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合約編號 CE 18/2002 (EP)

**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**

Peng Chau Helipad
坪洲直升機升降坪

Executive Summary
行政摘要

BMT Asia Pacific Limited in
Association With:
環科顧問有限公司
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Hyder Consulting Limited
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Asiatic Marine Limited

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BMT Asia Pacific Limited

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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 & 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 Peng Chau 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 mainly by the Government Flying Service (GFS) for transporting Peng Chau residents to urban areas for medical treatment in emergency situations. The helipad may also be used by GFS for training flights and for official Government visits.
- 1.2.3 The current Peng Chau helipad, located at the top of a hill, is not considered ideal by GFS on flight safety grounds as the site is within a confined area and can only be accessed by climbing long stairs. In view of the present situation, the Home Affairs Department (HAD) commissioned CEDD to construct the helipad for the local community.

1.3 Project Characteristics and Site Location

- 1.3.1 The Project will be constructed by dredging / reclamation in shallow coastal waters at Pak Wan, northwest Peng Chau [Figure 1.1]. An access road will be constructed along the natural shoreline to link the proposed helipad with existing Emergency Vehicular Access (EVA).
- 1.3.2 The Project location and construction method were selected as the preferred options after due consideration of each of 13 site options / alternatives [Figure 1.2]. Two sites were found to be either of insufficient helicopter manoeuvring room or with unsuitable approach / departure paths and so were not taken forward for detailed consideration. Table 1.1 presents a summary of the helicopter site option evaluation for the remaining 11 sites that were evaluated after an initial screening exercise.
- 1.3.3 Key Project details include: dredging of approximately 14,000m³ of fine to coarse marine sand; and construction of a 150 metres long and 4.5 metres wide access road link, and helipad 25 metres in diameter. Figure 1.3 illustrates the proposed Peng Chau Helipad.
- 1.3.4 The construction programme can be broadly summarised as presented by Table 1.2.

Table 1.2 Summary of Peng Chau Helipad Construction Programme

Construction Activity	Construction Period
Site Clearance	Dec 2005 – Jan 2006
Reclamation	Feb 2006 – Sep 2006
Construction of Helipad	Jan 2006 – Nov 2006
Construction of EVA	Jul 2006 – Nov 2006

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
A1	Pak Wan – marine EVA	<ul style="list-style-type: none"> No helicopter <i>manoeuvring</i> noise impact during any operations. No helicopter <i>flight path</i> noise impacts under normal operations[^]. 	<ul style="list-style-type: none"> Helicopter <i>flight path</i> noise impact from use of 'Super Puma' type helicopter. 	<ul style="list-style-type: none"> Easy access from Clinic. No flight safety concerns. 	Residual flight path noise impact from Super Puma, but no helicopter noise impact under normal operations.
A2	Pak Wan – land EVA	<ul style="list-style-type: none"> No helicopter <i>flight path</i> noise impacts under normal operations. 	<ul style="list-style-type: none"> Potential landscape and ecological impact from necessary slope works. <i>Manoeuvring</i> noise impact from both helicopter types and <i>flight path</i> noise from 'Super Puma'. 	<ul style="list-style-type: none"> Easy access from Clinic, although steep slopes to navigate to helipad. No flight safety concerns. 	Potential ecology impacts from EVA construction. Residual manoeuvring noise impacts for both helicopter types.
B1	Pei Lei	<ul style="list-style-type: none"> Minimal construction works. 	<ul style="list-style-type: none"> Potential impacts on hard corals from construction works. Helicopter <i>flight path</i> and <i>manoeuvring</i> noise impact. 	<ul style="list-style-type: none"> Easy access from Clinic. No flight safety concerns. 	Potential adverse impacts on hard corals, and likely residual helicopter noise impact under normal operations.
B2	Pei Lei Southwest	<ul style="list-style-type: none"> Minimal construction works. 	<ul style="list-style-type: none"> Potential impacts on hard corals from construction works and shading effect of EVA & Helipad. Helicopter <i>flight path</i> and <i>manoeuvring</i> noise impact. 	<ul style="list-style-type: none"> Easy access from Clinic. No flight safety concerns. 	Potential adverse impacts on hard corals, and residual helicopter noise impact under normal operations.
C	Kam Peng Estate	<ul style="list-style-type: none"> No significant construction phase impacts (land already formed). 	<ul style="list-style-type: none"> Significant helicopter <i>flight path</i> and <i>manoeuvring</i> noise impact on nearby residences. 	<ul style="list-style-type: none"> Best access from Clinic. Helicopter flight safety concerns due to proximity to built-up area. 	No construction phase concerns, but likely significant residual helicopter noise impacts under normal operations. Unacceptable flight safety concerns.

Option / Alternative	Location *	Key Environmental Benefit(s)	Key Environmental Dis-benefit(s)	Other Key Considerations (e.g., safety & access)	Conclusion
D	Tai Lei South	<ul style="list-style-type: none"> Minimal construction works. 	<ul style="list-style-type: none"> Potential impacts on hard corals from construction works. Helicopter <i>flight path</i> and <i>manoeuvring</i> noise impact. 	<ul style="list-style-type: none"> Easy access from Clinic. No flight safety concerns. 	Potential adverse impacts on hard corals, and residual helicopter noise impact under normal operations.
E	Pak Wan	<ul style="list-style-type: none"> No significant construction phase impacts. 	<ul style="list-style-type: none"> Significant helicopter <i>flight path</i> and <i>manoeuvring</i> noise impacts on nearby residences. 	<ul style="list-style-type: none"> Easy access from Clinic. Some flight safety concern due to proximity of Sea Crest Villa. 	Likely significant residual helicopter noise impacts under normal operations, and flight safety concerns.
F	Pak Wan Reclamation (Open Space)	<ul style="list-style-type: none"> No significant construction phase impacts (land already formed). 	<ul style="list-style-type: none"> Significant helicopter <i>flight path</i> and <i>manoeuvring</i> noise impact on nearby residences. 	<ul style="list-style-type: none"> Best access from Clinic. Helicopter flight safety concerns due to proximity to built-up area. 	Likely significant residual helicopter noise impacts under normal operations. Unacceptable flight safety concerns.
G	Works Area of Highways Department on Tai Lei	<ul style="list-style-type: none"> No significant construction phase impacts (land already formed). 	<ul style="list-style-type: none"> Helicopter <i>flight path</i> and <i>manoeuvring</i> noise impact. 	<ul style="list-style-type: none"> Easy access from Clinic. Need to re-provision LPG storage / handling area, otherwise no flight safety concerns. 	Likely significant residual helicopter noise impacts under normal operations.
H	Existing Small Pier on Tai Lei	<ul style="list-style-type: none"> No significant construction phase impacts. 	<ul style="list-style-type: none"> Helicopter <i>flight path</i> and <i>manoeuvring</i> noise impact. 	<ul style="list-style-type: none"> Easy access from Clinic. Need to re-provision LPG storage / handling area, otherwise no flight safety concerns. 	Likely significant residual helicopter noise impacts under normal operations.
I	Pak Wan (EVA East Extension)	<ul style="list-style-type: none"> No helicopter <i>manoeuvring</i> or <i>flight path</i> noise impact. 	<ul style="list-style-type: none"> Extended EVA will encroach into zoned "Coastal Protection Area" (CPA). 	<ul style="list-style-type: none"> Easy access from Clinic. No flight safety concerns. 	The extended EVA on to the 'CPA' zone would create a significant adverse landscape impact.

Notes: * Figure 1.2 refers. ^ Normal operation refers to the use of EC155 B1 type helicopter.

1.4 Design Refinements

- 1.4.1 Measures incorporated into the Project design to avoid / reduce environmental impacts include lowering the Project elevation as far as practicable in order to minimize ‘footprint’ impacts, and optimising the construction sequence to avoid cumulative noise effects with the proposed construction of the Peng Chau Sewage Treatment Works Upgrade.
- 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 reduced as far as was practicable to avoid / minimise noise effects on residences.

1.5 Cumulative Effects

- 1.5.1 One other project identified in the vicinity that requires consideration for the purposes of assessing cumulative effects is the Drainage Services Department’s (DSD) *Peng Chau Sewage Treatment Works (STW) Upgrade Project* that is due to commence construction in mid 2005.
- 1.5.2 DSD is currently implementing sewerage works at Peng Chau. It has been confirmed with DSD that the portion of the works within the helipad Project boundary were completed in 2004.

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; reclamation works, 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 unmitigated construction noise level at Sea Crest Villa is predicted to exceed the daytime noise standard of 75 dB(A). However, with the implementation of appropriate mitigation measures, including use of silenced equipment and temporary noise barriers, construction noise impacts can be reduced to an acceptable level.
- 3.1.4 The cumulative noise impacts arising from the construction of helipad and sewage treatment works upgrade at Tai Lei Island upon the common NSR has also been evaluated and no cumulative construction noise impacts are 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 maximum predicted helicopter noise level during manoeuvring for both helicopter models is within the L_{max} limit and no mitigation is required. During helicopter approach the predicted noise level was initially 91 dB(A) and 88 dB(A) at NSR1 using the ‘Super Puma AS332 L2’ and ‘EC155 B1’ helicopters, respectively. Accordingly, in consultation with GFS, the angle of the flight path was reduced by 35 degrees, resulting in approach mode noise from the ‘EC155 B1’ helicopter being within the noise criteria of L_{max} 85dB(A).
- 4.1.4 There remains a maximum residual impact of 3 dB(A) at NSR2 (Sea Crest Villa) during the approach mode for the ‘Super Puma AS332 L2’. However, with reference to actual ‘casevac’ helicopter usage in *Table 4.1*, there will normally be no residual impact as the ‘EC155 B1’ helicopter will be used whenever possible. Use of the ‘Super Puma AS332 L2’ will be restricted to special emergency situations when a larger capacity helicopter is required. Furthermore, when use of the ‘Super Puma AS332 L2’ is necessary, the residual impact duration will be very short (< 10 seconds).

Table 4.1 Helicopter Usage for Peng Chau ‘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	97 (1)	51	2
2001	125 (9)	57	3
2002	234 (29)	56	5
2003	167 (4)	42	5
2004	140 (5)	37	3

Notes:

- The figures in brackets () are the number of casevac flights carried out by Super Puma (or Sikorsky prior to 2004).
- 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.
- Five casevac training flights were conducted to the Peng Chau helipad in 2003 (i.e., an additional 2.3% 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 The natural terrain of the cliff adjacent to the helipad effectively controls manoeuvring noise from both helicopter types, although noise levels from the approaching ‘Super Puma’ type helicopter are predicted to exceed the L_{max} 85 dB(A) limit at Sea Crest Villa. As such, consideration was given to direct mitigation involving relocation of the helipad a further 70 metres to the east [*Figure 1.2; ‘Option I’*].

Ultimately, such relocation would encroach on to an area currently zoned as a ‘Coastal Protection Area’ to protect and conserve the natural shoreline, and would bring about landscape and increased ecological impacts, including the complete loss of a sandy beach, as well as increased dredging requirements and associated water quality impacts.

- 4.2.2 A noise barrier is not practicable as the approach noise impact arises when the ‘Super Puma’ type helicopter is in mid-air over the sea, approximately 30 metres north of the helipad surface.
- 4.2.3 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 residents comply with a ‘closed-window’ living environment during helicopter manoeuvring. However, it was considered that such measures would not be effective as occupants of Sea Crest Villa 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 years 2000 - 2004, after taking into account all the practicable direct mitigation measures the residual impact from the ‘Super Puma AS332 L2’ type helicopter would involve a 3 dB(A) exceedance of the 85 dB(A) limit approximately every 12 days, affecting approximately 6 units at Sea Crest Villa. 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.
- 4.3.2 It should be noted that the existing worst-case helicopter noise level at Sea Crest Villa exceeds the noise standard by 4-7 dB(A) and there will be no spread of such noise impacts elsewhere after implementing the proposed new helipad. Moreover, there are over 100 residential building currently affected by the existing helipad. As such, the proposed new helipad will improve the ambient noise environment.
- 4.3.3 Residual noise may be audible during night time from 7pm to 7am. Research was undertaken to identify a suitable local or international standard to govern helicopter noise at night. In accordance with “Recommended Noise Reduction Approaches” in the United States of America Federal Aviation Agency Hearings on [Non-military Helicopter Noise], the proposed use of the new helipad for emergency use and noise from emergency medical helicopter service is exempted and that emergency helicopter service is a tolerable necessity.
- 4.3.4 There is no standard on emergency helicopter noise at night. Based on Civil Aviation (Aircraft Noise) Ordinance (Cap 312) of Hong Kong, although administrative means can be used to reduce the noise impact of the helipad operations on the NSRs, restrictions such as limiting the number of helicopter flights during night time as well as restrictions on the operating hours of the helipad will not be practical as the use concerned is for emergency service, which will be on an as needed basis that cannot be controlled.
- 4.3.5 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. It is estimated that 14,000m³ of predominantly fine to coarse marine sand will be dredged for disposal at the South Cheung Chau Spoil Disposal Area. Reclamation of approximately 30,200m³ of imported material will be required, of which approximately 25,000m³ will be rock fill and rock armour.
- 5.1.2 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 As only one dredger will be in operation during the dredging works, calculations predict that elevations in suspended solids at the identified sensitive receivers are negligible and well within the tolerance level. It is also predicted that the SS elevation will not exceed the tolerance level of 10.1 mg/l even in the very vicinity of the dredger, based on an average water depth of 5.8m in the study area. The mixing zone where the SS elevation will exceed the tolerance level is only 16m (along the main flow direction) by 5m (normal to the flow direction) at a water depth of 3m and 25m by 8m at a water depth of 2m, and will not affect water sensitive receivers.
- 6.1.2 As the backfilling material will be rock armour and granular material with a minimum particle size of 20mm, no fine sediment is expected to be released into water column during the backfilling stage and this activity will have much less water quality impacts than the dredging activities.
- 6.1.3 The use of silt curtains will be used to limit the extent of the impact zone.

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 The Project requires approximately 14,000m³ of dredging covering a seabed area of approximately 0.57 ha. Of this area, approximately 0.33 ha of sub-tidal benthic habitat will be permanently lost under the reclamation, with the remaining 0.24 ha temporarily affected and available for recolonisation on completion of marine works. There will also be the permanent loss of approximately 0.1 ha of mixed sandy, rocky and boulder inter-tidal habitat.
- 7.1.2 As regards impact mitigation, a length of approximately 200m of artificial sloping boulder seawall is to be constructed that will provide some level of mitigation for the permanent loss of natural habitat. Approximately 0.08 ha of sub-tidal benthic habitat and 0.12 ha of inter-tidal habitat can be created, resulting in a net loss of some 0.25 ha of sub-tidal benthic habitat and a net gain of some 0.02 ha of inter-tidal habitat. Given the low baseline ecological value of the sub-tidal and inter-tidal habitats at Pak Wan, the residual impact is not considered significant.
- 7.1.3 The small scale and short duration of the marine works will not cause any adverse water quality-induced impacts on the hard coral community at east Tai Lei. Use of a silt curtain is recommended to contain water quality impacts, and this will ensure no adverse ecological impacts on the hard coral community. No significant terrestrial ecology impacts are anticipated.

7.2 Operational Phase

- 7.2.1 Although 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, no significant ecological impacts are anticipated during the operational phase of the Project.

8 FISHERIES

8.1 Construction Phase

- 8.1.1 While the Project will lead to the permanent loss of approximately 0.33 hectares of shallow coastal environment, the permanently affected area is not of any particular fisheries value being situated in very shallow coastal waters. There is unrestricted fisheries habitat in adjacent waters contiguous with the Project area, including undeveloped / undisturbed shallow coastal water habitat east of the Project area.
- 8.1.2 No significant water quality-induced impacts are predicted in the popular fishing area off Tai Lei bridge given the small scale of the dredging activities for the access road link, while there are no impacts on the waters of this popular fishing area from the larger dredging activity scheduled for the helipad footprint due to the greater distance separation.

8.2 Operational Phase

- 8.2.1 The operational Project will not give rise to any fisheries impacts, while there may be some fisheries benefits from the construction of approximately 200m length of artificial seawall habitat.

9 CULTURAL HERITAGE

9.1 Construction Phase

- 9.1.1 Marine geophysical survey at Pak Wan identified two ‘items’ of potential marine archaeological value. However, due to geophysical survey limitations imposed by the shallow water depth it was decided to conduct a precautionary dive survey to cover these areas.
- 9.1.2 The two items recorded detected by the geophysical survey were identified as an area of coral rubble that was deposited from the shoreline, and a boulder. Various small items were recorded from the dive survey in waters too shallow for the geophysical survey boat, and these have been assessed to be of minimal to low cultural heritage significance. No further field investigation is recommended for the Peng Chau study area.
- 9.1.3 Desktop and field evaluation of terrestrial cultural heritage in and around the study area at Peng Chau revealed that no archaeological sites, historic buildings or structures will be impacted by the helipad development.

9.2 Operational Phase

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

10 CONCLUSION

- 10.1.1 The Project involves the construction and operation of a permanent helipad at Pak Wan, Peng Chau and is required mainly for transporting Peng Chau residents to urban areas for medical treatment in emergency situations. The Project will be constructed by reclamation, and through site surveys and impact assessment no significant adverse water quality or ecological impacts are anticipated from Project construction or operation.
- 10.1.2 The Pak Wan site was one of eleven site options for the Helipad considered in detail, and was selected as the optimal location for the Project due to its remoteness from the built environment, while it is still easily accessible from the Peng Chau medical clinic. The chosen helipad site offers the local community a significant time saving compared with the existing helipad at Tai Lung Tsuen which is also predicted to generate significant helicopter noise impacts (i.e., > 85 dB(A)) on residents of over 100 village type and medium rise residential buildings, including residents at Sea Crest Villa.
- 10.1.3 The helipad location also makes use of the natural rocky cliff-face between the helipad surface and Sea Crest Villa to effectively shield the residential development from helicopter manoeuvring noise, while the helicopter flight path has been refined to eliminate approaching helicopter noise impacts on residences under most operating conditions.
- 10.1.4 While a residual helicopter noise impact is predicted during the approach mode of the ‘Super Puma AS L2’ type helicopter, the impact frequency will be approximately once every 12 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為興建坪洲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 此顧問合約包括為兩個分別擬建於坪洲及南丫島榕樹灣之永久直升機升降坪於建築及運作期進行環境影響評估研究（簡稱「環評」）。本報告為坪洲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，由於坪洲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，所以是項工程被定為「指定工程項目」。而亦須要為本工程申請環境許可証。
- 1.2.2 本工程項目主要目的為在緊急情況下讓政府飛行服務隊運載坪洲居民往市區就醫。此外政府飛行服務隊亦會使用直升機升降坪作飛行訓練及政府官員訪問之用。
- 1.2.3 現有在坪洲使用的直升機升降坪，處於一山頂上而空間亦受到限制的地方，因此，政府飛行服務隊認為該位置在飛行安全方面並不理想。而且該處位置偏遠，需要經過很長的石級才可抵達。有見及此，民政事務總署委託土木工程拓展署為坪洲居民興建新的直升機升降坪。

1.3 工程特點及工地位置

- 1.3.1 工程將在坪洲西北面的白灣海岸較淺水的水域（見插圖 1.1）採用挖泥 / 填海方法進行。當中包括在天然沿岸線興建一條通往擬建直升機升降坪的緊急車輛通道。
- 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 13 個選擇而選出（見圖 1.2）。當中兩個選址因考慮到直升機運作空間不足，或是因降落 / 起飛路線不合適，而沒有再作進一步的詳細考慮。經初步篩選後，為 11 個直升機升降坪選址的評估總結列於表 1.1。
- 1.3.3 主要的工程細節包括：挖掘約 14,000 立方米由幼細至粗糙的海泥、興建一條長 150 米及闊 4.5 米的緊急車輛通道及一個直徑 25 米的直升機升降坪。圖 1.3 顯示出擬建直升機升降坪的視野圖。
- 1.3.4 工程的建造時間表概括地列於表 1.2。

表 1.2 坪洲直升機升降坪建造工程時間表

興建活動	建造期
工地清理	2005 年 12 月至 2006 年 1 月
填海工程	2006 年 2 月至 2006 年 9 月
築建直升機升降坪	2006 年 1 月至 2006 年 11 月
築建緊急車輛通道	2006 年 7 月至 2006 年 11 月

表 1.1 直升機升降坪選址評估的總結數矩表

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	白灣 –（海上緊急車輛通道）	<ul style="list-style-type: none"> 在任何運作中直升機不會產生顯著操作噪音 在正常情況^A下，並無與直升機路線相關的噪音影響 	<ul style="list-style-type: none"> 在使用「超級美洲豹」型號直升機時，會產生與直升機飛行路線相關的噪音影響 	<ul style="list-style-type: none"> 暢通的道路往來診所 並無飛行安全的憂慮 	<ul style="list-style-type: none"> 「超級美洲豹」型號直升機會產生與飛行路線相關的噪音，但在正常情況^A時則不會有直升機噪音影響
A2	白灣 –（陸上緊急車輛通道）	<ul style="list-style-type: none"> 在正常情況下，並無與直升機飛行路線相關的噪音影響 	<ul style="list-style-type: none"> 斜坡工程構成潛在景觀影響 來自兩款直升機的運作噪音，和「超級美洲豹」飛行期間所發出的噪音 	<ul style="list-style-type: none"> 雖然途中要經過斜坡通往直升機升降坪，但可提供暢通的道路往來診所 並無飛行安全的憂慮 	<ul style="list-style-type: none"> 建築緊急車輛通道時可能會產生生態影響。兩款直升機都會產生的剩餘的運作噪音
B1	坪利 –（緊急車輛通道的伸延部份）	<ul style="list-style-type: none"> 只牽涉有限度的建築工序 	<ul style="list-style-type: none"> 建築工序會對硬珊瑚群構成潛在的影響 直升機飛行期間及運作所產生的噪音 	<ul style="list-style-type: none"> 暢通的道路往來診所 並無飛行安全的憂慮 	<ul style="list-style-type: none"> 對硬珊瑚群產生的潛在影響及在正常情況^A時，可能產生的剩餘噪音影響
B2	坪利（西南）	<ul style="list-style-type: none"> 只牽涉有限度的建築工序 	<ul style="list-style-type: none"> 來自緊急車輛通道及直升機升降坪建築工程及遮蔽效應而對硬珊瑚群產生的潛在影響 直升機飛行期間及運作所產生的噪音 	<ul style="list-style-type: none"> 暢通的道路來往診所 並無飛行安全的憂慮 	<ul style="list-style-type: none"> 對硬珊瑚群產生的潛在影響及在正常情況^A時，產生的剩餘噪音影響
C	金坪村	<ul style="list-style-type: none"> 在建築期間並無顯著的影響（土地已平整） 	<ul style="list-style-type: none"> 對附近的民居構成顯著的直升機飛行期間及運作噪音 	<ul style="list-style-type: none"> 最佳通道通往診所 	<ul style="list-style-type: none"> 在建築期間並沒有任何憂慮，但在正常情況時直升機將可能產生顯著的剩餘直升機噪音，亦存有不可接受的飛行安全問題

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
D	大利南	<ul style="list-style-type: none"> 只牽涉有限度的建築工序 	<ul style="list-style-type: none"> 建築工序會對硬珊瑚群構成潛在的影響 直升機飛行期間及運作所產生的噪音 	<ul style="list-style-type: none"> 暢通的道路往來診所 並無飛行安全的憂慮 	<ul style="list-style-type: none"> 對硬珊瑚群產生的潛在影響及在正常情況[^]時，產生的剩餘噪音影響
E	白灣	<ul style="list-style-type: none"> 在建築期間並無顯著的影響 	<ul style="list-style-type: none"> 對附近的民居構成顯著的直升機飛行期間及運作噪音 	<ul style="list-style-type: none"> 暢通的道路往來診所 因鄰近翠濤花園而有飛行安全憂慮 	<ul style="list-style-type: none"> 在正常情況[^]中直升機可能會產生顯著的剩餘影響及飛行安全問題
F	白灣填海區（空地）	<ul style="list-style-type: none"> 在建築期間並無顯著的影響（土地已平整） 	<ul style="list-style-type: none"> 對附近的民居構成顯著的直升機飛行期間及運作噪音 	<ul style="list-style-type: none"> 最佳通道通往診所 因鄰近樓宇密集區而存有直升機飛行安全問題 	<ul style="list-style-type: none"> 在正常情況[^]中直升機可能會產生顯著的剩餘影響及不可接受的飛行安全問題
G	位於大利的路政署工地	<ul style="list-style-type: none"> 在建築期間並無顯著的影響（土地已平整） 	<ul style="list-style-type: none"> 直升機飛行期間及運作所產生的噪音 	<ul style="list-style-type: none"> 暢通的道路往來診所 有需要為石油氣的貯存／處理再劃設區域，否則有飛行安全問題 	<ul style="list-style-type: none"> 在正常情況[^]中直升機可能會產生顯著的剩餘影響及不可接受的飛行安全問題
H	現有位於大利的小渡輪碼頭	<ul style="list-style-type: none"> 在建築期間並無顯著的影響 	<ul style="list-style-type: none"> 直升機飛行期間及運作所產生的噪音 	<ul style="list-style-type: none"> 暢通的道路往來診所 有需要為石油氣的貯存／處理再劃設區域，否則有飛行安全問題 	<ul style="list-style-type: none"> 在正常情況[^]中直升機可能會產生顯著的剩餘影響及不可接受的飛行安全問題
I	白灣 – （緊急車輛通道東面的伸延部份）	<ul style="list-style-type: none"> 並無直升機運作時或途經路線產生的噪音影響 	<ul style="list-style-type: none"> 延長緊急車輛通道會影響到部份「海濱保護區」 	<ul style="list-style-type: none"> 暢通的道路往來診所 並無飛行安全的憂慮 	<ul style="list-style-type: none"> 延長緊急車輛通道會影響到部份「海濱保護區」因而產生顯著的負面景觀影響

註釋：* 見圖 1.2

[^] 「正常情況」是指使用直升機型號 EC155B1

1.4 設計改良

- 1.4.1 有關的工程設計已配合了減少環境影響的措施，當中包括在可行情況下將直升機升降坪及緊急車輛通道的高度減至最低以減少填海時所涉及的範圍，和安排適當的工序，以避免與擬定的坪洲污水處理廠改善工程產生累積噪音的影響。
- 1.4.2 於運作期間所產生的影響主要來自直升機噪音，因此最佳選址已考慮到遠離已發展地區的地方，同時亦容易通往就近診所。與此同時，亦已將直升機飛行範圍角度收窄，以避免/減少噪音對居民的滋擾。

1.5 累積影響

- 1.5.1 在評估累積影響時，亦考慮到另一項位於附近由渠務署進行的坪洲污水處理廠改善工程。該工程將於 2005 年中動工。
- 1.5.2 渠務署現正在坪洲設置污水收集系統，而渠務署已證實部份位於是項直升機升降坪工地邊界範圍內的工程，已於 2004 年完工。

2 建築工程塵埃

- 2.1.1 通過實行「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的影響。

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工地清理、設置工地寫字樓、豎立圍板及圍欄、填海工程和興建直升機升降坪及緊急車輛通道。
- 3.1.2 此項環評為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 根據擬定的建造時間表及使用設備清單，在未實施任何緩解措施的情況下，預計在翠濤花園的建築噪音將超過 75 分貝(A)的日間噪音標準。但在實施適當的緩解措施後（包括使用低噪音設備及臨時隔音屏障），建築噪音將可達至標準。
- 3.1.4 預計大利島污水處理廠改善工程和興建直升機升降坪的累積水平噪音，將不會對噪音感應強的地方構成任何噪音影響。

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」型號或「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 直升機在升降、起飛和在升降坪上操作時（包括在升降坪上懸空盤旋；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 就算在最壞的情況下，兩種型號的直升機在升降坪上操作時產生的噪音都符合 85 分貝(A) 的標準。然而「超級美洲豹 AS332 L2」型號直升機和「EC155 B1」型號直升機在標準的飛行範圍角度降落時於 NSR1 所產生的噪音水平分別為 91 分貝(A)和 88 分貝(A)。但經諮詢過政府飛行服務隊的意見後，飛行範圍角度可減少 35 度。減少飛行範圍角度後，由「EC155 B1」型號直升機降落時所產生的噪音影響，將因而符合噪音標準 – 最高噪音水平。
- 4.1.4 在「超級美洲豹 AS332 L2」型號直升機降落時，NSR2（翠濤花園）仍然受到約 3 分貝的剩餘噪音影響。但政府飛行服務隊盡量使用「EC155 B1」型號直升機進行緊急運送傷病者的行動，因此將不會產生任何的剩餘噪音影響。而「超級美洲豹 AS332 L2」型號的直升機只會在特別的緊急情況而又需要大型運送時才使用。此外，若需使用「超級美洲豹 AS332 L2」型號直升機，剩餘噪音影響亦將屬於非常短暫（少於 10 秒）。表 4.1 列出於 2003 年兩款直升機之使用記錄。

表 4.1 於坪洲執行「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	97 (1)	51	2
2001	125 (9)	57	3
2002	234 (29)	56	5
2003	167 (4)	42	5
2004	140 (5)	37	3

註：

- 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。
- 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」。
- 在 2003 年，政府飛行服務隊於坪洲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 2.3%。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 影響緩解評估

- 4.2.1 雖然在翠濤花園於「超級美洲豹」型號直升機在降落時所產生的最高噪音聲量預計會超過 85 分貝(A)，但由於直升機升降坪鄰近懸崖，而懸崖的地勢可有效減少兩款直升機在降落產生的噪音。因此，考慮亦包括設置緩解措施（將直升機升降坪往東面遷移 70 米）（見圖 1.2；即選擇 I）。最終，此遷移計劃會影響到現已被劃為用作保護及保留天然海岸線的「海濱保護區」，因而構成景觀及生態影響，當中包括天然沙灘的消失、增加了挖泥工程的需求，以及工程對水質的連帶影響。
- 4.2.2 由於直升機降落時的噪音是來自「超級美洲豹」型號直升機處於約距離直升機升降坪表面以北 30 米的半空時，所以裝設噪音屏障並不可行。
- 4.2.3 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。由於受影響的翠濤花園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 秒左右，住戶亦未必能迅速反應。因此，預計此措施的效用不大。

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 2000 至 2004 年的資料顯示，在考慮了所有可行的緩解措施後，「超級美洲豹」型號直升機運作時，平均每 12 日中，便在超過 85 分貝 (A) 噪音水平上，產生 3 分貝 (A) 的額外噪音。約 3 座位於翠濤花園的房屋將受到噪音的影響。預計每次的噪音影響只會維持約 5 至 10 秒左右。因此剩餘噪音影響的幅度、頻率及維持時間將不會構成嚴重而長遠的環境影響。
- 4.3.2 現時翠濤花園在最壞的情況下，所接收到的直升機噪音比標準高出 4-7 分貝(A)；而當擬建的直升機升降坪運作後，噪音將不會影響其他在翠濤花園以外的地方。因此新的直升機升降坪之建造將有助改善噪音環境。
- 4.3.3 將來擬建直升機升降坪在夜間（晚上七時至翌晨七時）運作時可能會引致可聽見的剩餘噪音。就選出合適的本地或國際標準對管制夜間直升機噪音以進行研究。根據美國航空署「消滅噪音的建議方法」中針對非軍用直升機噪音的，用作緊急服務的擬建直升機升降坪和來自緊急救護直升機服務的噪音，是豁免的。而且，緊急直升機服務是可容忍和必須的。
- 4.3.4 本港沒有用來管制晚間緊急直升機噪音的標準。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。如坪洲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 20 樓。

5 廢物管理

5.1 建築期

- 5.1.1 廢物管理評估中有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，以概述相應的措施，以減少對附近環境的影響和盡可能減少產生廢物。估計工程將挖掘約 14,000 立方米的海泥，並棄置於「南長洲廢土棄置區」。填海工程將需要輸入約 30,200 立方米的填料，當中包括約 25,000 立方米為石塊和護面塊石。
- 5.1.2 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，如：植物。但預計只會產生極少量的有機廢物，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 由於挖泥工程將只動用一部挖泥機，根據數據計算結果，預計於受體所產生的懸浮固體濃度，將會極輕微，並且符合可容忍水平。另外，根據於研究範圍的平均水深約 5.8 米，就是在非常接近挖泥機的地方，懸浮固體濃度亦將不會超出每公升 10.1 毫克的容忍水平。然而，懸浮固體濃度將於混合水域超標，但其影響範圍只有於水深約 3 米時伸延至 16 米（沿著主水流方向）和闊約 5 米（與水流垂直），及於水深約 2 米時伸延至 25 米和闊約 8 米，所以並未對其他容易受水質污染的地方構成影響。
- 6.1.2 預計回填施工期間不會排放微細的沉澱物，回填物料則將會是護面塊石及顆粒狀物料（最少的顆粒尺寸為 20 毫米），所構成的水質影響將因而較挖泥施工期間更為輕微。
- 6.1.3 將使用防沙幕以減少受到影響的範圍。

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。而運作時將不會產生任何排放物，所以不會對海洋環境構成影響。

7 生態

7.1 建築期

7.1.1 是項工程需在覆蓋約 0.57 公頃的海床範圍內進行約 14,000 立方米的挖泥工序，當中約 0.33 公頃的潮下海底棲息地會因填海工程而永久喪失。餘下的 0.24 公頃的海床將受到短暫的影響，而待海事工程完成後，該處可再次重建生態。此外，約有 0.1 公頃含沙、石及大石的潮間棲息地帶亦會永久喪失。

7.1.2 緩解影響的措施包括建造一條約長 200 米的人工斜面海堤，此舉將可減少永久喪失天然棲息地所帶來的影響。預計人工斜面海堤會提供 0.08 公頃的低潮海底棲息地和 0.12 公頃的潮間棲息地，而最後計算到的低潮海底棲息地的純損失面積為 0.25 公頃，潮間棲息地就有 0.02 公頃的純增長面積。由於本身白灣的低潮及潮間棲息地的基線生態價值不高，所以工程將不會構成顯著的剩餘影響。

7.1.3 由於海事工程規模小及為期短暫，所以不會構成不良水質影響因而危害到大利島的硬珊瑚群。但亦建議使用防沙幕以減低對水質的影響，以確保不會對硬珊瑚群構成不良生態影響。工程亦不會構成任何顯著的陸地生態影響。

7.2 運作期

7.2.1 雖然直升機升降坪在運作期間的噪音，可能會對雀鳥構成潛在的滋擾，而直升機運作時所產生的氣流，亦可能對蝴蝶構成潛在的影響，是項工程於運作期間將不會構成任何顯著的生態影響。

8 漁業

8.1 建築期

8.1.1 在工程進行期間，約 0.33 公頃較淺水的近岸環境將會永久喪失，但因該區較為淺水關係，所以並無漁業價值。包括一個位於工程東面未開發/未受影響的淺水海岸棲息地。

8.1.2 鑑於為連接通道而進行的挖泥工序規模較少，預期在大利橋對開的熱門休閒釣魚區將不會受到顯著的水質影響。而且，在直升機升降坪進行的較大型挖泥工序與該熱門休閒釣魚區的距離亦較遠，所以不會對該區水域構成影響。

8.2 運作期

8.2.1 工程在運作期間不會對漁業構成影響。反而更增建了一處約 200 米的人工海堤棲息地，而對該區漁業帶來益處。

9 文化遺產

9.1 建築期

- 9.1.1 在白灣進行的海洋地質測量發現兩件具有潛在海洋考古價值的「物件」。但由於淺水的關係，海洋地質測量亦受到限制，而只能限在該範圍進行防備性的水底勘察。
- 9.1.2 經海洋地質測量發現到的兩件「物件」為一幅沈積在海岸線的珊瑚瓦礫帶及大石。就水底勘察的發現，該處水域存有很多細小的「物件」，但經評估後，大多數「物件」只存有低文化遺產價值。
- 9.1.3 就桌面及實地的陸上文化遺產評估，並未發現在坪洲的研究範圍內有因興建直升機升降坪而受到影響的考古地點、歷史建築物。

9.2 運作期

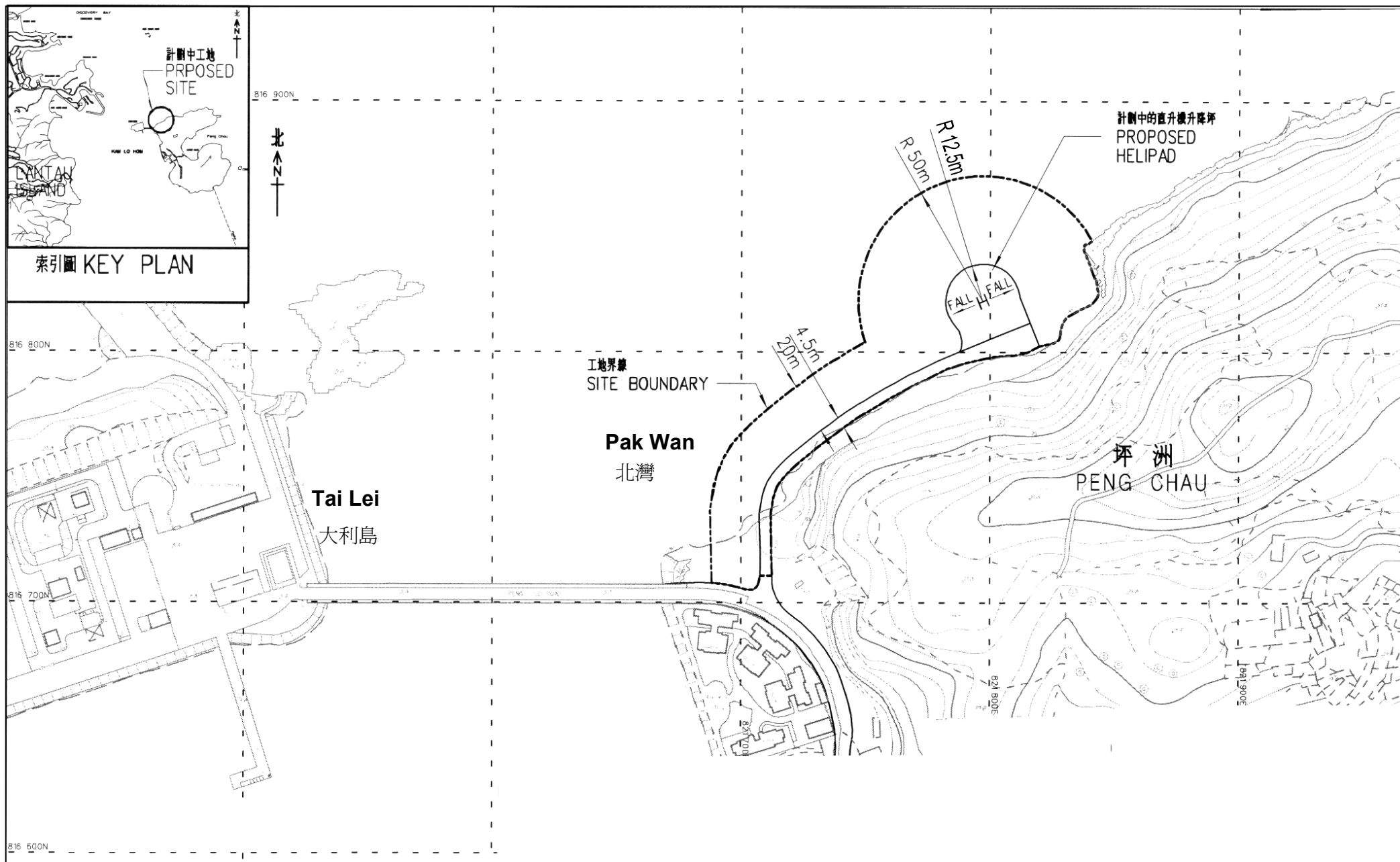
- 9.2.1 工程在運作期間將不會對文化遺產構成任何影響。

10 總結

- 10.1.1 是項工程包括在坪洲白灣興建一個可永久運作的直升機升降坪，在緊急的情況下運載坪洲居民往市區就醫。工程會以填海方法興建，實地考察及影響評估的結果指出，工程的興建及運作將不會構成顯著工程負面的水質或生態影響。
- 10.1.2 位於白灣的選址為 11 個在考慮興建直升機升降坪的選擇當中，最適合的一個。原因是因為其位置遠離樓宇密集區及容易通往坪洲診所。相對現有位於大龍村的直升機升降坪，擬定的選址，可為居民節省時間。此外當直升機靠近現有大龍村的升降坪時，會產生顯著的噪音影響（>85 分貝(A)），影響範圍包括附近的鄉村、包括翠濤花園的中型樓宇約 100 多人。
- 10.1.3 擬定的直升機升降坪選址擁有位於升降坪和翠濤花園之間，旁邊有天然石懸崖，此懸崖可有效阻隔直升機的運作噪音，減少噪音對居民構成滋擾。與此同時，通過改良直升機飛行路線，在大多數情況下，直升機降落時的噪音對居民的影響會減至最低。
- 10.1.4 預計「超級美洲豹」在降落時產生的噪音為大概每 12 日發生一次。噪音影響的產生會少於 10 秒，且其幅度、頻率，維持時間將不會構成嚴重而長遠的環境影響。

FIGURES

插圖

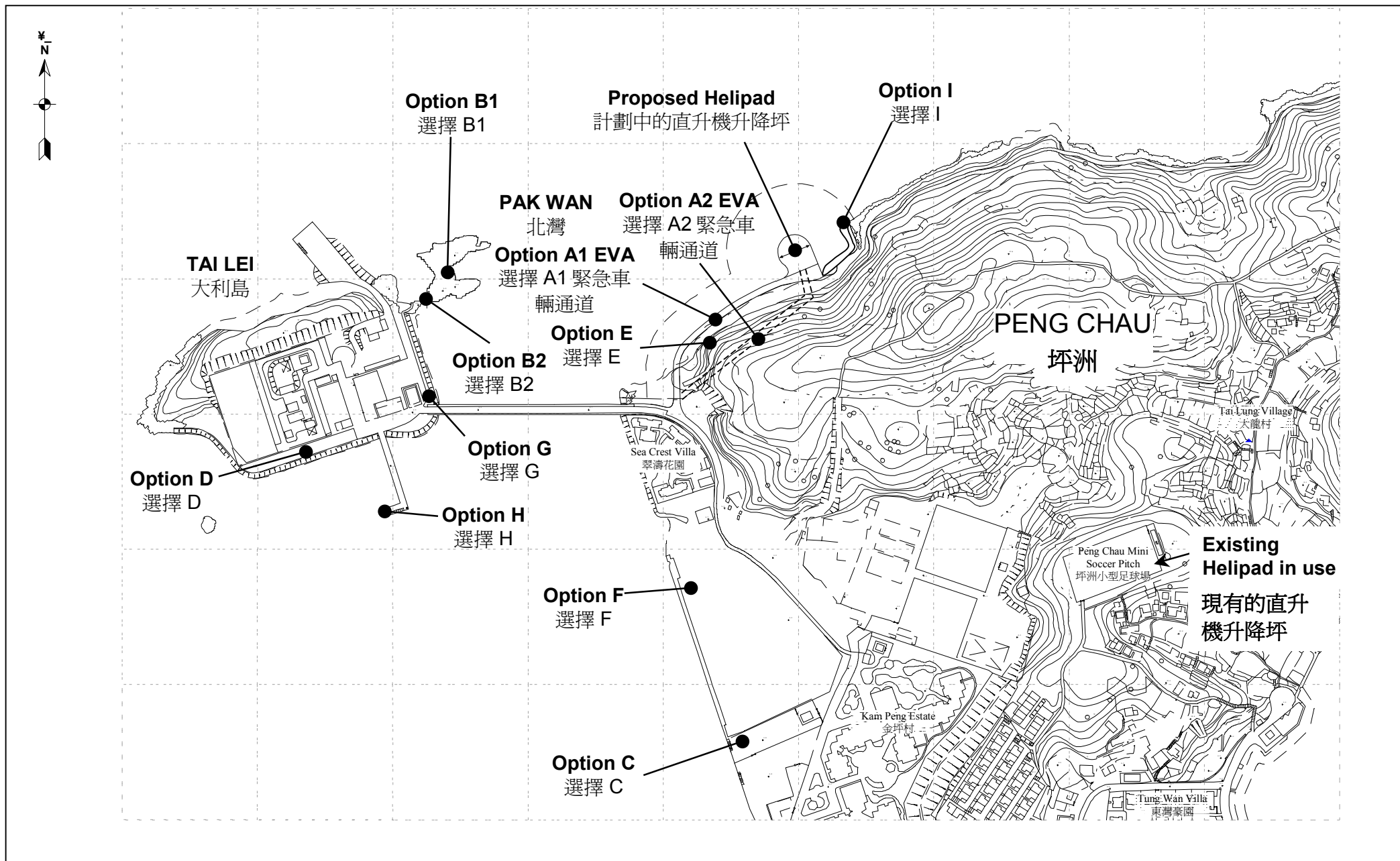


EIA Study for Peng Chau Helipad 坪洲直升機升降坪環境影響評估研究

PENG CHAU HELIPAD – SITE LOCATION 坪洲直升機升降坪 – 工地位置

Figure 1.1 圖 1.1

Drawn	ANW	Checked	RBR
Scale	1:2000	Date	June 2005 2005 年 6 月



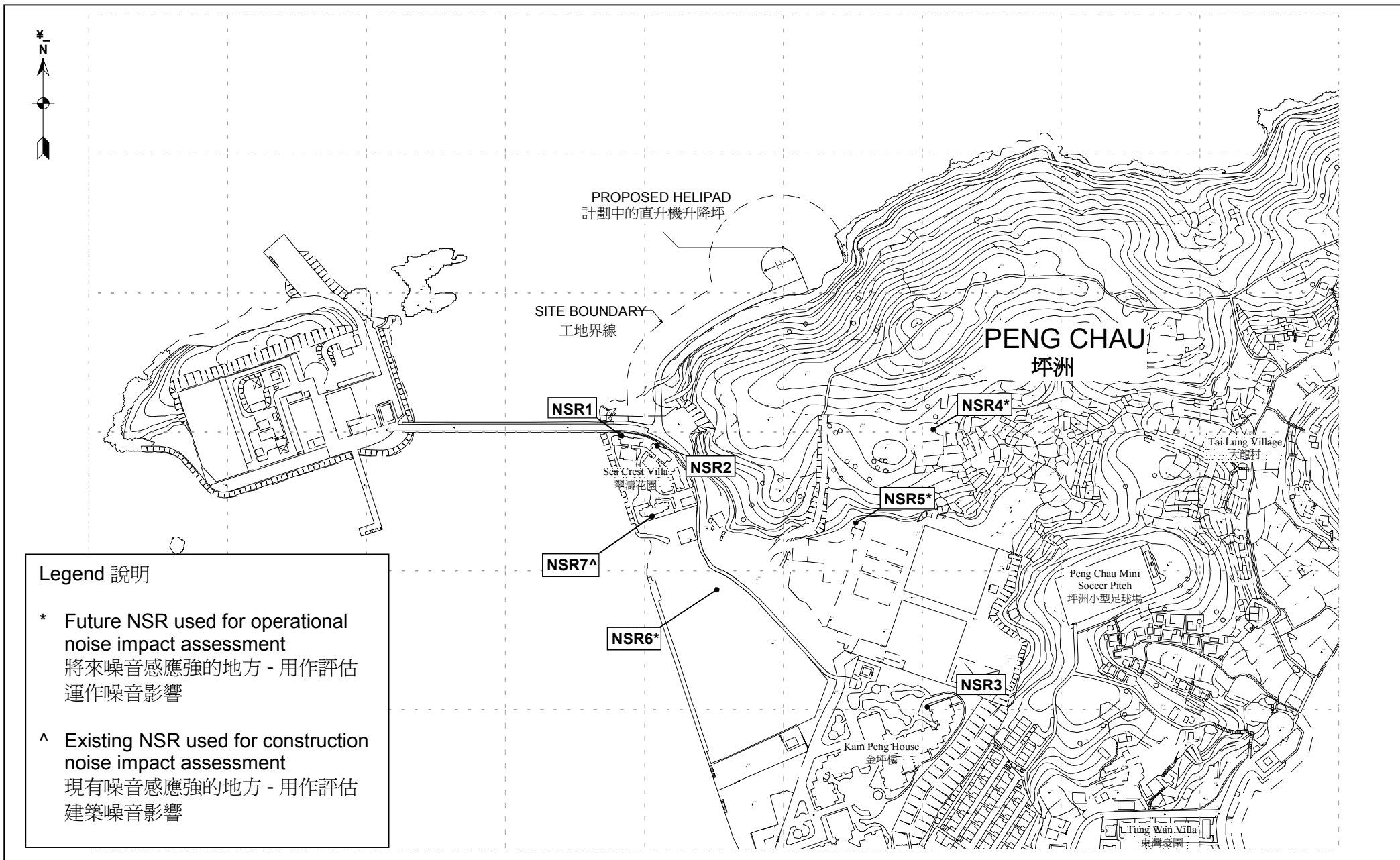


EIA Study for Peng Chau Helipad 坪洲直升機升降坪環境影響評估研究

VISUAL ILLUSTRATION 視野圖

Figure 1.3 圖 1.3

Drawn	ANW	Checked	RBR
Scale	NTS	Date	June 2005 2005 年 6 月



EIA study for Peng Chau Helipad 坪洲直升機升降坪環境影響評估研究

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	June 2005 2005年6月