

1 INTRODUCTION

1.1 BACKGROUND

- 1.1.1 The Civil Engineering Department (CED) of the Hong Kong Special Administrative Region (SAR) is proposing to construct an International Theme Park in Penny's Bay of North Lantau and its Essential Associated Infrastructure (hereafter referred to as the Project). Hongkong International Theme Parks Limited (HKITP) will construct the theme park and related resort development of hotels and retail, dining and entertainment areas.
- 1.1.2 Under a contract between CED and Scott Wilson (Hong Kong) Limited, Environmental Resources Management - Hong Kong, Limited (ERM) has been commissioned to undertake an Environmental Impact Assessment (EIA) and Shankland Cox Asia Limited and Wilbur Smith Associates have been commissioned to undertake Landscape and Visual Impact Assessment (LVIA) and traffic impact assessment, respectively, for the Project in accordance with the requirements of the *Environmental Impact Assessment Study Brief No. ESB-043/1999*.
- 1.1.3 The Theme Park concept is to transport guests into a world of imagination, fantasy and adventure bringing together the best of the rides, shows and attractions from Disney Parks around the world; the park is expected to become a core tourist attraction in the Hong Kong SAR.
- 1.1.4 Proposed facilities include the Theme Park, entertainment, retail and dining outlets, resort hotels, a water recreation centre comprising a multi-functional lake and essential supporting services and utilities. New roads, public transport interchange, vehicle parking areas, a new railway (Penny's Bay Rail Link) and associated stations will provide direct transport links to the proposed park. Ferry access is also proposed via two piers at the southern waterfront.
- 1.1.5 The proposed Project site will be located in and adjacent to Penny's Bay on North Lantau approximately 11 km to the east of Chek Lap Kok Airport and about 15 km to the west of Hong Kong central; the location was originally earmarked for container terminals (CT10 and CT11) and port related uses, including container back-up areas, business park and industrial uses under the Lantau Port and Western Harbour Development Studies concluded in 1993.
- 1.1.6 A number of EIA Studies have confirmed the feasibility of the reclamation and devised appropriate mitigation measures. The EIA reports that have been previously endorsed by the Environmental Pollution Advisory Committee (EPCOM) and the Advisory Council on the Environment (ACE) are as follows:
- *Lantau Port and Western Harbour Development Studies, Final Report, Volume III EIA Report*, Civil Engineering Department (CED), 1993 (EIA-021/BC) endorsed by the EPCOM on 7 June 1993.
 - *Lantau Port Development, Stage 1: Container Terminals No. 10 & 11, Ancillary Works (Design), EIA Final Report*, CED, 1994 (EIA-049/BC) endorsed by the ACE with conditions on 20 February 1995.
 - *Lantau Port Development Stage 1 Container Terminals 10 and 11, Preliminary Design, Final Report, Volume 2: Container Terminal EIA*, CED, 1995 (EIA-057/BC) endorsed by the ACE with conditions on 20 February 1995.

- *Lantau Port Development Stage I, Design of Reclamation and Edge Structures for Container Terminals 10 and 11 and Back-up Areas, EIA Final Report, CED, 1995 (EIA-073/BC) endorsed by the ACE with conditions on 18 December 1995.*

1.2 THE PROPOSED PROJECT AND DESIGNATED PROJECTS (DPS)

1.2.1 The proposed Project includes the following characteristics including 9 EIA Ordinance Schedule 2 Designated Projects (DPS):

- reclamation of about 280 ha of land within Penny's Bay (a DP) and 10 ha of land at Yam O (a DP), using marine sand fill and public filling materials and the construction of about 3.3 km and 0.7 km of seawall, respectively;
- phased development of world-class international Theme Park (of about 180 ha) together with retail, dining and entertainment (RD&E) complexes, individually-themed hotels (with up to 7,000 rooms by the end of Phase II of the Theme Park) and supporting infrastructure and services. The Theme Park is anticipated to have a (Phase I) opening annual capacity of 7.5 million visitors, rising to 20 million visitors with the completion of Phase II. The Theme Park comprises a DP;
- construction of an approximately 32 ha Water Recreation Centre with a 12 ha multi-function artificial lake (a DP), water-based and land-based recreational facilities and ancillary facilities, and other essential and supporting services and utilities;
- construction of a 1.5 km section of Chok Ko Wan Link Road from the existing Yam O Interchange extending over the proposed Penny's Bay roundabout (a DP);
- construction of a 4 km primary distributor, Road P2 (a DP), from Yam O to the eastern Theme Park roundabout and associated access roads;
- construction of a 3.5 km district distributor, Resort Road, around the proposed Theme Park (a DP), and a 800 m pedestrian walkway between the two theme parks through the RD&E facilities;
- construction of a 3.6 km long rail line (the Penny's Bay Rail Link) linking the Tung Chung Line at Yam O to the Theme Park (a DP);
- construction of a Public Transport Interchange (PTI) for the Theme Park close to the Penny's Bay station and a temporary PTI at Yam O rail station;
- construction of two public ferry piers for alternative transport mode and a service quay on the southern waterfront;
- construction of general service infrastructure and associated works, including a 15 km storm drainage system (including the eastern stormwater drainage channel which comprises a DP), sewerage facilities, irrigation, water supply and utility services; and
- proposed slope formation and stabilisation, screening and landscaping works.

1.3 PURPOSE AND OBJECTIVES OF THE EIA

EIA PURPOSE

1.3.1 As required by the EIA Study Brief, No. ESB-043/1999, the purpose of this EIA Study is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the relevant Designated Projects, see *Table 2.3a*, and related activities taking place concurrently. This EIA will provide information to contribute to decisions by the Director of Environmental Protection on:

- The overall acceptability of any adverse environmental consequences that are likely to arise as a result of the proposed Project;
- The conditions and requirements for the detailed design, construction and operation of the proposed Project to mitigate against adverse environmental consequences, wherever practicable; and
- The acceptability of residual impacts after the proposed mitigation measures are implemented.

EIA OBJECTIVES

1.3.2 The main objectives of the EIA Study, as outlined under Clause 2 of the Study Brief (attached in *Annex L*) are as follows:

- To describe the proposed Project and associated works together with the requirements for carrying out the proposed Project;
- To identify and describe the elements of the community and environment likely to be affected by the proposed Project and/or likely to cause adverse impacts to the proposed Project, including both the natural and man-made environment;
- To identify and quantify all environmental sensitive receivers, emission sources and determine the significance of impacts on sensitive receivers and potential affected uses;
- To identify and quantify any potential losses or damage to flora, fauna and natural habitats and negative impacts on sites of cultural heritage, landscape and visual impacts and to propose measures to mitigate these impacts;
- To propose the provision of infrastructure or mitigation measures so as to minimise pollution, environmental disturbance and nuisance during construction and operation of the Project;
- To identify, predict and evaluate the residual (i.e. after practicable mitigation) environmental impacts and the cumulative effects expected to arise during the construction and operational phases of the Project in relation to sensitive receivers and potentially affected uses;
- To identify, assess and specify methods, measures and standards, to be included in the detailed design, construction and operation of the Project which are necessary to mitigate these environmental impacts and reduce them to acceptable levels;
- To investigate the extent of side-effects of proposed mitigation measures that may lead to other forms of impacts and to identify constraints associated with EIA recommended mitigation measures;
- To identify, within the Study Area, any individual project(s) that fall under Schedule 2 of the EIAO, as Designated Projects; to ascertain whether the findings of this EIA Study have adequately addressed the environmental impacts of those Designated Projects; and where necessary, to identify the outstanding issues that need to be addressed in any further detailed EIA Study; and
- To design and specify the environmental monitoring and audit (EM&A) requirements, if required, to ensure the implementation and the effectiveness of the environmental protection and pollution control measures adopted.

1.4 KEY ENVIRONMENTAL ISSUES AND STUDY APPROACH

KEY ENVIRONMENTAL ISSUES

1.4.1 Key environmental issues and concerns identified in the Project Profile (No. PP-066/1999) and Study Brief, Clause 3.2, that have been evaluated in this EIA Study include:

- Noise impacts arising from construction and operation of the development, in particular the noise due to fireworks show (see *Section 4*);

- Air quality impacts arising from construction and operation of the development including impacts due to emissions from Penny's Bay Gas Turbine Plant and pollutants (including odour and pollutants like dioxin, volatile organic compounds (VOC) and heavy metals, if any) released during fireworks show (see *Section 3*);
- Landscape and visual impacts during construction and operation of the development and glare impacts due to laser and fireworks show on nearby sensitive receivers including passengers on air, land and sea (see *Section 12*);
- Water quality impacts during construction and operation, including sewage collection/treatment systems and stormwater systems (see *Sections 5, 8, and 9*);
- Risks of storage and handling of fireworks (see *Section 10*);
- Potential impacts on archaeological sites (see *Section 11*); and
- Impacts on fauna due to the operation of the Theme Park, especially during nighttime (see *Section 7*).

Cumulative and Territory-wide Considerations

1.4.2 The scope of this EIA Study covers the combined impacts of the Project and its associated elements as well as the cumulative impacts of existing, committed and planned development in the vicinity of the Project (see technical *Sections 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13*). In particular, attention has been given to the assessment of cumulative impacts due to:

- Loss of natural coastline on Lantau and surrounding areas on marine mammals and fisheries (see *Sections 8 and 9*);
- Concurrent reclamation works (see *Sections 5, 6, 8 and 9*); and
- The transport load and associated air pollution during construction and operation of the Theme Park (see *Section 3*).

1.4.3 In addition to the above, this EIA Study has also considered:

- Contaminated land issues (see *Section 13*);
- Territory-wide environmental implications of additional visitors to the Theme Park (see *Section 15*); and
- Consideration of different Project options and alternative transport modes (see *Section 14*).

Penny's Bay Rail Link (PBRL)

1.4.4 The Theme Park and associated developments EIA Study Brief (Clause 1.3 (ix)) also covers the new rail line from the MTRC Tung Chung Line at Yam O to Penny's Bay, the Penny's Bay Rail Link (PBRL), comprising stations at Yam O and at Penny's Bay and a 3.6 km long railway, partly in tunnel. As the HK SAR Government has invited MTRC to submit proposals for the construction of the PBRL, MTRC has commissioned an EIA for the rail link. The cumulative environmental assessment due to the PBRL has been presented in this EIA Report and the detailed environmental assessment for the PBRL is appended to this EIA Report (see *Annex M*) for easy reference. The railway scheme of the PBRL is subject to authorisation by the Chief Executive in Council under the Railways Ordinance.

APPROACH

1.4.5 This EIA Study has been prepared in accordance with the requirements of the Study Brief (*Annex L*) and the general principles and guidelines of the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO TM).

1.5 INTER-RELATIONSHIP WITH OTHER EIA STUDIES

1.5.1 A number of previous, ongoing and proposed EIAs, feasibility and engineering studies are relevant to the Project. These inter related EIA studies include the following:

- A comprehensive EIA Study for the Northshore Lantau Development Feasibility Study (NLDFS) (SB-044/BC), initiated in June 1998, has been undertaken under Schedule 3 of the EIAO by CED. The NLDFS EIA will comprise Schedule 3 level coverage of the cumulative environmental impacts arising from all of the proposed developments in Northeast Lantau and will broadly cover findings of this EIA for the Theme Park and its associated infrastructure. The NLDFS EIA will also include detailed assessment of the whole CKWLR, a DP, whilst the approximately 1.5 km section of the CKWLR which passes through the Theme Park EIA Study Area is broadly covered in this Theme Park EIA;
- An existing shipyard, Cheoy Lee Shipyards Ltd (CLS), to be decommissioned, is located within the Study Area and scope for the NLDFS. Consequently, the NLDFS EIA will comprise Schedule 3 level coverage of the environmental impacts arising from shipyard decommissioning, although access to undertake site investigation works at the shipyard site was not available, due to its present operation and private ownership. To allow this Theme Park EIA to 'stand alone' the relevant land contamination section of the NLDFS EIA is also included within this EIA, although it is not a requirement of the (ESB-043/1999) Study Brief. Additionally, the decommissioning of a shipyard comprises a Designated Project under Schedule 2 of the EIAO and an Environmental Permit is required before its decommissioning. Thus a separate and subsequent EIA Study will be commissioned by CED after the CLS site becomes available and before the decommissioning of the shipyard occurs. This subsequent CLS decommissioning EIA shall include detailed site investigation and formulation of appropriate methods and procedures, if required, to decontaminate the shipyard site. CED presently expect this decommissioning EIA to be completed and submitted under the EIAO to DEP for approval in 2002 before any construction work can commence in the CLS site;
- The Penny's Bay area was originally earmarked for container port development under the Lantau Port and Western Harbour Development Studies conducted in 1993. Subsequently, three EIA studies (referenced in *Section 1.1*) were completed in 1995 which thoroughly examined all environmental issues in relation to the reclamation works and associated infrastructures. The EIA reports show that the environmental impacts of the works can be controlled to meet the relevant environmental criteria. These EIA reports were endorsed by the Advisory Council on the Environment (ACE) in 1995 and are now placed in the EIA Ordinance Register for public inspection; and
- An environmental review study on the construction impacts of the reclamation works in Penny's Bay was conducted in 1999. The review concluded that as the extent of reclamation works for the Theme Park development in Penny's Bay would be less than that for the port development at the same location, less environmental impacts were anticipated when compared with the previously endorsed EIA reports. The review report was presented to the ACE on 27 September 1999.
- A review of the following ongoing and previously approved studies and EIAs (as identified under Clauses 1.2 and 3.2 of the Study Brief) has been undertaken and relevant findings have been taken into account in this EIA:
 - *Port and Airport Development Strategy* (PADS) (December 1989);
 - *Lantau Port and Western Harbour Development (LAPH) Studies*, CED (March 1993);
 - *Lantau Port Development, Stage 1: Container Terminals No. 10 and 11, Ancillary Works (Design)*, CED (December 1994);
 - *Lantau Port Development Stage 1 Container Terminals 10 and 11, Preliminary Design Study*, CED (August 1995);

- *Lantau Port Development Stage 1, Design of Reclamation and Edge Structures for Container Terminals 10 and 11 and Back-up Areas*, CED (August 1995);
- *Lantau Port Development Stage 1 Marine Mammal Survey, Final Report*, CED, (1996);
- *Lantau Port Development Stage 1 Fish Fry Survey*, CED (February 1997);
- *Lantau Port Development Stage 1 Fisheries Resources Survey*, CED (June 1997);
- *Dolphins (Sousa chinensis) in East Lantau Waters of Hong Kong: Assessment of Potential Effects of Port Development*, CED (September 1997);
- *Population Biology of Indo-Pacific Hump-backed Dolphin (Sousa chinensis Osbeck, 1975) in Hong Kong Waters, Final Report*, AFD (April 1998);
- *Fisheries Resources and Fishing Operations in Hong Kong Waters*, AFD (March 1998);
- *Port Survey 96/97 by Capture Fisheries Division of AFD* (August 1998);
- *East Lamma Channel Final Assessment Report*, CED (January 1993);
- *East Lamma Channel Borrow Area and Scoped Environmental Assessment Supplementary Water Quality Modelling*, CED (January 1993);
- *East Lamma Channel Borrow Area - Scoped Environmental Assessment, Final Report*, CED (January 1993);
- *Backfilling of South Tsing Yi and North of Lantau Marine Borrow Areas: Final Environmental Impact Assessment Report*, CED (November 1995);
- *Environmental Impact Assessment of Backfilling Marine Borrow Areas at East Tung Lung Chau - Final Report*, CED (February 1998);
- *Tang Lung Chau Dangerous Goods Anchorage EIA*, TDD (May 1999);
- *South-East Tsing Yi Port Development Planning and Engineering Feasibility Study for Container Terminal No. 9 - Final Report and Appendices*, (August 1991);
- *Outlying Islands Sewerage Master Plan Stage 1 Phase I*, DSD (September 1997);
- *Route 10 - North Lantau to Yuen Long Highway, Investigation and Preliminary Design, EIA Final Assessment Report*, HyD (September 1999); and
- *Outlying Islands Sewerage Master Plan Stage 2 Review*, EPD (on-going)

1.6 STRUCTURE OF THE EIA

1.6.1 Following this introductory Section, this EIA includes the following Sections:

- *Section 2* provides an overview of the Project outlining key elements, location, design, construction and operation as well as a description of the EIA Study Area and the perceived benefits and disbenefits of the Project, to satisfy Study Brief Clause 2.1(i);
- *Section 3* presents an assessment of potential impacts on air quality to satisfy Study Brief Clauses 2.1 (ii, iii, vii, viii, ix, x, xi, xiii), 3.2(ii), 3.7, 3.8.1, 3.8.12, 3.8.13, and 3.8.14;
- *Section 4* presents an assessment of potential noise impacts to satisfy Study Brief Clauses 2.1 (ii, iii, vii, viii, ix, x, xi, xiii), 3.2(i), 3.7, 3.8.2, 3.8.12, 3.8.13, 3.8.14 and 3.8.15;
- *Section 5* presents the results of the water quality, wastewater and non-point pollution sources and dredging, filling and dumping impact assessment plus Project sewerage and sewage treatment implications to satisfy Study Brief Clauses 2.1 (ii, iii, vii, viii, ix, x, xi, xiii), 3.2(v), 3.7, 3.8.3, 3.8.4, 3.8.12, 3.8.13 and 3.8.14;
- *Section 6* presents an assessment of waste management issues to satisfy Study Brief Clauses 2.1 (ii, iii, vii, viii, ix, x, xi, xiii), 3.7, 3.8.5, 3.8.12, 3.8.13 and 3.8.14.;
- *Section 7* details the results of the terrestrial and freshwater ecological impact assessment to satisfy Study Brief Clauses 2.1 (iv), 3.2(viii), 3.7, 3.8.7, 3.8.12, 3.8.13 and 3.8.14;
- *Section 8* presents the results of the marine ecological (including Chinese White Dolphins, and Finless Porpoises) and impact assessment to satisfy Study Brief Clauses 2.1 (iv), 3.2(viii), 3.7, 3.8.7, 3.8.12, 3.8.13 and 3.8.14;
- *Section 9* presents the results of the fisheries impact assessment to satisfy Study Brief Clauses 2.1 (iv), 3.2(viii), 3.7, 3.8.8, 3.8.12, 3.8.13 and 3.8.14;

- *Section 10* presents the results of the hazard assessment of dangerous goods (fireworks and sodium hypochlorite) incidents resulting in loss of life to satisfy Study Brief Clauses 3.7, 3.8.6, 3.8.12, 3.8.13 and 3.8.14;
- *Section 11* details the results of the cultural heritage impact assessment to satisfy Study Brief Clauses 2.1 (v), 3.2(vii), 3.7, 3.8.9, 3.8.12, 3.8.13 and 3.8.14;
- *Section 12* provides a summary of the results of the landscape and visual impact assessment, provided in full in *Annex K*;
- *Section 13* reviews the land contamination findings, pertaining to the Cheoy Lee Shipyard, of the NLDfS EIA and documents relevant information to the Theme Park and associated developments;
- *Section 14* provides an assessment of different Project options and consideration of alternative transport modes to satisfy Study Brief Clause 3.5;
- *Section 15* addresses in broad terms the overall territory-wide environmental implications, in terms of air quality, water and waste, of the additional visitors to the Theme Park to satisfy Clause 3.6 of the Study Brief;
- *Section 16* presents the tabulated Project Implementation Schedule grouped under separate Designated Projects to satisfy Study Brief Clause 3.8.11.2; and
- *Section 17* summarises the key conclusions, recommendations and environmental outcomes of the EIA Study.

1.6.2 In addition, detailed supplementary information associated with the various EIA Study elements is presented in the following Annexes:

- *Annex A* presents information on the construction programme and phasing;
- *Annex A* presents information on the construction programme and phasing;
- *Annex B* presents supporting information for the air quality impact assessment;
- *Annex C* presents supporting information for the noise impact assessment;
- *Annex D* presents supporting information for the water quality assessment;
- There is no *Annex E* as all information for the waste management assessment is presented in *Section 6*;
- *Annex F* presents supporting information for the terrestrial ecology impact assessment;
- *Annex G* presents supporting information for the marine ecology impact assessment;
- *Annex H* presents supporting information for the fisheries impact assessment;
- *Annex I* presents supporting information for the hazard assessment of dangerous goods (fireworks and sodium hypochlorite) incidents resulting in loss of life;
- *Annex J* presents cultural heritage impact assessment references;
- *Annex K* presents the full landscape and visual impact assessment, to satisfy Study Brief Clauses 2.1 (vi), 3.2 (iii and iv), 3.7, 3.8.10, 3.8.12, 3.8.13 and 3.8.14;
- *Annex L* presents the EIA Study Brief (ESB-043/1999);
- *Annex M* presents the Penny's Bay Rail Link (PBRL) EIA and PBRL EM&A Manual; and

- *Annex N* presents the Environmental Monitoring and Audit (EM&A) Manual for the Project (excluding PBRL's EM&A Manual, see *Annex M*) which provides the requirements for EM&A during before and during the construction and operational phases to satisfy Study Brief Clauses 2.1 (xiii), 3.8.14 and 3.8.15.