

2 PROJECT DESCRIPTION

2.1 Key Project Requirements

- 2.1.1 The fundamental Project requirements are the construction of an easily accessible and permanent helipad and an associated Emergency Vehicle Access (EVA) link with sufficient width to allow free movement of an ambulance. The Fire Services Department has requested a 4.5-metres wide EVA for the Peng Chau helipad, while the GFS has confirmed that a round helipad of 25 metres diameter is sufficient for helicopter operations.
- 2.1.2 The helipad is solely intended for emergency use and associated *essential* 'casevac' training flights, and will not be used for commercial operations. As such, helipad use will be intermittent, with no fixed flight schedule. The primary considerations for helipad development are flight operation safety and its accessibility by ground emergency vehicles from the Peng Chau Clinic in emergency situations. The helipad must also be operable and accessible at all times.
- 2.1.3 According to the GFS Helipad Specification Guidelines, the guiding factors for siting a 'surface-level helipad' are as follows:
- The design and the location should be such that downwind operations are avoided and crosswind operations are kept to minimum to maximise helicopter manoeuvrability and operational safety. It should have two approach surfaces, separated by at least 150 degrees (i.e., a minimum *flight path angle* of 150 degrees).
 - The site should be conveniently situated as regards ground transport access mainly for emergency service (e.g. ambulance, fire engines) and adequate vehicle parking facilities.
 - The ambient noise level should be considered near noise sensitive receivers, and especially in relation to areas below the helicopter approach / departure path(s). This means that the helicopter flight path should be situated away from residential areas as far as is practicable, and for this reason the flight path for the proposed Peng Chau Helipad will approach and depart from the proposed helipad across the sea.
 - Ground conditions beneath the take-off climb and approach surfaces should permit safe landings in the event of engine failure or forced landings during which injury to persons on the ground and damage to property is minimized.
 - Consider, and assess with flight tests if necessary, the potential for and effects of eddies and turbulence that may be caused by any large structures close to the proposed helipad.
 - Consider the presence of high terrain or other obstacles, especially power lines, in the vicinity of the proposed site that may pose a potential hazard.
- 2.1.4 As information on the usage frequency of the proposed Peng Chau Helipad is critical for accurate operational phase impact assessment, relevant flight data from GFS for the 2000 – 2004 period has been reviewed (Section 4.6 refers). Data for the year 2002 represents the greatest number of casevac flights in recent years, and so has been used as a basis for the impact assessment.
- 2.1.5 Information on possible future changes in the size of the resident population is also important, and the Notes of the draft Peng Chau OZP No. S/I-PC/6 (dated April 15th 2005) estimate a planned population of about 6,200 persons: up 1% from the population of around 6,130 persons estimated from the 2001 Census. Given that the GFS data for the year 2002 already represents a worst-case scenario for determining casevac flight frequency, this small population increase is considered insignificant.
- 2.1.6 There is no specific data available on tourist visits to Peng Chau, indicating that the island is not considered a significant tourist destination.

2.2 Project History and Site Selection

Identification of Options / Alternatives

2.2.1 With reference to *Clause 3.3* of the EIA Study Brief, a number of construction and operational scenarios have been considered for the Project, with the preferred option selected accordingly. Consideration has been given to alternatives for:

- Helipad location and EVA link alignment;
- Project Design and construction methods; and
- Helicopter approach and departure paths.

2.2.2 As regards potential helipad siting options, three potential options identified through a site selection exercise initiated in 1997 by the then District Planning Office (DPO) for Sai Kung & Islands (now DPO for Lantau & Islands) were taken forward for consideration, namely Options A1, B1 and C.

2.2.3 A further ten site options / alternatives were identified under this Study for investigation. However, two of these additional ten sites – both located beyond the immediate Study Area (at east Peng Chau (Tung Wan) and southeast Peng Chau) – 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.

2.2.4 The characteristics of the eleven options / alternatives that were taken forward for more detailed consideration are summarised below. *Figure 2.1* displays the locations of the eleven sites.

Option A: Alternative A1 - Pak Wan (Marine EVA)

2.2.5 The proposed ‘*Option A: Alternative A1*’ is situated on the north coast of Peng Chau, and would require construction of approximately 150 metres of new EVA along the natural existing rocky / sandy coastline from the junction of Peng Lei Road with the Tai Lei bridge crossing. The helipad would be constructed slightly offshore.

2.2.6 The proposed site is immediately adjacent to a natural rock wall that would provide some noise shielding from the construction and operation of the helipad.

Option A: Alternative A2 - Pak Wan (Land EVA)

2.2.7 The proposed ‘*Option A: Alternative A2*’ would access the same helipad as for ‘*Option A: Alternative A1*’ but by way of an inland coastal EVA that would follow the approximate alignment of the existing Pak Wan footpath and would thereby largely avoid disturbing the natural shoreline.

2.2.8 The start of this alternative EVA would also be from the Peng Lei Road / Tai Lei bridge crossing junction, and is also about 150 metres long.

Option B: Alternative B1 - Pei Lei

2.2.9 The proposed ‘*Option B: Alternative B1*’ would involve developing the helipad on top of the small islet of Pei Lei, off the northeast coast of Tai Lei. As the Pei Lei islet is on rocky ground, it was assumed that the construction of this alternative would require rock drilling / blasting activities to form a level platform for use by the helicopter.

2.2.10 There would also be a need to develop approximately 100m of EVA from the Tai Lei end of the bridge crossing, of which some 70m could be developed on existing formed land with the re-provisioning of a landscaped area. The remaining 30m of EVA would be developed by concrete on top of small diameter mini bored piles.

- 2.2.11 It was noted that there is a hard coral community of some ecological conservation value around Pei Lei that would need to be considered should there be any development of this option.

Option B: Alternative B2 - Pei Lei Southwest

- 2.2.12 The proposed '*Option B: Alternative B2*' site would involve developing the helipad on a raised platform supported by small pre-bored mini piles on the relatively flat southwestern edge of Pei Lei. This alternative could avoid directly disturbing coral communities of ecological and conservation value around Pei Lei.
- 2.2.13 As with '*Option B: Alternative B1*', there would be the need to construct an 80m long EVA link from the Tai Lei end of the bridge crossing, although most of this length can be developed relatively easily through re-provisioning of the existing landscaped area at the east of Tai Lei.

Option C – Kam Peng Estate

- 2.2.14 The proposed '*Option C*' site is located to the west of Kam Peng Estate. As the land has been reclaimed, the construction works required would be relatively minor. However, this site is in close proximity to nearby residences.

Option D – Tai Lei South

- 2.2.15 The proposed '*Option D*' site is located at the southern site of Tai Lei Island beside the existing Peng Chau Sewage Treatment Works (STW). The Drainage Services Department (DSD) is planning for an extension of the STW under which a submarine outfall would be constructed. Through liaison with DSD, it was determined that the alignment of the planned effluent outfall could still leave sufficient space for the development of a helipad at this location.
- 2.2.16 The helipad would be situated on the existing land between the STW and the seawall. It is required to extend the southern side of the landing area by about 15 metres to meet the minimum helipad size requirement. The EVA can be developed on existing formed land. As there are also coral communities of ecological conservation value adjacent to the '*Option D*' site, these need to be considered should there be any development of this option.

Option E – Pak Wan

- 2.2.17 The '*Option E*' site was proposed to minimise the potential loss of natural shoreline, and hence potential water quality, ecology and fisheries impacts, as compared with '*Option A*' site. The helipad would be situated at a similar location to the '*Option A*' site but closer to the existing Tai Lei bridge crossing so that only about 50 metres of EVA would be required. However, this site cannot take advantage of the noise shielding effect of the rock wall near '*Option A*' site and so noise impacts to adjacent residences would be correspondingly greater.

Option F – Pak Wan Reclamation Area (Open Space)

- 2.2.18 The proposed '*Option F*' site is an open space at the north end of the Pak Wan reclamation area. It was proposed to use part of the vacant area as a helipad site. As with the '*Option C*' site, there are residential buildings nearby that would be particularly sensitive to helicopter noise.

Option G – Works Area of Highways Department on Tai Lei

- 2.2.19 The proposed '*Option G*' site is currently used as a works area by a Highways Department (HyD) contractor and liquefied petroleum gas (LPG) cylinder storage area. If the site was to be adopted, an alternative site would need to be provided for a new LPG storage facility.

Option H – Existing Small Pier on Tai Lei

- 2.2.20 This proposed ‘*Option H*’ site comprises the existing small pier on the southern side of Tai Lei Island, primarily used for the delivery of LPG cylinders and other goods. The size of the pier deck has to be enlarged to comply with the minimum size requirements of the helipad.
- 2.2.21 There are also coral communities of ecological conservation value adjacent to the ‘*Option H*’ site that would need to be considered should there be development at this site.

Option I – Pak Wan (EVA East Extension)

- 2.2.22 This proposed ‘*Option I*’ helipad site would involve an eastwards extension to the ‘*Option A: Alternative A1*’ EVA by approximately 70 metres. The extended EVA would pass along a sandy beach and around a ‘Coastal Protection Area’, but would allow the helipad to be located beyond the helicopter noise impact zone.

Construction Methods

- 2.2.23 Three construction methods for forming the helipad platform and the EVA link have been considered and these are briefly summarized as follows:*
- The dredge and reclaim method would require dredging of marine sediment to a suitable depth to allow construction of a stable foundation, followed by deposition of filling materials up to the required platform level.
 - Small diameter pre-bored piling method involves sinking a casing through the substrate and removing the material within. Concrete is then poured into the casing to form the pile. A platform structure is then constructed on top of the piles.
 - Percussive piling method involves driving steel piles into the bedrock. As the piles are driven through to the bedrock, sediments are laterally displaced without the need for dredging or excavation. A platform is constructed similarly as for the pre-bored piling method.

Evaluation of Options / Alternatives

- 2.2.24 Under the broader remit of the Assignment, the Consultants established a framework based on the basic principles of the EIA process that collectively aim to protect the environment through prevention.[†]
- 2.2.25 The evaluation framework comprised an initial assessment, mainly on environmental issues, through which environmental impacts were predicted through joint consideration of helipad location and construction method / programme. This was followed by a Value Management (VM) exercise that involved consultation with the local community and other stakeholders at an early stage of the Project and before detailed technical assessment had been undertaken. The VM exercise also took other non-environmental evaluation criteria, including time-frame, engineering feasibility, project cost, site availability, land ownership and community / social impacts into consideration.
- 2.2.26 The key community concerns identified through the consultation meetings and the VM exercise are listed below (in order of importance):
- *Operational safety* – the safety of the helicopter crew, passengers and the nearby community during

* The development of a Floating Pontoon was investigated but was not considered feasible for ‘casevac’ operations due to questions over operability and accessibility under adverse weather conditions.

[†] EPD (2000). EIAO Guidance Note No. 1/2002: Basic Principles of the EIA Process. January 2002.

helicopter activity were the main concern.

- *Time frame* – site availability and the speed of construction was raised as important factors due to the fact the helipad is for emergency casualty evacuation.
- *Direct ground access* – given the inconvenience of the existing helipad, proximity to and availability of direct and uninterrupted access to the Peng Chau Clinic is another issue of key concern.

- 2.2.27 Cost is another factor to be considered as it may indirectly affect the project delivery schedule. If the project cost exceeds the available budget ceiling, a more lengthy funding allocation exercise will be required that will delay project development.
- 2.2.28 In accordance with ETWB Technical Circular (Works) No. 13/2003 on “Guidelines and Procedures for Environmental Impact Assessment of Government Projects and Proposals”, regular consultation has also been conducted with EPD and the local District Council throughout the duration of the EIA Study.
- 2.2.29 A summary of the helicopter site option evaluation in relation to environmental benefits, dis-benefits and other key non-environmental considerations (e.g., access and safety issues) is presented in *Table 2.1*. Elaboration on the factors affecting site selection is provided in the following paragraphs.
- 2.2.30 For the ‘*Option A: Alternative A2*’ site, consideration had been given to combining the EVA construction works with those for the Pak Wan footpath. However, the result of the assessment and evaluation exercise indicated that this approach would give rise to a range of unacceptable environmental impacts. In particular:
- Widening the footpath to 4.5m wide to cater for the need of the EVA would require slope cutting some 3 metres into the natural hillside along the 150m long EVA. Assuming that the slope faces along the EVA are very stable rock and can be formed vertically to ~3m height, there would be a loss of at least 500m² of natural vegetation. There would also be a need to form a vertical strip of engineered slope some 3m high and 150m long across the middle of the hillside parallel to the coastline.
 - The elevation of the footpath is at approximately 14mPD at its closest point to the proposed helipad. The helipad would be built to a final elevation of 5.15 mPD. In order to link up the EVA with the helipad to match the level difference while satisfying the maximum allowable gradient for use of the emergency vehicles, the length of the EVA has to be extended and the helipad would need to be located further offshore. Both requirements would increase the scale of the project and associated environmental impact potential.
- 2.2.31 The ‘*Option B*’ (both *Alternatives B1 and B2*) and ‘*Option D*’ sites were considered environmentally unacceptable, as they are too close to the ecologically sensitive coral communities that may be disturbed by sediment release during construction. The possible shading effect from the helipad platform could also adversely affect coral growth and survival. These three options would also give rise to a helicopter noise impact at the Sea Crest Villa Noise Sensitive Receiver (NSR) under normal operating conditions.
- 2.2.32 The ‘*Option C*’ and ‘*Option F*’ sites would give rise to unacceptable safety concerns and helicopter noise impacts due to their close proximity to built areas and infrastructure nearby. Similarly, the ‘*Option E*’ site –, as the closest to Sea Crest Villa – would generate unacceptable helicopter noise impacts on residents.
- 2.2.33 The ‘*Option G*’ and ‘*Option H*’ sites are not acceptable due to safety concerns over relocating the existing LPG storage / handling areas, while a helipad at either of these sites would also generate a helicopter noise impact at Sea Crest Villa under normal operating conditions.
- 2.2.34 As presented in more detail under *sub-section 4.6*, the coastal cliff adjacent to the ‘*Option A: Alternative A1*’ location effectively shields the Sea Crest Villa NSRs from helicopter ‘manoeuvring’

noise. This location is also sufficiently distant from Sea Crest Villa and other NSRs such that no helicopter ‘approach’ noise impacts are predicted during normal operations when the preferred ‘Eurocopter EC 155B1’ type helicopter is in use.

- 2.2.35 Helicopter ‘approach’ noise levels are predicted to reach up to 88dB(A) at Sea Crest Villa on occasions when the preferred ‘EC 155B1’ type helicopter is not available for use, and the ‘Super Puma AS332 L2’ type helicopter is required. However, the impact duration is predicted to last 5-10 seconds while the impact frequency is predicted to be just once approximately every 12 days.
- 2.2.36 Consideration was given to implementing direct and indirect mitigation measures to satisfy the 85dB(A) helicopter noise standard. It was found that if direct mitigation measures were pursued, involving relocation of the helipad further 70m to the east to eliminate residual helicopter noise generated by the ‘Super Puma’ type helicopter (i.e., ‘*Option P*’), such relocation would infringe upon an area zoned “Coastal Protection Area” on the draft Peng Chau OZP No. S/I-PC/6 and therefore give rise to adverse landscape impacts, increased waste handling, habitat loss and water quality impacts.
- 2.2.37 As the helipad is intended for emergency use there is no fixed flight schedule. Accordingly, the use of indirect mitigation, such as improved window glazing and installation of air conditioners, was not considered practicable due to the short impact duration (< 10 seconds) and unpredictable timing of helicopter operations at the proposed helipad.
- 2.2.38 Overall, in addition to consideration of the residual helicopter noise impact on the local community as mentioned in above paragraphs, as the residual helicopter noise impact is not predicted to cause significant adverse long-term effects on the local community, development at the ‘*Option A: Alternative A1*’ helipad location is preferred. It is also noted that the noise impact due to helicopter manoeuvring at the existing helipad is estimated to adversely affect over 100 residential buildings. Furthermore, the noise level at Sea Crest Villa from existing helicopter flight is 92 dB(A) when the ‘Super Puma’ is in operation and 89 dB(A) when the ‘EC 155B1’ is operational [*sub-section 4.6* refers]. These levels are above the permissible noise standard of 85dB(A).
- 2.2.39 Reclamation was selected as the preferred construction method by virtue of the shorter time frame required for development in the absence of any significant adverse construction phase environmental impacts. Percussive piling would give rise to significant construction noise impacts due to the proximity of the works area to residences at Sea Crest Villa, while the main disadvantage of mini pre-bored piling is the slow rate of construction and hence delay in availability of the project to the local community. The footprints of the helipad and EVA are small due to the shallow water depth, and hence the scale of the reclamation is relatively minor. Reclamation also ensures there is no adverse construction noise impact at Sea Crest Villa [*Section 4* refers].

Design Refinements to the Preferred Option

- 2.2.40 Consideration has been given to means by which the design could be refined to minimise the scale and duration of the works, and hence avoid or reduce the environmental impact potential. This approach of proactive avoidance and minimisation through design takes precedence over impact mitigation.
- 2.2.41 During the course of the study the following measures have been taken to refine the project design with a view to avoiding potential impacts:
- The elevation of the helipad and EVA have been lowered as far as practicable in order to minimize their footprint, and hence the disturbance to the affected coastal waters.
 - The sea-facing sloping boulder wall has been designed to a steeper gradient, resulting in a reduction in the size of the foundation.
 - The construction sequence shall be optimised to avoid cumulative construction noise effects with works for the proposed upgrading works of the Peng Chau Sewage Treatment Works.

- 2.2.42 In addition, during the detailed design stage of the Project the alignment of the EVA shall be further refined to make it as close to the existing cliff-face as is practicable in order to minimise marine-based works and the loss of shallow sub-tidal habitat.

Operational Considerations

- 2.2.43 Helicopter noise is the main environmental concern during operation of the helipad. It is predicted that there would be residual noise impact of 3 dB(A) at Sea Crest Villas under the worst-case scenario, compared with the existing worst-case scenario exceedance of the noise criterion of 7 dB(A). Based on worst-case GFS data for 'casevac' operations at Peng Chau, the predicted frequency of the residual impact is approximately once every 12 days. The impact duration would last for not more than 5-10 seconds per event. A number of issues have been considered in this regard, and are discussed in greater detail in *sub-section 4.6*. They include:

Helipad distance from the built environment

- 2.2.44 It has been predicted that the helicopter flight noise impact 'zone' for the 'Super Puma' type helicopter is 221 metres [para. 4.6.19 refers]. Given the hilly nature of the topography at north and south Peng Chau and the relatively densely populated central isthmus that needs to be protected from helicopter noise impacts as far as is practicable, there are no suitable land-based helipad options. On the other hand, there is need to minimize the travelling time from the Clinic to the helipad. A suitable balance must be struck between these conflicting requirements.
- 2.2.45 Of all the Options / Alternatives considered, '*Option A: Alternative 1*' offers the best noise environment as it is relatively remote from the built environment, while a natural rocky cliff-face will effectively shield Sea Crest Villa – the nearest Noise Sensitive Receiver – from adverse helicopter manoeuvring noise impacts. There will be no adverse helicopter noise impact under normal operating conditions.

Helicopter Type

- 2.2.46 Consideration has been given to use of helicopter types generating lower noise levels for casualty evacuation operations. However, GFS has confirmed that at present only the two helicopter types that have been assessed in this EIA Report (i.e., the 'Eurocopter EC155 B1' and 'Eurocopter Super Puma AS332 L2') are available for such operations.
- 2.2.47 For operational considerations, the GFS would not be able to exclude the 'Super Puma', the noisier of the two types, from using the helipad although the GFS has agreed to give priority to the quieter 'EC155 B1' type helicopter for 'casevac' operations wherever practicable. This approach also follows the trend of current usage of the two helicopter types in Peng Chau. As only one helicopter would be able to operate at the helipad at any one time, no cumulative helicopter noise effects will be generated. During the years 2003 and 2004, GFS has only used the smaller and quieter EC155 B1 type helicopter for night-time casevac operations and GFS has advised that this usage trend is expected to continue.

Table 2.1 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 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 impact from necessary EVA construction / slope works, and 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 likely 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.
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.

Option / Alternative	Location *	Key Environmental Benefit(s)	Key Environmental Dis-benefit(s)	Other Key Considerations (e.g., safety & access)	Conclusion
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 2.1 refers. ^ Normal operation refers to the use of EC155 B1 type helicopter.

Helicopter Flight Path

- 2.2.48 The flight path is necessarily constrained by the flight safety requirements of GFS. The GFS guideline states that a surface level helipad should have two approach surfaces extending from the helipad. In plan view, the centreline of the two flight paths should ideally be separated by at least 150 degrees so that should wind conditions impose constraints on flight safety (para 2.1.3(a) refers) there is always one other option for safe helicopter approach / departure.
- 2.2.49 It was determined that a flight path separation angle of 150 degrees would adversely affect all residences at Sea Crest Villa. With the agreement of GFS, the angle of separation between the two flight paths for the 'Option A: Alternative A1' site has been reduced to 115 degrees [Figure 4.3 refers]. The re-aligned helicopter flight path will increase the distance between the noise source (helicopter) and the noise sensitive receiver (residential area) so that helicopter approach noise generated by the 'EC155 B1' type helicopter can be reduced to within the 85dB(A) guideline at all noise sensitive receivers.
- 2.2.50 There will be a residual helicopter noise impact when the 'Super Puma AS332 L2' helicopter is used although this helicopter type is not frequently used.

2.3 Project Characteristics and Site Location

- 2.3.1 The Project involves the construction of a helipad by the 'dredge and reclaim' method in shallow coastal waters of 2-3 metres depth at Pak Wan, northwest Peng Chau. The project will be constructed off a natural, predominantly rocky coastline. The project location was selected after detailed consideration of the operational requirements and environmental impact potential of developing the Project at each of thirteen site locations. With reference to the current statutory Peng Chau Outline Zoning Plan (No. S/I-PC/6), the proposed site is within a "Government, Institution or Community" ("G/IC") zone and has been identified as a possible helipad. According to the Notes of the OZP, "Helicopter Landing Pad" is a Column 2 use that may be permitted with or without conditions on application to the Town Planning Board.
- 2.3.2 The helipad deck will be located approximately 10 metres from the back of the Pak Wan shore (i.e., existing land). An EVA will be constructed along the natural shoreline to link the proposed helipad with the existing EVA located adjacent to Sea Crest Villa. The works contractor shall install a standard 2.4m high solid corrugated metal hoarding along the Peng Lei Road site boundary, opposite to Sea Crest Villa, to fence the site and with the effect of also avoiding adverse visual impacts on pedestrians. Figure 2.2 shows the site location, while Appendix 2.1 presents a visual illustration of the Project.
- 2.3.3 The site location was selected after due consideration of the operational requirements and environmental impact potential of constructing and operating the Peng Chau helipad at each of eleven site locations. Specific Project details are as follows:
- Approximately 14,000m³ of fine to coarse marine sand will need to be dredged.
 - The EVA link will be about 150 metres long and 4.5 metres wide.
 - The helipad will have a diameter of 25 metres.
 - The EVA link and helipad surfaces will be formed to a height of approximately +5.0 mPD.
 - Wave deflectors will be installed around the helipad to enhance operational safety.
 - An off-site works area (including site office) to be located on existing vacant land immediately south of Sea Crest Villa that will be required for about 2 years, from December 2005. No off-site pre-casting works are anticipated.
- 2.3.4 The construction programme can be broadly summarised as presented by Table 2.2.

Table 2.2 Summary of Peng Chau Helipad Construction Programme

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

2.3.5 Further details of the construction works are presented in *Section 4*, while the full construction programme is presented in *Appendix 2.2*.

Landscape Treatment

2.3.6 Clause 3.4.8 of the ESB that requires the provision of landscape design proposals. On the advice of PlanD, it is proposed that vegetation cover be established beside the junction of the proposed new EVA with the existing Peng Lei Road, opposite the low-rise Sea Crest Villa residential development. This area is the only part of the proposed EVA alignment that will be visible to the general public from and occupants of some of the middle and upper floor residences at Sea Crest Villa. The coastal section of the proposed EVA comprises a natural vertical cliff face that does not require landscape treatment, while this section of the EVA and the actual helipad will be exposed to seawater splash where terrestrial vegetation cannot be established. Hard landscaping measures have been proposed in these areas with the sensitive design of a sloping boulder seawall (*Figure A2.1b* and *Figure A2.1c* in *Appendix 2.1* refer).

2.3.7 For the soft landscaping works, it is proposed that the area immediately west of the EVA at the Peng Lei Road junction and the strip between the coastal EVA and the foot of the cliff be hydroseeded with a commercially available mix of grass seeds. A suitable composition of such a mixture that is currently being applied for hydroseeding works for CEDD's Fill Bank at Tseung Kwan O Area 137 includes:

- Carpet Grass (*Anoxopus compressus*): 5 g/m²
- Bermuda Grass (*Cynodon dactylon*): 10 g/m²
- Bahia Grass (*Paspalum notatum*): 10 g/m²
- Mulch: 200 g/m²
- Fertilizer (NPK 15:15:15): 100 g/m²

2.3.8 The location of the proposed hydroseeding is illustrated on *Figure A2.1a* and covers an approximate area of 100 m².

2.3.9 Given the presence of a fairly diverse vegetation community at northwest Peng Chau, including a range of native trees and shrubs, it can be expected that natural colonisation of the hydroseeded area will occur in time, thereby adding to the 'greening' effect in the area.

2.4 Nearby Projects

2.4.1 Other projects identified in the vicinity that require consideration for the purposes of identifying and assessing as necessary the potential for cumulative effects are as follows:

Peng Chau Sewage Treatment Works Upgrade

2.4.2 The construction of DSD's Peng Chau Sewage Treatment Works (STW) Upgrade is scheduled to commence in mid-2005 and is tentatively scheduled for completion by the end of 2007. In addition to DSD's further advice, the associated marine works are tentatively scheduled from August 2005 to April

2006, although the programme is still under vetting. The latest agreed construction programme for the STW Upgrade project and DSD's further information are presented in *Appendix 2.3*.

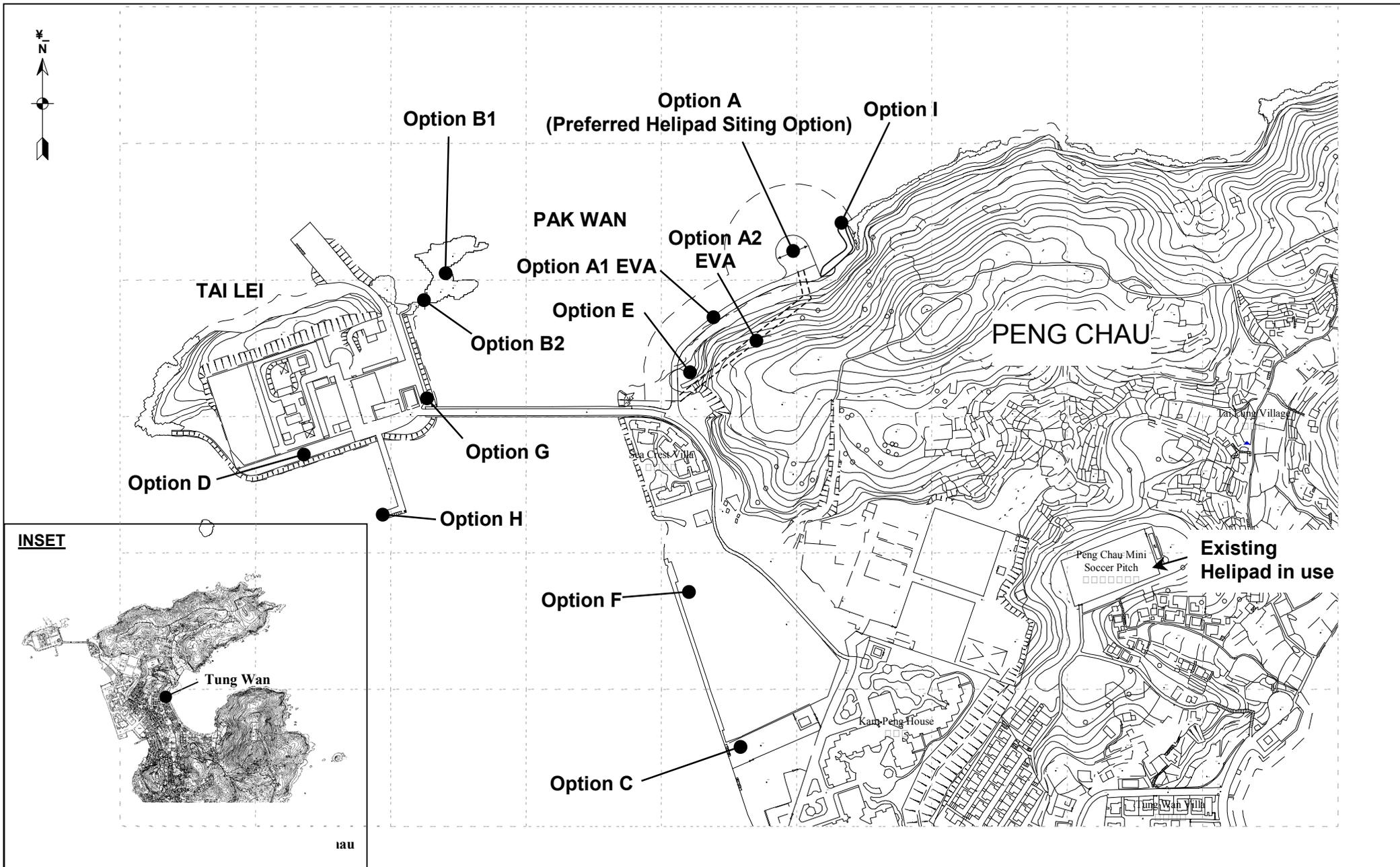
- 2.4.3 As the STW upgrading works may be implemented in parallel with the helipad project, the potential for, and magnitude of, cumulative impacts have been assessed in detail using a standard calculation based on the Gaussian theory, as presented in the following sections.

Drainage Improvement Works at Peng Chau

- 2.4.4 DSD is currently implementing a sewerage improvement scheme, mainly in the centre of Peng Chau town but also involving some works within the helipad project boundary. It has been confirmed with DSD that the overall works are scheduled for completion in early / mid 2005, while the portion within the Peng Chau helipad project boundary – involving mains upgrade and construction of a pumping station – was completed in 2004. As such, these works will not lead to any cumulative effects.

2.5 Likely Future Environmental Conditions Without the Project

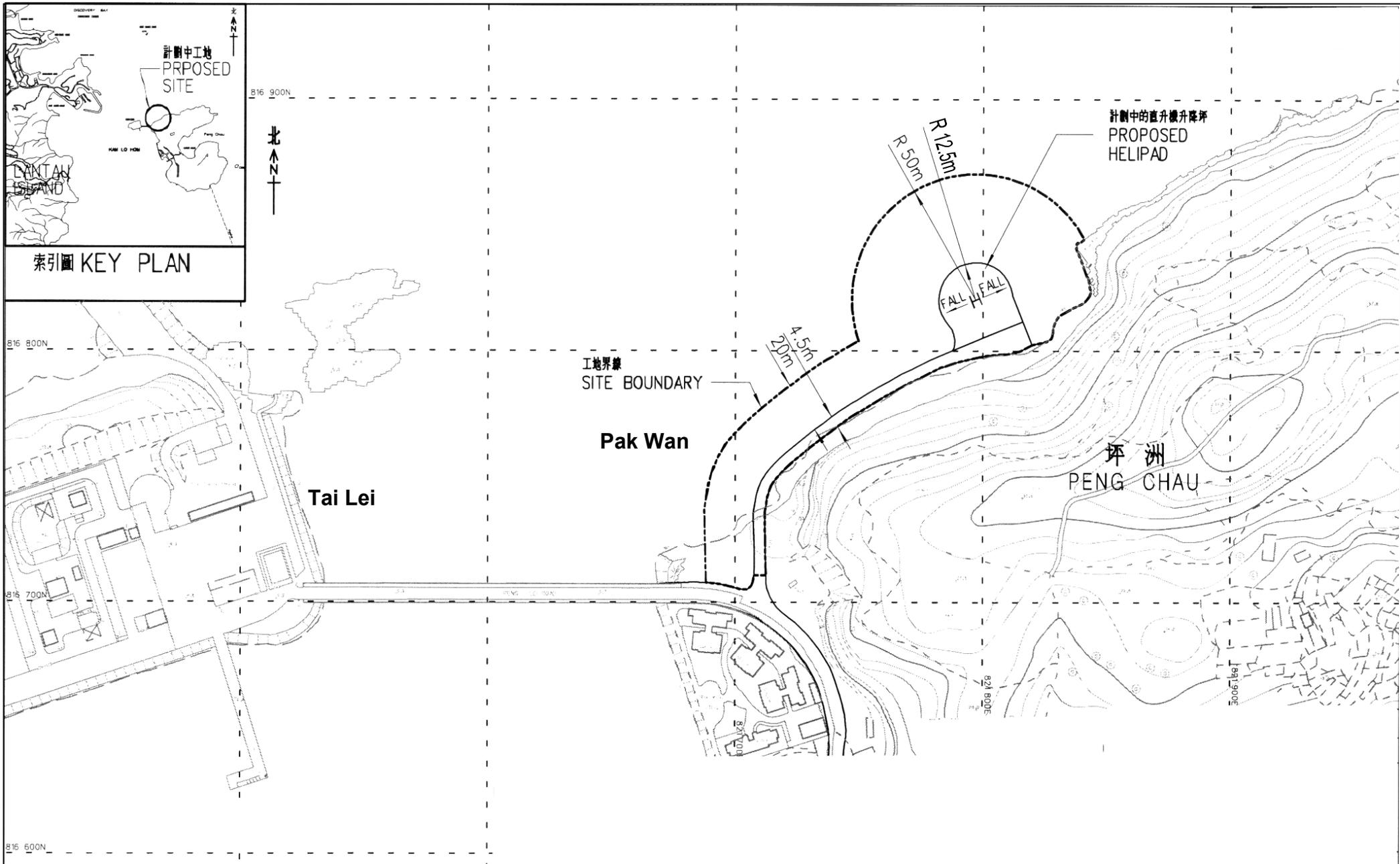
- 2.5.1 Without the Project the existing helipad site on a hard surface soccer pitch located atop a hill near Tai Lung Tsuen will continue to be used. In addition to flight safety concerns (para. 1.2.3 refers) and access difficulty (para. 1.2.4 refers), use of the existing helipad will generate a significant helicopter noise impact on surrounding residents.
- 2.5.2 It has been estimated that over 100 village type and medium rise residential buildings, principally in Shan Ting Tsuen, Kam Peng and Tung Wan Villa are presently exposed to noise levels above the 85dB(A) helicopter noise standard under normal operating conditions (i.e., using the quieter EC155 B1 type helicopter). In particular, the flight path to the existing helipad passes over Sea Crest Villa.
- 2.5.3 The noise assessment detailed in *Section 4* predicts that helicopter noise levels at Sea Crest Villa due to the existing flight path are greater than the 85dB(A) limit. Furthermore, the noise level is predicted to be greater than the corresponding helicopter flight noise level upon operation of the proposed helipad at Pak Wan due to a shorter distance separation. As such, if the project is not implemented a large number of residents will continue to be adversely affected by helicopter noise, including those at Sea Crest Villa.



EIA Study for Peng Chau Helipad
PENG CHAU HELIPAD SITING OPTIONS

Figure 2.1

Drawn	FEW	Checked	RBR
Scale	1:4000	Date	June 2005



EIA Study for Peng Chau Helipad
PENG CHAU HELIPAD – SITE LOCATION

Figure 2.2

Drawn	MAT	Checked	RBR
Scale	1:2000	Date	June 2005