特別行政區政府土木工程拓展署於 2002 年 8 月委托環科顧問有限公司爲興建坪洲直升機升降坪及南丫島直升機升降坪進行環境影響評估（合約編號 CE18/2002）。

1.1.2 此顧問合約包括爲兩個分別位於坪洲及南丫島榕樹灣擬建之永久直升機升降坪之建築及運作期進行環境影響評估研究（簡稱「環評」）。本報告爲南丫島榕樹灣擬建的直升機升降坪的環評研究行政摘要。

1.2 工程背景

1.2.1 根據「環境影響評估條例」附表 2 中的項目 B2，由於擬建的南丫島榕樹灣直升機升降坪位於現有或計劃中的住宅發展之 300 米範圍內，所以是項工程定爲「指定工程項目」。而亦須要爲是項工程申請環境許可証。

1.2.2 是項工程只供政府飛行服務隊使用以便在緊急情況下運載北南丫島居民往市區就醫，並不會用作商業用途。

1.2.3 由於舊有的榕樹灣直升機升降坪處於一個擠擁的位置，而且欠缺明確的起飛及降落航線，所以該直升機升降坪已於 1998 年 5 月停用。自此以後，南丫島居民便再沒有永久和專用的直升機升降坪，而只能暫用位於香港電燈有限公司南丫發電廠的直升機升降坪，該直升機升降坪與北南丫診所相距 2.75 公里，以小型救護車行走時間計算，需時約 20 分鐘才可由診所到達直升機升降坪。有見及此，民政事務總署建造了一個已於 2005 年 10 月啓用的臨時直升機升降坪，以作較爲可接受的臨時措施，並計劃爲當地居民興建一個永久直升機升降坪。

1.3 工程特點及工地位置

1.3.1 工程將在榕樹灣塘螃磡(北)的海岸水域採用小型鑽孔樁建築方法 [見插圖 1.1]。直升機升降坪將位於距離現有已平整的土地約 25 米。工程亦包括興建一條連接著現有緊急車輛通道的通道。

1.3.2 是項工程的選址和採納的建造方法，是透過「初步評估」和「價值管理」考慮了 7 個選擇而選出。表 1.1 總結直升機升降坪選址的評估。

表 1.1 直升機升降坪選址評估的總結數據表

選擇 / 其他選擇	位置*	關鍵的環境益處	關鍵的環境影響	其他重要考慮 (如安全及通道)	結論
A	榕樹灣（北）	• 並無關鍵的環境益處。	• 由直升機降落／起飛所引致的剩餘噪音影響（即飛行路線噪音）。† • 由直升機於直升機升降坪運作時所產生的剩餘噪音影響。‡ • 建築噪音影響。	• 鄰近榕樹灣人口較密集的地區而引起的直升機飛行安全問題。 • 潛在的交通問題包括通往診所的道路較窄及榕樹灣大街間中較繁忙。	在飛行安全及剩餘噪音影響的角度上不可接受。
B1	螺磡 (北)	• 在建築期間並無顯著影響。 • 並無與直升機路線相關的噪音影響。（參閱第四節）	• 直升機在操作時產生的噪音。（參閱第四節）	• 最佳通道往來診所。	有剩餘的直升機噪音影響，但在建築或通道上沒有問題。
B2	螺磡 (北) (緊急車輛通道的伸延部份)	• 沒有直升機飛行路線或直升機運作時產生的噪音影響。	• 潛在 270 米沿海的緊急車輛通道之 興建，可能引起潛在的景觀影響。	• 暢通的道路往來診所。 • 緊急車輛通道的長度會構成海事安全風險 (如船隻相撞)。	並未預期有剩餘的直升機噪音影響，但存有不可接受的海事風險問題。
C	螺磡 (南)	• 建築期間並沒有顯著影響 (因土地已被平整)。 • 沒有直升機飛行路線或直升機運作時產生的噪音影響。	• 並沒有關鍵的環境影響。	• 最佳通道往來診所。 • 擬興建的污水處理廠需要土地發展。	並沒有剩餘的直升機噪音，但擬興建的污水處理廠需土地作發展。
D	渡輪碼頭	• 並無關鍵的環境益處。	• 直升機飛行路線及直升機運作時的影響。 • 建築噪音影響。	• 渡輪碼頭的航道可能受到直升機影響。 • 潛在的交通問題，包括通往診所的道路較窄及榕樹灣大街間中較繁忙。	在飛行安全及剩餘噪音影響的角度上不可接受。
E1	螺磡 (西)	• 並無直升機飛行路線或直升機運作時產生的噪音影響。	• 因海上緊急車輛通道的建築工程及運作而對生長於海堤巨石上的硬珊	• 暢通的道路往來診所。 • 避免海上通道通往擬興建的污水處理	沒有剩餘的直升機噪音影響，但在擬興建的污水處理

* *見圖 1.2。*

† *飛行路線噪音是指由直升機降落及起飛時所產生的噪音。*

‡ *運作時所產生的噪音是指當直升機於直升機升降坪上或於其上空時運作時所產生的噪音。*

選擇 / 其他選擇	位置*	關鍵的環境益處	關鍵的環境影響	其他重要考慮 (如安全及通道)	結論
	(海上緊急車輛通道)		湖群產生潛在的影響。	廠；及影響污水渠口的建築及維修。	廠及污水渠口的道路支緩角度上，不可接受。
E2	螃磯 (西) (陸上緊急車輛通道)	• 並無直升機飛行路線或直升機運作時產生的噪音影響。	• 生態影響來自次級林地做清理。	• 暢通的道路往來診所。	沒有剩餘的直升機噪音影響，但生態影響不可接受。

** 見圖 1.2*

1.3.3 概括的建造時間表見於表 1.2。

表 1.2 榕樹灣直升機升降坪建造工程時間表

興建活動	建造期
整理工地	2006 年 5 月 16 日至 2006 年 7 月 22 日
機械調動	2006 年 5 月 24 日至 2006 年 8 月 16 日
安裝椿柱	2006 年 8 月 17 日至 2007 年 1 月 27 日
築建直升機升降坪	2007 年 1 月 29 日至 2007 年 6 月 22 日
機電工程	2007 年 5 月 30 日至 2007 年 7 月 5 日
機械調動	2007 年 7 月 6 日至 2007 年 7 月 30 日

1.3.4 主要工程包括：裝嵌約 26 支直徑 610 毫米的鑽孔椿柱，興建一條長 25 米闊 3.5 米的車輛通道，以及一個直徑 25 米的直升機升降坪。圖 1.3 展示兩幅擬建直升機升降坪的視野圖。

1.4 設計改良

1.4.1 有關的工程設計已配合了避免產生或減少環境影響的措施，當中包括採用小型鑽孔椿的建築方法，相對於挖泥及填海的建築方法，此方法能大大減少廢物處理工序，也可減低對水質及海洋生態造成的影響。而且，緊急車輛通道的闊度亦由標準的 4.5 米減至 3.5 米，從而減少所需的建築物料。

1.4.2 於運作期間，直升機升降坪所產生的影響主要來自直升機噪音，因此選址已考慮到遠離已發展地區的地方。與此同時，亦改良了直升機的飛行範圍角度，以避免對居民造成剩餘噪音影響。

1.5 累積影響

1.5.1 在評估累積影響時，亦考慮到渠務署一項鄰近的污水處理廠興建工程，該工程將於 2007 年八月動工，建造期爲三年。然而，介時倘若該項興建污水處理廠的工程已動工，但是項直升機升降坪的建築工程仍未完成，現有的臨時直升機升降坪則需遷回南丫發電廠，此舉將延誤緊急服務。故此，土木工程拓展署和渠務署已同意避免兩項建築工程重疊，因而將不會產生累積影響。

1.5.2 根據現時最新的程序表，榕樹灣第二期發展工程將於 2008 年動工，這不會帶來任何的累積影響。而香港電燈有限公司南丫發電廠進行航道改善的維修挖掘工程已於 2004 年年初完工。此外，香港電燈有限公司南丫發電廠擴建工程中進行的海事工程，亦已在 2003 年航道改善挖掘工程前完成。

2 建造工程塵埃

2.1.1 透過實行「空氣污染管制（建造工程塵埃）規例」所訂定的塵埃控制措施，建造工程塵埃應可達至合理水平，因此建造工程塵埃將不會構成顯著影響。

3 建築噪音

3.1.1 施工期間，機動設備的操作將會是主要的噪音來源。而主要會產生噪音的工序包括整理工地，設置工地寫字樓，豎立圍板及圍欄，安裝及拆卸臨時工作架，安裝樁柱，和興建直升機升降坪及緊急車輛通道。

3.1.2 此項環評爲現有及計劃中的噪音感應強的地方（見插圖 3.1），評估日間建築工序所產生的潛在噪音影響。

3.1.3 根據擬建築時間表及使用設備清單，在未實施任何緩減措施的情況下，預計在 NSR4 最高的建築噪音水平爲 74 分貝(A)。此噪音水平不會超過「環境影響評估程序的技術備忘錄」附件 5 表 1B 所定下的 75 分貝(A) 日間噪音標準。雖然緩減措施並不需要，但將來施工的承建商仍需實施良好的建築工序，以盡量減少工程所造成的噪音。

3.1.4 由於興建污水處理廠工程和興建直升機升降坪將不會重疊，預計是項工程將不會對噪音感應強的地方構成任何累積噪音影響。

4 直升機噪音

4.1 影響評估

4.1.1 直升機升降坪運作時，直升機噪音將會是唯一的噪音來源。而政府飛行服務隊將使用歐洲直升機公司「EC155 B1」型號和歐洲直升機公司「超級美洲豹 AS332 L2」型號直升機進行緊急運送傷病者的行動。

4.1.2 直升機在降落時、起飛，和在升降坪上操作時（包括在升降坪上空盤旋；在升降坪上著陸；在地面旋翼空轉；及從地面垂直升起作懸空盤旋），都會產生噪音。

4.1.3 根據計算結果，受到直升機在升降坪上操作時最高噪音影響的是 NSR4。當「超級美洲豹 AS332 L2」型號直升機在懸空盤旋時，和當「EC155 B1」型號直升機從地面垂直升起時，最高噪音水平分別爲 90 分貝(A) 和 87 分貝(A)。而兩種型號的直升機在升降坪地面上 旋翼空轉時所產生的噪音則符合 85 分貝(A) 的標準。因此，因直升機在升降坪上操作時 所產生的剩餘噪音影響只會是很短暫（少於 10 秒)。

4.1.4 經諮詢過政府飛行服務隊的意見，「EC155 B1」型號直升機的飛行範圍角度已收窄至 80 度，至於「超級美洲豹 AS332 L2」型號直升機，則收窄至 70 度。而限制了飛行 範圍後，預計直升機在降落時所產生的噪音會符合 85 分貝(A)的標準。

4.1.5 根據政府飛行服務隊所提供的直升機實際使用情況（請參考圖表 4.1），在可行的情況下都會盡量使用「EC155 B1」型號直升機。而「超級美洲豹 AS332 L2」型號直升機只會在特別緊急情況而又需要大型運送時才使用。總括來說，在正常的情況下，只會在「EC155 B1」型號直升機在升降坪上操作時才會產生少量的剩餘噪音影響。

表 4.1 於榕樹灣執行「緊急召援」的直升機使用量：2000 至 2004 年

年份	「緊急召援」次數：0700 時 至 2200 時 [1]	「緊急召援」次數：2200 時至 0700 時 [2]	「緊急召援」飛行訓練次數 [3]
2000	51 (1)	30	3
2001	69 (7)	39	4
2002	104 (13)	37	6
2003	92 (7)	34	5
2004	66 (1)	29	4

註：

1. 括號 ( ) 內的數字是由超級美洲豹（或在 2004 前使用的西科斯基）所執行的「緊急召援」的飛行次數。
2. 自 2003 年起，所有晚間「緊急召援」只由「 EC155 B1 」型號直升機執行；然而根據本噪音評估的精神， 將來超級美洲豹不能否定需要在晚間執行「緊急召援」。
3. 在 2003 年，政府飛行服務隊於榕樹灣直升機升降坪共進行五次「緊急召援」飛行訓練，即是總飛行量的 4%。在沒有其他年份的統計數字下，其他年份的「緊急召援」飛行訓練次數是以相同的百分比來計算。由於直升機機種已於 2001/02 年完成更換，且沒有計劃增添新直升機機種，故此政府飛行服務隊預計在短期至中期內不會增加飛行訓練次數。

4.2 影響緩減評估

4.2.1 重新編排直升機飛行路線，有助減低剩餘直升機在降落／起飛噪音對住戶的影響。在使用「EC155 B1」型號直升機時，減少了 420 住戶受影響。在使用「超級美洲豹」型號直升機時，減少了 300 住戶受影響。[圖 4.1]

4.2.2 在兩種直升機運作時，預計在部份噪音感應強的地方將接收到超過 85 分貝(A) 的最高噪音水平。因此，有必要對各種可行的緩減措施作研究。

4.2.3 環境影響評估有就延長緊急車輛通，促使直升機升降坪進一步離岸及遠離市區作考慮。爲使兩款型號直升機在懸空盤旋時發出噪音符合 85 分貝(A) 的噪音標準，有需要將緊急車輛通道延長大概 270 米。[圖 1.2；選擇 B2] 但根據海事處的意見，由於此類方案會減少位於「選擇 B2」與現有渡輪碼頭可航行的範圍，從而減少於該等範圍航行船隻的空間，因而增加撞船的風險，故海事處並不接受此類方案。海事處亦提出擬建之直升機升降坪不應再從建議的「選擇 B1」作出任何伸延，以把海事風險減至最低。

4.2.4 此外，考慮亦包括爲直升機升降坪重新定出位置，約向西南方伸延 150 米以除去剩餘噪音影響。但此安排將使緊急車輛通道橫跨擬興建的榕樹灣污水處理廠的海水渠口。基於此安排會阻礙渠口的建造及維修 [圖 1.2；選擇 E1]。所以渠務署並不支持此方案。此外，陸上的緊急車輛通道會侵佔在[illegible]螃磡山腳的未開發林地，包括砍伐樹林及清除林地。在生態／自然保護角度上，[圖 1.2；選擇 E2]，此建議並未得到漁農自然護理署的支持。

4.2.5 在直升機升降坪方面，安裝隔音屏障/屏罩或相類的建築物不能有效減低噪音。這是由於直升機所產生的是位於主水平基準以上 17 米以空氣爲傳播媒體的噪音，並且在直升機升降坪 30 米範圍內。另一方面，以隔音屏障/屏罩來減低直升機噪音，在工程或飛行安全方面亦不可行。

4.2.6 最後，考慮亦包括在所有接收到最高噪音水平 – 85 分貝(A) 以上噪音感應器強的地方，使用間接緩解措施，如安裝隔音設備。有效的間接緩解措施包括住戶在直升機操作時關閉窗戶。不過，由於有關住戶並不會預早收到直升機到達時間的通知，且噪音影響只維持僅 10 秒，住戶亦未必能迅速反應。因此，預料此措施的效用不大。

4.3 直升機剩餘噪音影響評估

4.3.1 根據政府飛行服務隊由 2000 年至 2004 年的資料顯示，在實施所有可行的緩解措施後，「EC155 B1」型號直升機運作時，平均每 2.8 日，便在 85 分貝 (A) 噪音水平上，產生 1-2 分貝 (A) 的額外噪音。估計在 「EC155 B1」型號垂直起飛時，位於 276 米範圍內、直線的視線範圍內，受影響的住宅約 有 75 戶。在「超級美洲豹」型號直升機運作時，平均每 24.3 日，在 85 分貝 (A) 的噪音水平上將產生 3-5 分貝 (A) 的額外噪音，介時在 386 米範圍內約有 360 住戶受影響 [圖 4.2]。

4.3.2 兩款直升機的影響大概維持 5 至 10 秒，預料剩餘影響的音量、頻率持續時間將不會構成長遠的環境影響。

4.3.3 於晚上七時至翌晨七時，直升機升降坪在運作時可能會產生可聽見的剩餘噪音。在爲找出用來監管夜間直升機噪音的本地或國際標準而進行的調查發現，大部份關注飛機噪音的文獻，都只是和商用航機和直升機噪音有關。然而，當美國聯邦航空局爲非軍事直升機噪音進行公眾諮詢時，所有團體一致認爲由緊急醫療直升機所產生的噪音是可容忍的。

4.3.4 雖然根據香港法例第 312 章 - 「民航飛機 噪音條例」，儘管可以以行政手法來減低直升機升降坪在噪音感應器強的地方的影響，但本港是沒有用來管制晚間緊急直升機噪音的標準。而且，由於擬建直升機升降坪是用作基於實際需要的緊急服務，諸如限制晚間直升機數量，或是限制直升機升降坪的運作時間的方法，是不可行的。

4.3.5 擬建直升機升降坪將會採用影響最少民居的直升機飛行路線。由於擬建直升機升降坪是用作緊急服務，及此服務是可容忍和必須的，在建議的選址興建直升機升降坪是可以接受的。

4.3.6 此外，政府飛行服務隊已答應在可能的情況下，避免使用如「超級美洲豹」型號直升機。如榕樹灣居民有任何關於噪音的投訴，可以以下的方法傳達至離島區議會秘書處： (傳真) 2815 2291；(電郵) dois@had.gov.hk ；或 (郵遞) 離島區議會秘書處，中環統一 碼頭道， 38 號海港政府大樓 11 樓。

5 廢物管理

5.1 建築期

5.1.1 廢物管理評估中就興建直升機升降坪的工種及有關可能產生的廢物種類作分析，和概述相應的措施，以減少對附近環境的影響和盡可能減少產生廢物。

5.1.2 估計由 2006 年 8 月至 2007 年 1 月，由小型鑽孔樁所產生未受污染的淤泥約有 200 立方米，並棄置於「南長洲廢土棄置區」。於建築期內亦會產生約 80 立方米的建築廢料、每月 480 公升的化學廢料及每星期 127 千克的一般廢料。

5.1.3 經實踐良好的工地實務和適當的緩解措施，各類物料將得到正常處理、儲存、運送及棄置，所以於施工期間將不會在廢物管理方面構成任何負面影響。

5.2 運作期

5.2.1 直升機升降坪運作時（如間中的維修工序），預期唯一會產生的是有機廢物(植物)。但預料此類廢物只會極少量，所以在運作期間不會對環境構成任何不良影響。

6 水質

6.1 建築期

6.1.1 直升機升降坪及其連接通道會採用小型鑽孔樁建築方法，因此工程並不會進行挖泥或填海工序。而打樁工程進行時可能會翻起樁柱附近的海床沉積物，但這只會造成局部影響而不會對附近的水質造成顯著的影響。然而於打樁工程進行時，承建商亦需裝設防沙網作爲緩解措施。

6.2 運作期

6.2.1 是項工程完工後將不會對水流產生流體力學效應。而運作時亦不會產生任何排放物，所以不會對海洋環境造成影響。

7 生態

7.1 建築期

7.1.1 由於本工程項目規模細小，加上採納了影響較低的小型鑽孔樁建築方法，因此工程將不會對潮下棲息地構成顯著損失，亦不會對潮間或陸上生態構成任何損失。而所有屬於建築緊急車輛通道及直升機升降坪的樁柱所拈的總面積將會使永久損失大概 16 平方米的潮下棲息地。

7.1.2 因榕樹灣的潮汐循環不大，所以海泥可以加速沈降；加上小規模的工程和適當的建築方法，水質影響評估中並沒有發現任何顯著因水質而引起的生態影響。而在打樁時配合好實務措施，對生長在人工大石海堤上的硬珊瑚群亦不會受到任何影響。

7.1.3 在緩解措施方面，建議在施工時使用防沙幕和配合實務措施，以進一步減低因水質引起對生態的影響。實務措施包括：將物料儲存盡量置於遠離海堤的地方；確保鑽樁時鑽孔機身是密封以避免滲漏。

7.1.4 就施工方法及直升機升降坪的位置而言，預期是項工程不會對潮間或陸上生態造成影響。

7.2 運作期

7.2.1 直升機升降坪於運作期間產生的噪音可能會騷擾到附近雀鳥，而產生的氣流亦可能影響到蝴蝶。因此，直升機升降坪的位置就置於距離有發現野生動物的植物生長地約 50 米的地方。而在本工程項目附近的地方由於缺乏適合的海岸線，所以雀鳥的活動會極爲有限。而根據實地觀察，亦未有發現在項目西面的人工斜海堤和大石岸邊的地方有雀鳥活動。而在榕樹灣的東及東南面發現到的雀鳥，當被直升機噪音騷擾時，亦可無阻地在灣內向岸方飛走。因此，預期是項工程運作期間將不會帶來任何顯著的生態影響。

8 文化遺產

8.1 建築期

8.1.1 在榕樹灣進行的海洋地質測量發現三件具有潛在海洋考古價值的「物件」。但經進一步的評估，証實該三件物品只屬於在最近建造海堤時挖泥工序所產生的瓦礫：(1) 一件由挖掘海床的的產生的耕耙；(2) 由從前挖泥工序所產生的沉積物；及(3)由從前挖泥工序及 / 或卵石所產生的沉積物。由於該挖泥區鄰近範圍的潛在海底文化價值很低，所以並沒需要進一步考察。

8.1.2 陸上文化遺產評估指出，在榕樹灣研究範圍一帶的考古地點和歷史建築物將不會受到發展直升機升降坪影響。

8.2 運作期

8.2.1 工程的運作將不會對文化遺產造成任何影響。

9 總結

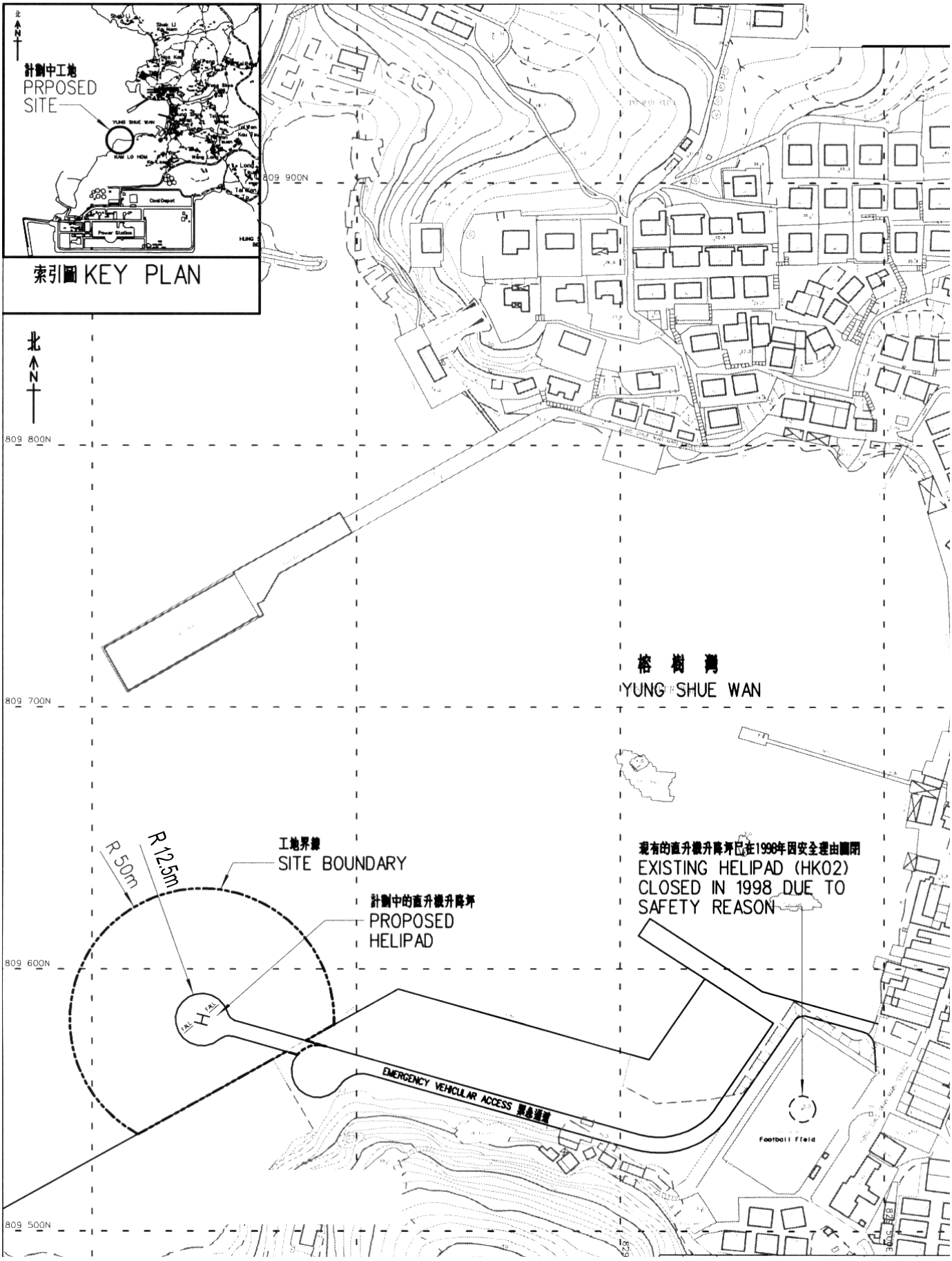
9.1.1 是項工程項目包括在南丫島的[illegible]螃磡（北）及榕樹灣興建永久直升機升降坪，以在緊急情況下運載北南丫居民往市區就醫。而在沒有現時位於擬建永久直升機升降坪和用作臨時措施的臨時直升機升降坪時，當地居民必須走過距離北南丫診所 2.75 公里的車程（約 20 分鐘）才可使用香港電燈有限公司南丫發電廠的直升機升降坪。

9.1.2 是項工程會採用小型鑽孔樁建築方法，此舉能大大減少需要處理的物料及廢物。在水質和水生生態方面，亦只會帶來局部而不大顯著的影響；在建築噪音、塵埃，以及文化遺產方面，亦並未預期有任何影響。

9.1.3 直升機噪音是運作期間的主要影響。在 7 個被考慮的選址中，擬定的直升機升降坪選址已爲最合適的位置。擬定選址有通道住來診所，亦有考慮到住來通道避免通過市內建築物，和收窄直升機的飛行範圍角度，結果的剩餘影響只會是源自直升機在直升機升降坪上的操作時發出的噪音。

9.1.4 直升機噪音影響評估指出，在正常情況下，剩餘噪音將平均大概會每 2.8 日產生介乎 1 至 2 分貝 (A) 的額外噪音，影響將會輕微，且只會維持少過十秒鐘。因此並不會有 長遠的影響。

FIGURES
插圖



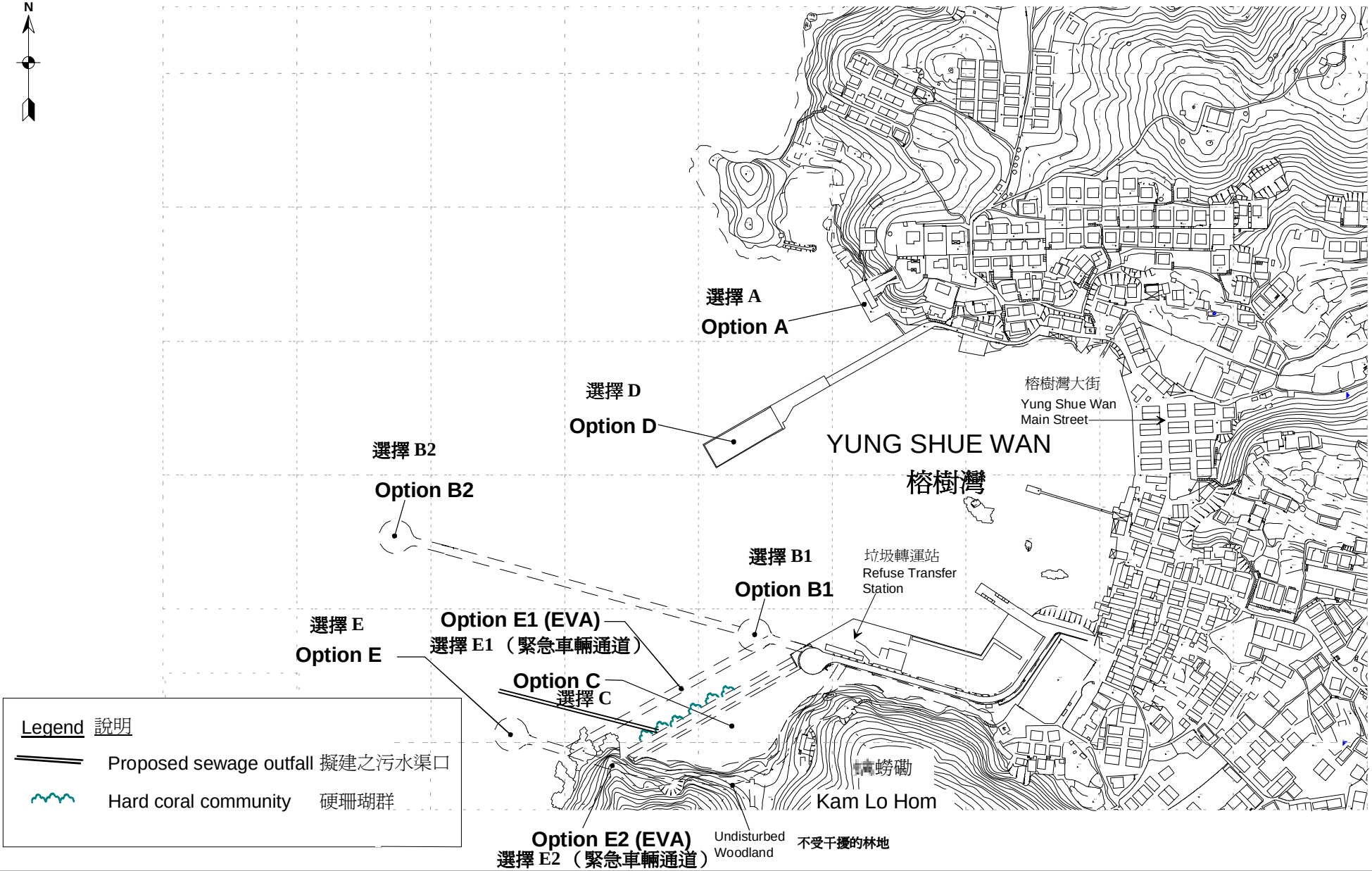
BMT

EIA Study for Helipad at Yung Shue Wan, Lamma Island
南丫島榕樹灣直升機升降坪環境影響坪估研究

YUNG SHUE WAN HELIPAD – SITE LOCATION
南丫島榕樹灣直升機升降坪 – 工地位置

Figure 1.1 圖 1.1

Drawn	MAT	Checked	RBR
Scale	NTS	Date	November 2005 2005 年 11 月



EIA Study for Helipad at Yung Shue Wan, Lamma Island 南丫島榕樹灣直升機升降坪環境影響坪估研究

YUNG SHUE WAN HELIPAD SITING OPTIONS 榕樹灣直升機升降坪選址位置

Figure 1.2 圖 1.2

Drawn	FEW	Checked	RBR
Scale	NTS	Date	November 2005 2005 年 11 月

BMT

VISUAL ILLUSTRATION 視野圖

EIA Study for Helipad at Yung Shue Wan, Lamma Island 南丫島榕樹灣直升機升降坪環境影響坪估研究

Figure 1.3a 圖 1.3a

Drawn	ANW	Checked	RBR
Scale	NTS	Date	November 2005 2005 年 11 月

BMT

VISUAL ILLUSTRATION 視野圖

EIA Study for Helipad at Yung Shue Wan, Lamma Island 南丫島榕樹灣直升機升降坪環境影響坪估研究

Figure 1.3b 圖 1.3b

Drawn	ANW	Checked	RBR
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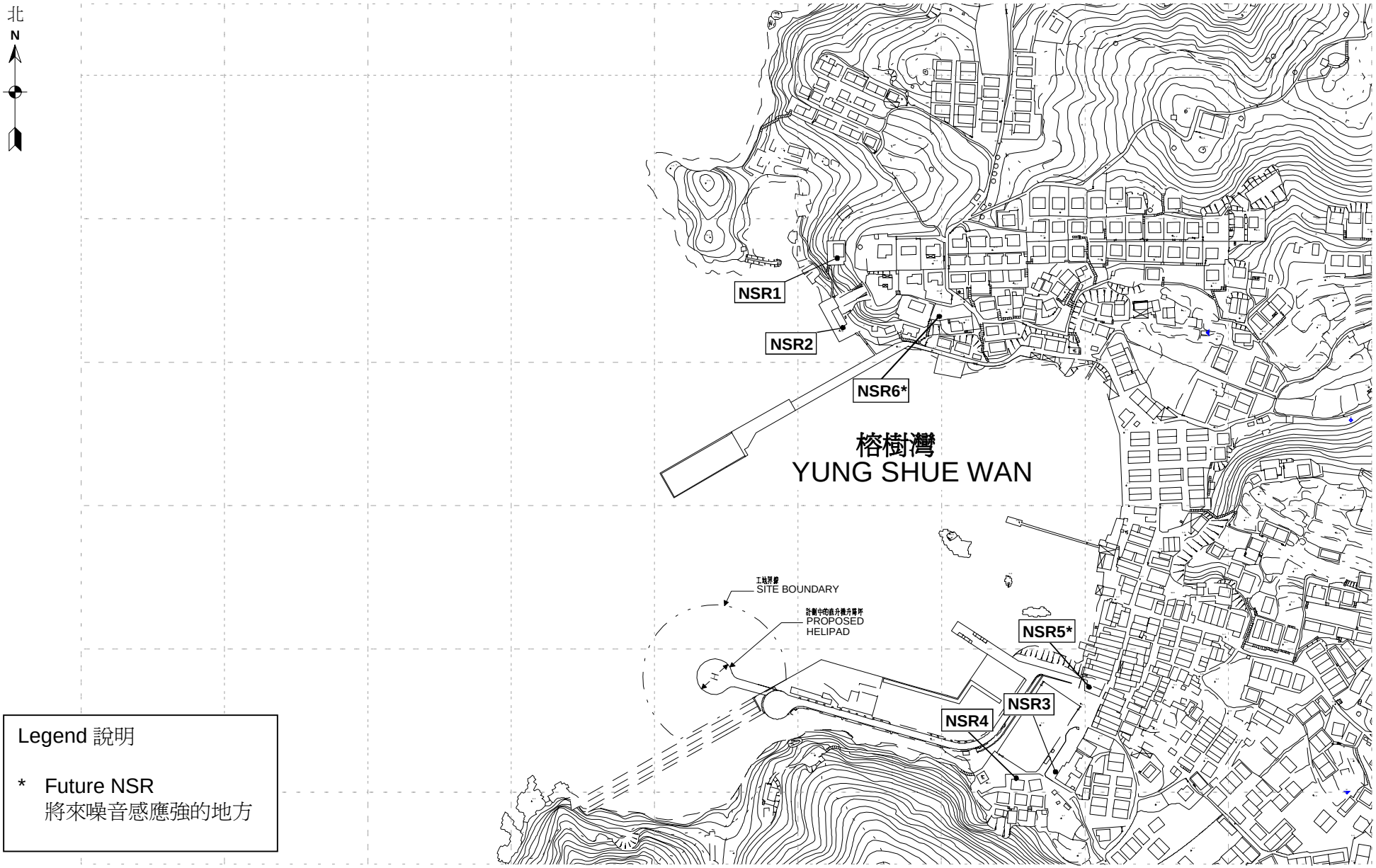
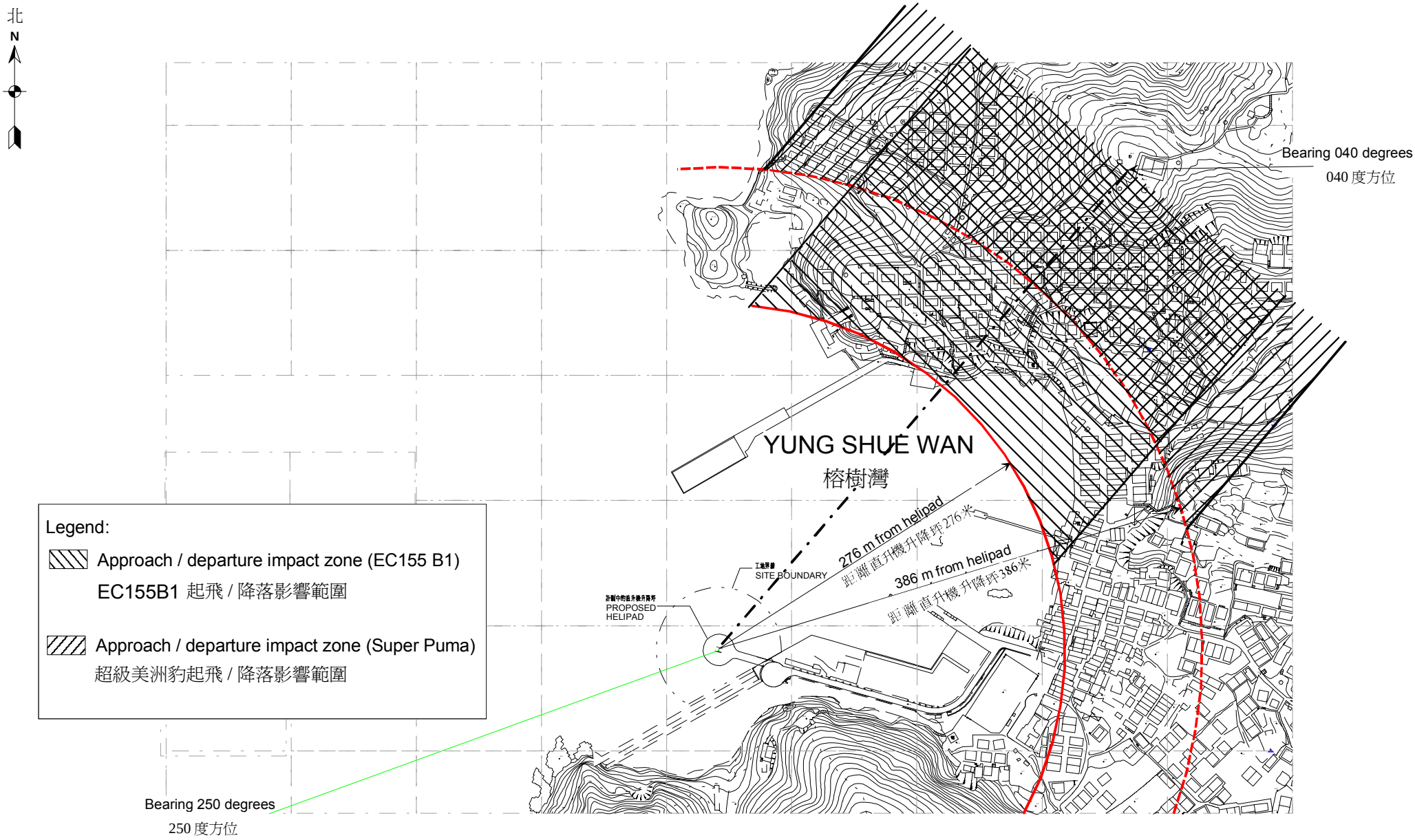


EIA Study for Helipad at Yung Shue Wan, Lamma Island 南丫島榕樹灣直升機升降坪環境影響坪估研究

REPRESENTATIVE NOISE SENSITIVE RECEIVER LOCATIONS 具代表性噪音感應強的地方位置

Figure 3.1 圖 3.1

Drawn	DEH	Checked	RBR
Scale	NTS	Date	November 2005 2005 年 11 月



EIA Study for Helipad at Yung Shue Wan, Lamma Island 南丫島榕樹灣直升機升降坪環境影響坪估研究

AREA PROTECTED FROM HELICOPTER APPROACH / DEPARTURE NOISE
不受直升機降落／起飛時噪音影響範圍

Figure 4.1 圖 4.1

Drawn	DEH	Checked	RBR
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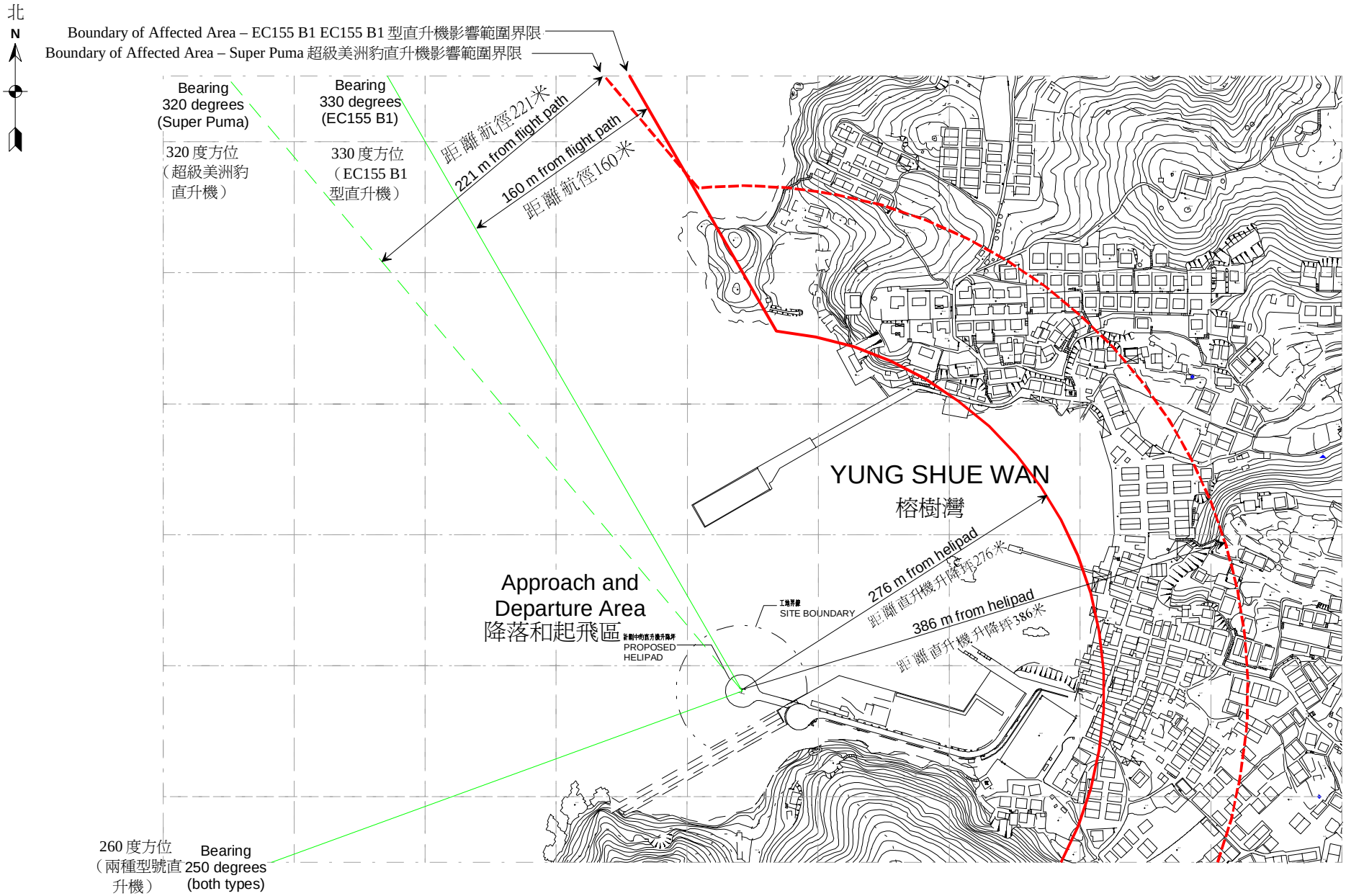

EIA Study for Helipad at Yung Shue Wan, Lamma Island 南丫島榕樹灣直升機升降坪環境影響坪估研究

AREA AFFECTED BY HELICOPTER MANOEUVRING NOISE 直升機運作噪音影響範圍

Figure 4.2 圖 4.2

Drawn	DEH	Checked	RBR
Scale	1:4000	Date	November 2005 2005 年 11 月