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**Figure 1.1**      Location of the Project Site

## 1. INTRODUCTION

- 1.1 In early 2002, the Civil Engineering Department (CED) carried out a study on the implication of the deferment of the construction of Route 10 Southern Section, which was formerly known as the Route 10 Lantau East Coastal Section, and the Pa Tau Kwu Section of Chok Ko Wan Link Road to beyond 2016 on the proposed Penny's Bay development including Hong Kong Disneyland Development. The study report concluded that it was acceptable from the point of view of road capacity, and recommended that the construction of a part of the Road P1 works at **Yam O, which has been renamed as Sunny Bay recently** would need to be advanced to ensure that a second entrance/exit is provided to and from the proposed theme park in Penny's Bay for relieving large number of park visitors during emergency situation. **Figure 1.1** shows the location of the proposed Project.
- 1.2 In April 2000, Maunsell Consultants Asia Limited was commissioned by CED as the consultant to undertake the design and construction assignment for the Infrastructure for Penny's Bay Development (Agreement No. CE 68/99). The services have subsequently been extended to cover the Road P1 Advance Works at Sunny Bay (hereinafter referred to as "the Project"), under the Supplemental Agreement No. 1.
- 1.3 Under Item A.1 and Item C.2 of Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap.499), the Project is a designated project and therefore an Environmental Impact Assessment (EIA) study is required and an environmental permit will need to be obtained prior to construction works commencement.
- 1.4 This report provides a summary of the key findings of the EIA Report, assessing potential environmental impacts from the construction and operation phases of the Project, and recommending mitigation measures to comply with environmental legislation and standards.

## 2. PROJECT DESCRIPTION

- 2.1 The proposed Road P1 Advance Works at Sunny Bay mainly comprises:
- (i) construction of about 1,000m of 2-lanes single carriageway road, namely Slip Road 5, including about 650m on elevated concrete structures, about 200m on elevated steel structures and the remaining section on reclamation;
  - (ii) construction of about 1,000m of 2-lanes carriageway road, namely Slip Road 6, including about 650m on elevated concrete structures, about 200m on elevated steel structures and the remaining section on reclamation;
  - (iii) construction of an at-grade roundabout, namely at-grade Road P1 Roundabout, to the west of Sunny Bay reclamation area formed under the Infrastructure for Penny's Bay Development, Contract 1;
  - (iv) construction of about 150m of dual-2 and two 350m single two-lane at-grade road, namely Road A, connecting from the at-grade Road P1 Roundabout to Sunny Bay Road Roundabout north of Sunny Bay Public Transport Interchange and the associated retaining wall;
  - (v) reclamation works (about 3 ha.) and construction of seawall for forming the road embankment;
  - (vi) other associated works including traffic control and surveillance system and CCTV facilities in connection with the roads construction of at-grade road connections from the at-grade

Road P1 Roundabout to Sunny Bay Road Roundabout north of the proposed Sunny Bay Public Transport Interchange;

- (vii) provision of environmental mitigation measures during construction and operational stage, including but not limited to landscape and visual remedies to be recommended in the approved EIA study to be carried out in this Supplementary Assignment; and
- (viii) provision of future construction of the Road P1 works at Sunny Bay.

2.2 Based on the preliminary construction programme, the construction of the Project is scheduled to commence in April 2006 for completion in December 2008.

### **3. ENVIRONMENTAL IMPACT ASSESSMENT**

#### **Introduction**

3.1 The EIA study was conducted in accordance with the guidelines on assessment methodologies provided in Annexes 12 to 19 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The general approach and methodologies adopted for the assessment included:

- ♣ description of the environment;
- ♣ impact prediction;
- ♣ impact evaluation; and
- ♣ impact mitigation.

3.2 Quantitative uncertainties in the assessment of impacts were considered when drawing conclusions from the assessment. In carrying out the assessment, realistic worst case assumptions were made in order to provide a conservative assessment of environmental impacts.

3.3 Key findings of the EIA study, undertaken in accordance with the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) and the EIA Study Brief, are summarised below.

#### **Description of the Assessment area**

3.4 The majority of the proposed works for the Project runs along the coastal area at Sunny Bay. The assessment area is generally a sparsely populated area dominated by scattered village houses at Luk Keng Tsuen. In the vicinity of the construction area are North Lantau Highway and Airport Express Line. The Luk Keng Conservation Area and the planned Lantau North Extension Country Park are found to the north and south of the proposed Project site respectively. Two known archaeological sites: **Luk Keng Tsuen Archaeological Site** and **Yam O Archaeological Site** are found to the north and east of the proposed Project site respectively.

#### **Noise Impact**

3.5 Unmitigated construction noise levels at the existing noise sensitive receivers (NSRs) at Luk Keng Tsuen were predicted to range from 63 to 78 dB(A), slightly exceeding the EIAO-TM daytime construction noise criteria of 75dB(A). With the use of recommended mitigation measures including good site practices and quieter plant, the construction noise levels at Luk Keng Tsuen would meet the noise criteria. No adverse residual construction noise impact would be expected.

- 3.6 Traffic in the road networks within the study area would be the main source of noise during the operation phase of the Project. Road traffic noise modelling was undertaken and the results indicated that the traffic noise levels predicted at Luk Keng Tsuen would be below the EIAO-TM noise limit of 70dB(A), and no mitigation measure would be necessary.

#### **Air Quality Impact**

- 3.7 With the implementation of the dust suppression measures stipulated in the *Air Pollution Control (Construction Dust) Regulations* and good site practices, no adverse residual construction dust impact would be envisaged.
- 3.8 Vehicular exhaust emissions from open road sections would be the main air pollutant source during the operation of the Project. Cumulative air quality impacts were predicted by using CALINE 4 computer model. No exceedance of the Air Quality Objectives (AQOs) was predicted at all air sensitive receivers (ASRs) and therefore no mitigation measure would be required.

#### **Water Quality Impact**

- 3.9 The dredging works for the reclamation formation of the Project would be the key source of water quality impact.
- 3.10 The nearest water sensitive receivers include the Ma Wan Fish Culture Zone and Dragon Beach, which are located approximately 4km from the proposed works area. The assessment results showed that with the use of two closed grab dredgers operated at a maximum dredging rate of 8,000m<sup>3</sup> per day and with frame type silt curtains enclosing the grabs, the elevations in suspended sediment (SS) concentration generated from the dredging activities would be expected to be well below the allowable elevation under the Water Quality Objectives (WQO) at these sensitive receivers. Other mitigation measures comprise limiting the rates of working, sequence of construction and general working methods.
- 3.11 Sediment quality data indicated the level of contamination to be low and therefore adverse impacts on water quality from the release of contaminants from sediment disturbed during dredging were not predicted. The potential water quality impacts arising from construction runoff and drainage and other land-based construction activities were assessed and no adverse impacts were identified.
- 3.12 Overall, no unacceptable residual impacts would be expected during the construction phase with the full implementation of the recommended mitigation measures for the reclamation formation and land-based construction activities of the Project.
- 3.13 In accordance with the recommendations of the *Northshore Lantau Development Feasibility Study Environmental Impact Assessment* (hereinafter referred to as the "NLDFS EIA"), silt traps should be installed on storm drains serving developed and landscaped/managed areas of the Project, and polluted stormwater discharges should be relocated away from Sunny Bay. With the implementation of the recommended mitigation measures, it is anticipated that the water quality impacts associated with the operation phase of the Project would be minimal and acceptable.

#### **Waste Management**

- 3.14 A review of the sediment quality data from the marine ground investigation indicated that the majority of marine sediments to be dredged for the construction of the seawall were classified as Category L suitable for open sea disposal. The total dredged volume for the Project was estimated as approximately 700,000 m<sup>3</sup>, of which 8,000 m<sup>3</sup> of sediments were classified as Category M requiring Type 2 confined marine disposal. With the implementation of the recommended mitigation measures and management procedures in accordance with the requirements of Environment, Transport and Works Bureau Technical Circular (Works) (ETWB TCW) No. 34/2002, no adverse residual impact was predicted.

- 3.15 Other waste types generated by the construction activities are likely to include construction & demolition (C&D) material (rock armour and fill material from piling and excavation works), general refuse from the workforce and chemical wastes from the maintenance of construction plant and equipment. Provided that these identified waste arisings are to be handled, transported and disposed of using approved methods and that the recommended good site practices are to be strictly followed, adverse environmental impacts would not be anticipated.

### **Terrestrial Ecology**

- 3.16 Most habitats within the assessment area were considered to be of low or low/moderate ecological value. Habitats recorded comprised grassland/shrubland mosaic, tall shrubland, wasteland, secondary woodland, plantation, village/orchard, backshore vegetation and brackish wetland. Two areas of recognised conservation interest fall partly within the assessment area; the Luk Keng Conservation Area and the planned Lantau North Extension Country Park.
- 3.17 Plant species recorded in the ecological surveys for this study were mostly common species. One tree species with a restricted local distribution (*Thespesia populnea*) recorded in the *NSLDFS EIA Report* was found in the Assessment Area during the recent surveys. Additionally, a locally common but regionally endangered shrub species (*Diospyros vaccinioides*) was recorded from the secondary woodland at Luk Keng Tsuen.
- 3.18 Fauna recorded in the Assessment Area were generally common and widespread species in Hong Kong.
- 3.19 Potential impacts to terrestrial habitats and species resulting from the Project would be limited to the loss of very small areas of very low-low value habitats (plantation and wasteland). No species or areas of conservation interest would be affected.
- 3.20 Residual impacts on terrestrial ecology would be minor restricted to very small areas of wasteland and plantation habitat. Mitigation measures should include good site practise and reinstatement of affected areas. Native plants should also be used for landscaping of newly formed reclaimed land.

### **Marine Ecology**

- 3.21 Findings of the *NLDFS EIA Report* regarding the Assessment Area were reviewed based on recent literature and field surveys. This indicated that the ecological value of intertidal artificial seawall, sandy shore, mangrove and subtidal benthic habitats were low. Of medium ecological value were the Assessment Area's natural rocky shore and marine mammal habitat. No seagrass was recorded from the mudflat at Sunny Bay during a recent survey conducted in April 2005, although surveys conducted in 2002/03 recorded a 0.8 ha cover of the locally rare seagrass, *Halophila ovalis*. It was considered that *H. ovalis* may re-establish on the mudflat in the future, and therefore the mudflat was considered of moderate-high ecological value.
- 3.22 The key marine ecological sensitive receivers in the Assessment Area were therefore the Indo-Pacific Hump-backed Dolphin, *Sousa chinensis*, and the mudflat in Sunny Bay, which could support the seagrass *H. ovalis*.
- 3.23 The Chinese White Dolphin is regularly sighted in North Lantau waters year round, but apparently has a higher abundance in the Assessment Area in autumn and winter months. By strictly observing mitigation measures to control water quality as well as minimise physical dangers due to marine traffic and works, it is anticipated impact on dolphins would be low.
- 3.24 The seagrass *H. ovalis* may re-establish in Sunny Bay and would be indirectly impacted by increases in turbidity associated with the release of suspended sediment during dredging for the Project. A precautionary mitigation approach is adopted by deployment of two layers of silt curtain within the boundary of the works. Indirect impacts on any seagrass present were considered to be minor. Elevations in suspended sediment levels elevations at the previous location of the seagrass

bed (when submerged by the tide) would be within allowable levels under the WQO standard and of lower magnitude than natural variation in ambient conditions at the site.

- 3.25 The proposed reclamation would result in the permanent loss of 3 ha of disturbed seabed area and loss of 0.5km of sloping artificial seawall which would be partly compensated by construction of 450m of vertical seawall and 100m of sloping seawall and provide habitats for colonisation of intertidal organisms. The residual impact of the Project on marine ecology is therefore minor.

### **Fisheries Impacts**

- 3.26 Fisheries production in the Sunny Bay area is generally low when compared to other fishing grounds in Hong Kong, although the value of the Sunny Bay fisheries were ranked as moderate-high. No important spawning or nursery area was identified in the vicinity of the proposed works. Overall, fisheries in the Sunny Bay area were considered of moderate importance.
- 3.27 The proposed reclamation would result in the direct loss of a small portion (3 ha) of potential fishing area. The loss of this area is anticipated to have a very low effect on fisheries production of Hong Kong as a whole.
- 3.28 Indirect impacts through impact to water quality due to dredging were assessed. Sediment levels in the water would not be elevated to levels that would impact fisheries of the Sunny Bay fisheries area or impact cultured fish at the Ma Wan fish culture zone.
- 3.29 Provided that mitigation measures to protect water quality are fully implemented, specific mitigation measures to protect fisheries resources are not necessary. In a similar way, monitoring and audit activities for detecting and mitigating any unacceptable impact on water quality would also serve to protect fisheries resources, and so an environmental monitoring and audit (EM&A) programme for fisheries is not recommended.

### **Impact on Cultural Heritage**

- 3.30 A Marine Archaeological Investigation was conducted and did not reveal any anomalies or targets of potential archaeological significance. The Yam O Archaeological Site and Luk Keng Tsuen Archaeological Site are located well outside the proposed advance works area. No adverse cultural heritage impact would therefore be expected.

### **Landscape and Visual Impact**

- 3.31 The Project would require reclamation of approximate 3 ha of sea area at Sunny Bay and construction of two approximately 1km long elevated bridges over the existing North Lantau Highway and Airport Express Line and connect to the at-grade Road P1 Roundabout formed on the reclaimed land. The elevated bridges structures are located at about 32m above existing ground level and when viewed from the road level of North Lantau Highway (NLH), the structures are at an average of 25m above.
- 3.32 The primary visual impacts will be the obstruction to the views of Sunny Bay and woodlands when viewed by marine traffic outside Sunny Bay. The elevated Slip Roads 5 and 6 would cause the majority of visual obstruction. However, landscape treatment at lower level of the superstructure can provide visual-relief effect for travellers and the majority of visual impacts would be minimized.
- 3.33 The proposed Project would inevitably disturb the natural settings and scenery during both the construction and operation phases. Major landscape resources and landscape characters that would have the most disturbance is the log ponds at Sunny Bay Inlet which are visually pleasant.
- 3.34 The assessment predicted that the reclamation and construction works would have negative impacts upon the landscape character and resources over marine traffic and the development at Sunny Bay. Travellers and road users along Airport Express Line, North Lantau Highway and associated road network would feel slight negative visual impacts.

- 3.35 The magnitude of negative impact on both landscape and visual quality due to the proposed reclamation and construction works would be reduced if proper mitigation measures were implemented during construction and operation phases. Major mitigation measures include good site practices during construction phase; provision of an international standard of soft landscape and ensure regular maintenance of planting are provided during operation of the Project.
- 3.36 The landscape and visual impact due to the proposed reclamation works at operation phase would be the loss of part of Sunny Bay. The provision of an international quality soft landscape treatment would reduce this negative landscape impact from negative in the construction stage to very slight negative in the operational stage. As most of the features identified within the project area are man-made structures such as road network, viaducts, railway tracks, railway stations and transport interchange, it is considered that even without implementation of any mitigation measures, the change brought by the Project would not be apparent in visual term and therefore the residual impact was considered as an acceptable impact as the works would blend in with the overall context of the adjacent development. In conclusion, the overall landscape and visual impacts associated with the Road P1 Advance Works are considered to be acceptable with proper implementation of the mitigation measures.

#### **4. ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS**

- 4.1 An environmental monitoring and audit (EM&A) programme was recommended for implementation during the construction and operation of the Project to ensure compliance with environmental legislation and standards during Project implementation.

#### **5. CONCLUSIONS**

- 5.1 The proposed Road P1 Advance Works would provide an important alternative road access to the Theme Park at Penny's Bay, to ensure that uninterrupted road access would remain available in case of blockage of the main access roads.
- 5.2 This EIA study has assessed potential environmental impacts including noise, air quality, water quality, waste management, terrestrial and marine ecology, fisheries, cultural heritage, and landscape and visual. With the implementation of the recommended mitigation measures, the Project would be environmentally acceptable and no adverse residual impacts would be anticipated.