8 CONCLUSIONS

8.1 INTRODUCTION

In this section an overview of the EIA Study is provided, and the EIA findings in relation to key issues are presented and summarised, and, where required, recommendations for further work are discussed.

The Penny's Bay Rail Link runs through an area that is sparse with existing and planned sensitive development. With large buffer distances and appropriate levels of environmental control, no sensitive receivers will be affected during the construction and operational phases of the project.

8.2 OVERVIEW OF THE EIA

The objectives of the EIA, as defined in the EIA Study Brief issued by the EPD, were to describe the proposed project and associated works, identify and describe the potential impacts and potentially affected populations and environmental resources, provide a detailed assessment of the environmental issues and impacts, make recommendations for their resolution and mitigation, describe residual impacts, and ensure that mitigation measures were integrated within the engineering design process. The assessment work, findings and recommendations described in this EIA Report meet these objectives.

8.3 KEY ENVIRONMENTAL ISSUES OF THE EIA

8.3.1 *Construction Phase*

Noise

Construction noise has been identified as the main issue arising from the Project during its construction phase. The use of powered mechanical equipment on site is the primary source of noise. However, in view of the buffer distance between the sensitive uses and the works, no noise impacts are expected. Environmental control measures have been recommended to ensure the environmental performance of the works.

Air Quality

Construction dust has been identified as the main air quality issue arising from the Project during its construction phase. Handling of excavated materials and vehicle movements on haul roads are the main sources of dust. However, in view of the buffer distance between the sensitive uses and the works, no air quality impacts are expected. To ensure the environmental performance of the works, environmental control measures stated in the *Air Pollution Control (Construction Dust) Regulation* should be followed to limit the dust emissions from the site. Other measures to suppress the emission of dust during blasting works and concrete batching have been recommended.

Water Quality

Water quality impacts during the construction of PBRL are associated with the surface discharge from the site and temporary depot, groundwater and waste water discharge during tunnelling works, and sewage from on-site construction workers. Impacts can be controlled to comply with standards by implementing the recommended mitigation measures. No unacceptable residual impact on water quality is anticipated.

Waste

The assessment of the environmental impacts associated with the storage, handling, collection, transport, and disposal of wastes arising from the construction of the PBRL has shown that provided the recommendations of this report are implemented, no unacceptable environmental impacts are anticipated.

Landscape and Visual

The assessment has indicated that the most significant impacts during the construction phase would be visual impacts caused by the construction of the cut and cover tunnel and slope stabilisation works at the north portal and the temporary works area and slope stabilisation works at the south portal. However, with the implementation of the proposed mitigation works, it is anticipated that the residual impacts would be reduced to slight significance and will be acceptable.

8.3.2 *Operational Phase*

Noise

In view of a large distance between sensitive uses and the alignment, no noise impacts are expected.

Air Quality

No air quality impacts during the operational phase will arise owing to negligible sources of pollution arising from the operation of electric railways.

Water Quality

With the adoption of the proposed mitigation measures, no insurmountable water quality impacts will result from the operational phase of the PBRL.

Waste

The amount of general refuse arising from the operation of the PBRL is expected to be small, but all feasible measures should be taken to avoid and minimise wastes. Industrial and chemical wastes arising from maintenance activities will be low and limited to plant and equipment maintenance.

The assessment of the environmental impacts associated with the storage, handling, collection, transport, and disposal of wastes arising from the operation of the PBRL has shown that provided the recommendations of this report are implemented, no unacceptable environmental impacts are anticipated.

Landscape and Visual

During the operational phase, the most significant landscape and visual impacts would be associated with the southern tunnel portal and vent structure and associated geotechnical slope stabilisation works, and the section of the at-grade railway that curves around the edge of the Water Recreation Centre. However, if the proposed mitigation measures are adopted, the residual impacts would be reduced to slight significance. With regard to the Water Recreation Centre, the railway would be clearly visible to users of the Centre who would subsequently suffer residual adverse impacts of moderate significance. However, it would be quite possible for the designers of the Centre (which will be built concurrently with the railway) to provide berming and screening with the Centre to screen the railway if so desired.

Overall, it is considered that, the landscape and visual impacts are acceptable with the implementation of the recommended mitigation measures.

8.3.3 *Environmental Monitoring & Auditing (EM&A)*

During the construction phase of the PBRL environmental monitoring will not be necessary as noise, air quality, water quality and waste impacts are unlikely. Regular environmental auditing is recommended, however, to ensure that the recommended mitigation measures are adequately implemented as defined in this EIA Report.

8.4 *OVERALL CONCLUSIONS*

The implementation of the recommended mitigation measures will ensure that all potential impacts are controlled to within the required criteria during the construction and operation of the PBRL.

The recommended mitigation measures represent accepted measures which may be employed to ensure compliance with statutory requirements, Government guidelines and other environmental standards agreed with the EPD. The EM&A programme which will be adopted during the construction of the PBRL will also help ensure compliance with statutory and recommended criteria. No residual impacts are expected with the implementation of these measures.

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Annex A

EIA Study Brief, Description of Northshore Lantau Development & Relevant Communication

EIA Study Brief

Environmental Impact Assessment Ordinance (Cap. 499), Section 5 (7)

Environmental Impact Assessment Study Brief No. ESB- 043/1999

Project Title: **Construction of An International Theme Park in Penny's Bay of North Lantau and Its Essential Associated infrastructures**

Name of Applicant: **Civil Engineering Department (hereinafter known as the "Applicant")**

1. BACKGROUND

1.1 An application (No. ESB-043/1999) for an Environmental Impact Assessment (EIA) study brief under section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by the captioned Applicant on 3.11.99 with a project profile (No. PP-066/1999).

1.2 The Applicant proposes to construct an international theme park of about 180 ha in size on a reclaimed land in Penny's Bay, North Lantau. The location plan of the project indicating the project boundary is shown in the attached Drawing No. PD2007-009D (as provided in the submitted project profile). The proposed theme park development will be located at Penny's Bay originally earmarked for container terminals (CT10 and CT11) under the Lantau Port and Western Harbour Development Studies conducted in 1993. 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:

(i) *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 Jun 1993

(ii) *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 Feb 1995

(iii) *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 Feb 1995

(iv) *Lantau Port Development Stage 1, 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 Dec 1995

A comprehensive EIA study for the *Northshore Lantau Development Feasibility Study* (SB-044/BC) is now being carried out under Schedule 3 of the EIA Ordinance by CED. The study will address the cumulative environmental impacts arising from all the proposed developments in Northeast Lantau including the proposed theme park.

1.3 The project scope includes the theme park and other essential associated infrastructures related to the theme park development including the followings:

(i) reclamation of about 290 ha of land using marine sand fills and public filling materials, and the construction of about 3.5 km of vertical seawall and sloping seawall to retain the fills;

(ii) theme park and its related development with an area of about 180 ha including hotels of up to 7,000 rooms, retails, dinning and entertainment and any Dangerous Goods (DG) storage;

(iii) two piers;

(iv) road works comprising:

(a) a section of Chok Ko Wan Link Road (Expressway Standard) from the existing Yam O Interchange to the valley near the existing power station of China Light and Power (CLP). This 1.5 km long section of road will be dual three lanes with a roundabout adjacent to the existing CLP station;

(b) Road P2 (Primary Distributor) together with an access road at Yam O to connect the proposed Yam O rail station to the theme park. The proposed Road P2 will be dual 2/dual 3 lanes and of about 4 km long with two roundabouts. A reclamation of size about 10 ha. is required at Yam O to accommodate part of the proposed road works;

(c) a 3.5 km long resort road (District Distributor) around the proposed theme park; and

(d) a central pedestrian walkway in the middle of the park of length about 800m.

(v) a water recreation centre with a lake of size about 23 ha. for irrigation and water sport recreation activities, together with de-silting and pumping facilities;

(vi) a stormwater drainage system consisting of an open channel of width about 50m and length about 1.2 km, and box culvert and pipelines of various widths and lengths;

(vii) a sewerage network including pumping stations, chambers and wells together with the associated gravity sewers and pumping mains;

(viii) essential facilities for the operation of the theme park including:

(a) two public parking areas at Penny's Bay;

(b) a Public Transport Interchange (PTI) near the proposed Penny's Bay rail station and a temporary PTI at Yam O rail station; and

(c) pipelines for fresh, salt and irrigation water supply, and utilities.

(ix) a new rail line from the Tung Chung Line at Yam O to Penny's Bay, comprising stations at Yam O and at the theme park, and a 3.5km long railway, partly in tunnel;

(x) road side buffers, berms and landscaping works; and

(xi) slope stabilization works.

1.4 Pursuant to section 5(7)(a) of the EIAO, the Director of Environmental Protection (the Director) issues this EIA study brief to the Applicant to carry out an EIA study.

1.5 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 proposed designated projects and related activities taking place concurrently. This information will contribute to decisions by the Director on:

(i) the overall acceptability of any adverse environmental consequences that are likely to arise as a result of the proposed project;

(ii) the conditions and requirements for the detailed design, construction and operation of the proposed project to mitigate against adverse environmental consequences wherever practicable; and

(iii) the acceptability of residual impacts after the proposed mitigation measures are implemented.

2. OBJECTIVES OF THE EIA STUDY

2.1 The objectives of the EIA study are as follows:

(i) to describe the proposed project and associated works together with the requirements for carrying out the proposed project;

(ii) 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;

(iii) to identify and quantify all environmental sensitive receivers, emission sources and determine the significance of impacts on sensitive receivers and potential affected uses;

(iv) to identify and quantify any potential losses or damage to flora, fauna and natural habitats;

(v) to identify any negative impacts on sites of cultural heritage and to propose measures to mitigate these impacts;

(vi) to identify and quantify any potential landscape and visual impacts and to propose measures to mitigate these impacts;

(vii) to propose the provision of infrastructure or mitigation measures so as to minimize pollution, environmental disturbance and nuisance during construction and operation of the project;

(viii) 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 operation phases of the project in relation to the sensitive receivers and potential affected uses;

(ix) 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 reducing them to acceptable levels;

(x) to investigate the extent of side-effects of proposed mitigation measures that may lead to other forms of impacts;

(xi) to identify constraints associated with the mitigation measures recommended in the EIA study;

(xii) to identify, within the study area, any individual project(s) that fall under Schedule 2 of the EIA Ordinance; to ascertain whether the findings of this EIA study have adequately addressed the environmental impacts of those projects; and where necessary, to identify the outstanding issues that need to be addressed in any further detailed EIA study; and

(xiii) to design and specify the environmental monitoring and audit requirements, if required, to ensure the implementation and the effectiveness of the environmental protection and pollution control measures adopted.

3. DETAILED REQUIREMENTS OF THE EIA STUDY

3.1 The purpose of this study brief is to scope the key issues of the EIA study. The Applicant has to demonstrate in the EIA report that the criteria in the relevant sections of the Technical Memorandum on the Environmental Impact Assessment Process of the Environmental Impact Assessment Ordinance (hereinafter referred to as the TM) are fully complied with.

The Scope

3.2 The scope of this EIA study shall cover the proposed projects and associated works mentioned in section 1.3 above. The EIA study shall cover the combined impacts of all these developments and the cumulative impacts of the existing, committed and planned developments in the vicinity of the proposed projects, in accordance with the requirements laid down in section 3.4 of the TM. The environmental impacts of on-site and off-site works and facilities associated with the proposed developments shall be addressed. The EIA study shall address the likely key issues described below; together with any other key issues identified during the course of the EIA study:

(i) noise impacts arising from construction and operation of the development, in particular the noise due to firework shows;

(ii) air quality impacts arising from construction and operation of the development including impacts due to emission from Penny's Bay power station and pollutants (including odour and pollutants like dioxin, volatile organic compounds (VOC) and heavy metals, if any) released during fireworks show;

(iii) landscape and visual impacts during construction and operation of the development;

(iv) glare impacts due to laser and fireworks show on nearby receivers including passengers on air, land and sea;

(v) water quality impacts during construction and operation, including sewage collection/treatment systems and stormwater system;

(vi) risk on storage and handling of fireworks and risk on aircraft due to fireworks show;

(vii) potential impacts on archeological sites; and

(viii) impacts on fauna due to the operation of the theme park, especially during nighttime.

Technical Requirements

3.3 The Applicant shall conduct the EIA study to address all environmental aspects of the works and activities as described in the scope set out above.

Use of the Relevant Findings of Previously Approved EIA Reports and Relevant Studies

3.4 The Applicant shall review all on-going and previously approved studies/EIA studies relevant to the proposed development and extract relevant information for the purpose of this EIA study. The on-going and previously approved studies/EIA studies relevant to the proposed development include, but not limited to:

(i) Port and Airport Development Strategy (PADS) (Dec. 1989);
(ii) Lantau Port and Western Harbour Development (LAPH) Studies, CED (Mar. 1993);
(iii) Lantau Port Development, Stage 1: Container Terminals No. 10 & 11, Ancillary Works (Design), CED (Dec. 1994);
(iv) Lantau Port Development Stage 1 Container Terminals 10 and 11, Preliminary Design Study, CED (Aug. 1995);
(v) Lantau Port Development Stage 1, Design of Reclamation and Edge Structures for Container Terminals 10 and 11 and Back-up Areas, CED (Aug. 1995);
(vi) Lantau Port Development Stage 1 Marine Mammal Survey, Final Report,

CED, (1996);

(vii) Lantau Port Development Stage 1 Fish Fry Survey, CED (Feb. 1997);

(viii) Lantau Port Development Stage 1 Fisheries Resources Survey, CED (Jun. 1997);

(ix) Dolphins *(Sousa chinensis)* in East Lantau Waters of Hong Kong: Assessment of Potential Effects of Port Development, CED (Sept. 1997)

(x) Population biology of the Indo-Pacific Hump-backed Dolphin *(Sousa chinensis Osbeck, 1975)* in Hong Kong Waters, Final Report, AFD (Apr. 1998)

(xi) Fisheries Resources and Fishing Operations in Hong Kong Waters, AFD (Mar. 1998);

(xii) Port Survey 96/97 by Capture Fisheries Division of AFD (Aug. 1998)

(xiii) East Lamma Channel Final Assessment Report, CED;

(xiv) East Lamma Channel Borrow Area – Scoped Environmental Assessment, Final Report, CED (Jan. 1993);

(xv) East Lamma Channel Borrow Area Scoped Environmental Assessment Supplementary Water Quality Modelling, CED;

(xvi) Backfilling of South Tsing Yi and North of Lantau Marine Borrow Areas: Final Environmental Impact Assessment Report, CED (Nov. 1995)

(xvii) Backfilling of Marine Borrow Pits, North Lantau and South Tsing Yi: Feasibility Study/EIA, CED;

(xviii) Environmental Impact Assessment of Backfilling Marine Borrow Areas at East Tung Lung Chau – Final Report, CED (Feb. 1998);

(xix) Tang Lung Chau Dangerous Goods Anchorage EIA, TDD (May 1999)

(xx) South-East Tsing Yi Port Development Planning and Engineering Feasibility Study for Container Terminal No. 9 - Final Report and Appendices, (Aug. 1991)

(xxi) Outlying Islands Sewerage Master Plan Stage 1 Phase I, DSD (Sep. 1997)

(xxii) Route 10 – North Lantau to Yuen Long Highway, Investigation and Preliminary Design, EIA Final Assessment Report, HyD (on-going)

(xxiii) Northshore Lantau Development Feasibility Study, CED (on-going)

(xxiv) Outlying Islands Sewerage Master Plan Stage 2 Review, EPD (on-going)

Consideration of Different Options and Transport Modes

3.5 The EIA study shall take into consideration with clear and objective comparison of the environmental benefits and disbenefits of different siting and alignment options, with or without the proposed developments. This is particularly relevant to the size, shape, method and sequence of reclamation as well as the type of transport modes (such as rail, monorail, travellator, trolley bus, and etc.). In formulating the preferred options, the Applicant shall seek to avoid adverse environmental effects to the maximum practicable extent.

Territory-wide Environmental Implications of the Additional Tourists

3.6 The Applicant shall assess the overall territory-wide environmental implications of the additional tourists attracted by the international theme park development. There should be a chapter in the EIA report to address the environmental implications in broad terms.

Cumulative Environmental Impacts

3.7 The Applicant shall assess and evaluate the cumulative environmental impacts arising from the international theme park development and other planned developments in its vicinity. Findings of relevant environmental studies, in particular the EIA for the Northshore Lantau Development Feasibility Study, shall be reviewed and incorporated into the EIA report. Particular attention shall be paid on the assessment on the cumulative impacts due to:

(a) loss of natural coastline on Lantau and surrounding areas on marine mammals and fisheries
(b) concurrent reclamation works; and
(c) the transport load and associated air pollution during construction and operation of the theme park.

3.8 The EIA study shall include the following technical requirements on specific impacts.

3.8.1 Air Quality Impact

3.8.1.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing air quality impact as stated in Annexes 4 and 12 of the TM, respectively.

3.8.1.23.8.1.2 The "Assessment Area" for air quality impact shall be normally defined by a distance of 500m from the boundary of the scope of EIA study as defined in section 3.2 above, yet it may be extended depending on the circumstances.

3.8.1.3 For construction impacts, the Applicant shall ensure the construction works will follow the requirements of the Air Pollution Control (Construction Dust) Regulation in dust control and, subject to section 3.8.14 below, the Applicant shall initiate an audit and monitoring program during the constructional stage to ensure construction dust impacts are controlled within the relevant standard as stipulated in Annex 4 of the TM.

3.8.1.4 The construction and operation air quality assessment shall include the following:

(i) presentation of background air quality (including zone) in the study area for the purpose of identifying the key issues which may have implications on the proposed project's development and, evaluating the cumulative air quality impacts of the proposed project;

(ii) addressing the significance, if any, of the likely increase in air pollutants due to the proposed project by estimating the additional air pollutant emissions in HKSAR caused by internal traffic and cross-boundary traffic of the theme park-bound tourist;

(iii) description of the topographical and man-made features (including features of the proposed project) which may affect the dispersion characteristics of air pollutants (including emissions from Penny's Bay power station) within the study area;

(iv) identification of representative air sensitive receivers and/or potential affected uses;

(v) identification of emission characteristics and provision of an emission inventory of the existing, committed and planned air pollution sources including the Penny's Bay power station and those from the theme park construction and operation. The inventory shall include odour and pollutants like dioxins, VOC and heavy metals, if any emitted from the proposed fireworks displays, if any;

(vi) description of assessment method (whether analytical or numerical, etc.) and associated assumptions, validity of the method and limits of application. The methodology used shall be agreed with the Director before commencement of the relevant assessment in the EIA study;

(vii) analysis of operational activities identified in (v) above including but not limited to:

(a) emissions from Penny's Bay power station;

(b) pollutants (including odour and pollutants such as dioxins, VOC and heavy metal, if any) released from the proposed fireworks displays;

(c) vehicle emissions from roads and public parking areas;

(d) off-site and territory-wide impacts caused by internal traffic and theme park-bound tourists;

(e) emissions from fuel combustion equipment including boilers to be installed in the proposed project;

(f) odour, if any from sewage pumping station; and

(g) impacts of alternative access modes to the international theme park shall be considered.

(viii) assessment and evaluation of the net and cumulative construction dust and operational air quality impacts;

(ix) presentation of the assessment results in the form of summary table and pollution contours, whenever practicable, for comparison with relevant air quality standards and the examination of the land use implications of these impacts;

(x) proposals of effective mitigation measures to reduce the cumulative air pollution impacts to established standards;

(xi) the air quality implications of any proposed noise mitigation measures should be assessed. If noise mitigation measures such as noise canopy, which will affect dispersion of air pollutants are proposed to mitigate noise impact due to traffic flow, then the Applicant shall also assess the implications of such mitigation measures on air quality impact. If noise canopy in the form of total enclosure is proposed, then both "tunnel" portal emissions and air quality inside the "tunnel" shall also be addressed;

(xii) the Applicant shall submit all input and output files of the model run(s) in electronic format to the Director; and

3.8.2 Noise Impact

3.8.2.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing noise impact as stated in Annexes 5 and 13 of the TM, respectively.

3.8.2.2 The noise impact assessment shall include the following:

(i) Determination of Assessment Area

The "Assessment Area" for the noise impact assessment shall include all areas within 300m from the boundary of the scope of EIA study as defined in section 3.2 above. Subject to the agreement of the Director, the assessment area could be reduced accordingly if the first layer of noise sensitive receivers, closer than 300m from the boundary of the scope of EIA study as defined in section 3.2 above, provides acoustic shielding to those receivers at further distance behind. Subject to the agreement of the Director, the area shall be expanded to include NSRs at larger distance which would be affected by the construction and operation of the proposed project.

(ii) Provision of Background Information and Existing Noise Levels

The Applicant shall provide all background information relevant to the project, e.g. relevant previous or current studies. Unless involved in the planning standards, e.g. those for planning of fixed noise sources, no existing noise levels are particularly required.

(iii) Identification of Noise Sensitive Receivers

(a) The Applicant shall refer to Annex 13 of the TM when identifying the noise sensitive receivers (NSRs). The NSRs shall include all existing NSRs and all planned/committed noise sensitive developments and uses earmarked on the relevant Outline Zoning Plans (OZP), Outline Development Plans and Layout Plans. The Applicant shall review and take into account of the latest progress of the planning land-uses to be recommended in the ongoing Northshore Lantau Development Feasibility Study (NSLDFS).

(b) The Applicant shall select assessment points to represent all identified NSRs for carrying out quantitative noise assessment described below. The assessment points shall be agreed with the Director prior to the quantitative noise assessment. A map showing the location and description such as name of building, use, and floors of each and every selected assessment point shall be given. For planned noise sensitive land uses without committed site layouts, the Applicant should use the relevant planning parameters to work out site layouts for operational noise assessment purpose.

(c) Among other assessment points, the Applicant shall consider noise impacts on the North Lantau Country Park.

(iv) Provision of an Emission Inventory of the Noise Sources

The Applicant shall provide an inventory of all noise sources during construction and operation of the proposed development. For traffic noise assessment, the inventory shall include the road traffic data. Confirmation of the validity of the inventory shall be obtained from the relevant government departments/ authorities.

(v) Construction Noise Assessment

(a) The Applicant shall carry out assessment of noise impact from construction (excluding percussive piling) of the project during day time, i.e. 7 a.m. to 7 p.m., on weekdays other than general holidays in accordance with the methodology stipulated in paragraphs 5.3. and 5.4 of Annex 13 of the TM. The criteria in Table 1B of Annex 5 of the TM shall be adopted in the assessment.

(b) To minimise the construction noise impact, alternative construction methods to replace percussive piling shall be proposed as far as practicable.

(c) If the unmitigated construction noise levels are found exceeding the relevant criteria, the Applicant shall propose practicable direct mitigation measures (including movable barriers, enclosures, quieter alternative methods, re-scheduling and restricting hours of operation of noisy task) to minimise the impact. If the mitigated noise levels still exceed the relevant criteria, the duration of the noise exceedance shall be given.

(d) In case the Applicant would like to evaluate whether construction works in restricted hours as defined under the Noise Control Ordinance (NCO) are feasible or not in the context of programming construction works, reference should be made to the relevant technical memoranda issued under the NCO. Regardless of the results of the construction noise impact assessment for restricted hours, the Noise Control Authority will process the Construction Noise Permit (CNP) application, if necessary, based on the NCO, the relevant technical memoranda issued under the NCO, and the contemporary conditions/situations. This aspect should be explicitly stated in the noise chapter and the conclusions and recommendations chapter in the EIA report.

(vi) Operational Noise Assessment

(a) Rail Noise

(a1) The Applicant shall assess the impacts of the operation of the proposed

railway from Yam O to Penny's Bay within the "Assessment Area" with respect to the acceptable levels contained in Table 1A in Annex 5 in the TM. The assessment methodology including the railway/train design noise level shall be agreed with the Director prior to the commencement of the assessment.

(a2) The Applicant shall present the noise levels in Leq(30min) and Leq(24hr), Lmax during the day and at night at the NSRs at various representative floor levels (in m P.D.) on tables and plans of suitable scale.

(a3) The Applicant shall propose direct mitigation measures in all situations where the predicted noise level exceeds the criteria set out in Table 1A of Annex 5 of the TM to protect the affected NSRs.

(b) Fixed Noise Sources

(b1) The Applicant shall identify any fixed noise sources within the "Assessment Area", including all activities within the theme park, any sewage pumping stations, any pump houses, electricity sub-station, bus depot/terminus, public transport interchange, open car/lorry park, etc. The Applicant shall calculate the expected noise using standard acoustics principles. Calculations for the expected noise shall be based on assumed plant inventories and utilization schedule for the worst case scenario. The Applicant shall calculate the noise levels taking into account of correction of tonality, impulsiveness and intermittence in accordance with the Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites.

(b2) The Applicant shall present the noise levels in Leq(30min) or other unit(s) as agreed by the Director, at the NSRs at various representative floor levels (in m P.D.) on tables and plans of suitable scale.

(b3) A quantitative assessment at the NSRs for the fixed noise source(s) shall be carried out and compared against the criteria set out in Table 1A of Annex 5 of the TM.

(b4) The Applicant shall propose direct mitigation measures within the project limits in all situations where the predicted noise level exceeds the criteria set out in Table 1A of Annex 5 of the TM to protect the affected NSRs.

(c) Fireworks

(c1) The Applicant shall propose criteria, noise metric and methodology in assessing the noise impact arising from fireworks, and, such criteria, noise metric, and methodology shall be approved by the Director prior to the commencement of the assessment. The Applicant shall evaluate the

assumed worst case scenarios of fireworks inventories and the display schedule.

(c2) The Applicant shall propose direct mitigation measures within the project limits in all situations if the predicted noise level exceeds the criteria.

(d) Road Traffic Noise

(d1) Calculation of Noise Levels

The Applicant shall analyse the scope of the proposed road alignment(s) to identify appropriate new and existing road sections for the purpose of traffic noise impact assessment. When an existing road section undergoes major modification which will directly result in 25% increase in lanes or substantial changes in alignment or characters (e.g. change to a high speed road) of the existing road, it shall be regarded as a new road for the purpose of this noise impact assessment.

The Applicant shall calculate the expected road traffic noise using methods described in the U.K. Department of Transport's "Calculation of Road Traffic Noise" (1988). Calculations of future road traffic noise shall be based on the peak hour traffic flow in respect of the maximum traffic projection within a 15 years period upon commencement of operation of the proposed roadwork. The Applicant shall calculate traffic noise levels in respect of each road section and the overall noise levels from combined road sections (both new and existing) at NSRs.

(d2) Presentation of Noise Levels

The Applicant shall present the prevailing and future traffic noise levels in L10(1hr) at the NSRs at various representative floor levels (in m P.D.) on tables and plans of suitable scale.

Quantitative assessment at the NSRs for proposed road alignment(s) shall be carried out and compared against the criteria set out in Table 1A of Annex 5 in the TM. The potential noise impact of proposed road alignment(s) shall be quantified by estimating the total number of dwellings, classrooms and other noise sensitive elements that will be exposed to noise levels exceeding the criteria set in Table 1A of Annex 5 in the TM.

(d3) Proposals for Noise Mitigation Measures

After rounding of the predicted noise levels according to the U.K. Department of Transport's "Calculation of Road Traffic Noise" (1988), the Applicant shall propose direct technical remedies in all situations

where the predicted traffic noise level exceeds the criteria set in Table 1A of Annex 5 in the TM by 1 dB(A) or more. Specific reasons for not adopting certain direct technical remedies in the design to reduce the traffic noise to a level meeting the criteria in the TM or to maximize the protection for the NSRs as far as possible should be clearly quantified and laid down. The total number of dwellings, classrooms and other noise sensitive element that will be benefited by the provision of direct technical remedies should be provided.

The total number of dwellings, classrooms and other noise sensitive elements that will still be exposed to noise above the criteria with the implementation of all recommended direct technical remedies shall be quantified.

In case where a number of the NSRs cannot all be protected by the recommended direct technical remedies, the Applicant shall identify and estimate the total number of existing dwellings, classrooms and other noise sensitive elements which may qualify for indirect technical remedies under the Executive Council directive "Equitable Redress for Persons Exposed to Increased Noise Resulting from the Use of New Roads", the associated costs and any implications for such implementation. For the purpose of determining the eligibility of the affected premises for indirect technical remedies, reference shall be made to the following set of three criteria:

(1) the predicted overall noise level from the new road together with other traffic noise in the vicinity must be above a specified noise level (e.g. 70 dB(A) for domestic premises and 65 dB(A) for education institutions, all in L10(1hr));

(2) the predicted overall noise level is at least 1.0 dB(A) more than the prevailing traffic noise level, i.e. the total traffic noise level existing before the works to construct the road were commenced; and

(3) the contribution to the increase in the predicted overall noise level from the new road must be at least 1.0dB(A).

(e) Helicopter Noise

The Applicant shall predict the long-term and short-term noise impacts arising from the operation of the helicopter with respect to the criteria set in Table 1A of Annex 5 in the TM. The assessment methodology shall be agreed with EPD prior to commencement of the assessment. The Applicant shall propose noise control or mitigation measures to minimise impacts to an acceptable level.

(f) Aircraft Noise

The Applicant shall predict the long-term and short-term noise impacts arising from the operation of aircraft with respect to the criteria set in Table 1A of Annex 5 in the TM. The assessment methodology shall be agreed with EPD prior to commencement of the assessment. The Applicant shall propose noise control or mitigation measures to minimise impacts to an acceptable level.

(vii) Assessment of Side Effects and Constraints

The Applicant shall identify, assess and propose means to minimize any side effects and to resolve any potential constraints due to the inclusion of any recommended direct technical remedies.

(viii) Evaluation of Constraints on Planned Noise Sensitive Developments/Landuses

For planned noise sensitive uses which will still be affected even with all practicable direct technical remedies in place, the Applicant shall propose, evaluate and confirm the practicality of additional measures within the planned noise sensitive uses and shall make recommendations on how these noise sensitive uses will be designed for the information of relevant parties.

The Applicant shall take into account agreed environmental requirements / constraints identified by the study to assess the development potential of concerned sites which shall be made known to the relevant parties.

3.8.3 Water Quality Impact

3.8.3.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing water pollution as stated in Annexes 6 and 14 of the TM respectively during the construction and operation phases.

3.8.3.2 The Applicant shall conduct the following detailed water quality assessment unless the Applicant can demonstrate with sufficient justification that the anticipated water quality impacts of the project and the associated cumulative impacts (e.g. the construction of container terminal No. 9) are less than or equal to those in the previously approved EIA studies.

Water Quality Impact Assessment

3.8.3.3 The "Assessment Area" for the purpose of water quality impact assessment shall cover all relevant sensitive receivers in North Western, Western Buffer and Southern Water

Control Zones (WCZs) identified in section 2.1 (iii) above.

3.8.3.4 The Applicant shall identify and analyze all physical, chemical and biological disruptions of marine water system arising during the construction and operation of the project (including the impacts arising from emergency discharge from sewage pumping stations and sewer bursting discharge). The Applicant shall address the following:

General

(i) collection and review of background information on the existing water system(s) and the respective catchment(s);

(ii) characterization of water and sediment quality based on existing information or site surveys/ tests as appropriate;

(iii) identification and analysis of all existing and planned future activities and beneficial uses related to the water system(s) and identification of all water sensitive receivers including inshore water protection/recreation areas;

(iv) identification of pertinent water quality objectives and establishment of other appropriate water quality and sediment criteria or standards for the water system(s) and all sensitive receivers affected by the project;

(v) identification of any alteration of water course, natural stream/ponds, wetland, change of shoreline or bathymetry and change of flow regimes; change of ground water levels, change of catchment types or areas;

(vi) identification, analysis and quantification of all existing and likely future water and sediment pollution sources, including point discharges and non-point sources to surface water runoff. Field investigation and laboratory tests shall be conducted as appropriate;

(vii) establishment and provision of an emission inventory on the quantities and characteristics of all these pollution sources;

Impact Predictions

(viii) prediction and quantification by mathematical modelling or other technique approved by the Director, of the impacts on the water system(s) and the sensitive receivers due to those alterations and changes identified in (v) and the pollution sources identified in (vi) above. Possible impacts include changes in hydrology, flow regime, sediment erosion or deposition, water and sediment quality and the effects on the aquatic organism due to such changes. The prediction shall take into account and include likely different construction stages or sequences, different operation stages. Cumulative impacts due to other projects, activities or pollution

sources within a boundary around the Study Area to be agreed by the Director shall also be predicted and quantified;

(ix) assessment and evaluation of water quality impacts on the sensitive receivers due to the operation of the theme park development. Among other receivers, the impact on the operation of the Discovery Centre at Sz Pak Wan shall be included;

Waste Water and Non-point Sources Pollution

(x) analysis on the adequacy of existing and planned future sewerage infrastructure to receive discharges of waste water identified in (vi) above;

(xi) analysis on the provision and adequacy of existing and planned future facilities to reduce pollution arising from the non-point sources identified in (vi) above;

(xii) identification of on the alignment, volume and possible pollutants contained in storm water discharge;

(xiii) analysis on the characteristics of sewage nature ;

(xiv) identification and quantification of the stormwater, wastewater and non-point sources pollution loads to the artificial lake during operational phase and taking into account of quality of sediment left *in situ* and analysis whether the lake is suitable for secondary recreational activities as proposed;

(xv) analysis and assessment of the impacts due to additional sewage diverted from the project to Siu Ho Wan Sewage Treatment work on North Lantau waters;

(xvi) assessment on the impacts of using chlorine as a disinfectant in the theme park, in particular on the potential of generation of carcinogenic and toxic organic chlorides;

(xvii) identification and assessment of the residual impacts of any pesticides and herbicides (if applied) on the marine water, the artificial lakes and other inland water courses;

Dredging, Filling and Dumping

(xviii) identification and quantification of all dredging, fill extraction, filling, reclamation, sediment/ mud transportation and disposal activities and requirements. Potential fill source and dumping ground to be involved shall also be identified. Consideration shall be given to the use of public fill for reclamation. Field investigation, sampling and laboratory tests to characterize the sediment/ mud concerned shall be conducted as appropriate. The ranges of parameters to be analyzed; the number, type and methods of sampling/ sampling preservation/ laboratory tests; and the laboratory to be used shall be approved by the Director.

Particular attention shall be given to the requirement of WBTC No. 22/92 on "Marine Disposal of Dredged Material";

(xix) prediction, quantification and assessment of impacts on the physical regime, water and sediment quality of the marine water system and the nearby sensitive receivers due to the activities identified in (xviii) above. The prediction and quantification of impacts caused by sediment re-suspension and contaminants release shall be carried out by mathematical modelling or other techniques approved by the Director;

(xx) identification and evaluation of the best practicable dredging and reclamation methods to minimize dredging and dumping requirements and demand for fill sources based on the criterion that existing marine mud shall be left in place and not be disturbed as far as possible;

(xxi) evaluation of the impacts due to release of the interstitial water and associated contaminants to the water column, if wick drain installation is employed to speed up consolidation of mud;

(xxii) Prediction and quantification of cumulative impacts due to other dredging, filling or dumping activities within a boundary around the Study Area to be agreed by the Director;

(xxiii) Among other sensitive receivers, impact on the operation of the Discovery Centre at Sz Pak Wan shall be addressed; and

(xxiv) Proposal of effective mitigation measures to control the spread of floating refuse originated from the public fill during construction phase;

Mitigation

(xxv) Proposal of effective infrastructure upgrading or provision, water pollution prevention and mitigation measures to be implemented during the construction, operation stages so as to reduce the water and sediment quality impacts to within acceptable levels of standards. Best management practices to reduce storm water, pesticides and herbicides and non-point source pollution shall be investigated and proposed as appropriate; and

(xxvi) evaluation and quantification of residual impacts on the water system(s) and the sensitive receivers with regard to the appropriate water and sediment quality criteria, standards and guidelines.

3.8.4 Sewerage and Sewage Treatment Implications

3.8.4.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing impacts on the downstream public sewerage, sewage treatment and disposal facilities as

stated in section 6.5 in Annex 14 of the TM.

3.8.4.2 The Applicant shall investigate and determine the need and the feasibility of having central pre-treatment facilities and/or a separate sewage treatment plant within the study area.

3.8.4.3 The Applicant shall study and assess the impacts of the pumped sewage discharge to the Siu Ho Wan Sewage Treatment Works (SHWSTW). The assessment shall include the following:

investigate and review the adequacy of the existing sewerage and treatment facilities for absorbing part or all of the sewage discharge from the proposed development within the scope of EIA study as defined in section 3.2 above. The Applicant shall confirm in the EIA report that the upgrading of Siu Ho Wan Sewage Treatment works will be completed prior to the opening of the theme park and the appropriate treatment level shall be assessed;

(iii) any additional sewage flows and flow projections from other planned developments to be connected to the Siu Ho Wan Sewage Treatment Works (such as the developments in Discovery Bay, Tai Ho, Tung Chung, Northeast Lantau Outline Zoning Plan and etc.) shall also be assessed (Any additional flows to SHWSTW should be controlled and recorded, i.e. provision of flowmeter.) The water quality impacts arising from the effluent discharge of SHW STW and its proposed extension, if any, shall be assessed in accordance with section 3.8.3 above.

based on the above items (i) and (ii), if the existing sewerage capacities cannot cope with the maximum discharges, the Applicant shall propose an optimal and cost-effective upgrading works to improve the existing sewerage and sewage treatment facilities or to provide new sewerage and sewage treatment facilities to receive and transport the sewage. Any proposed sewerage system should be designed to current DSD standard. Computerised analysis techniques such as HYDROWORKS may be used in the preliminary design. The Drainage Services Department (DSD)'s requirements of HYDROWORKS Model Transfer are given in Appendix 1;

(vi) identify and quantify the water quality and ecological impacts due to the emergency discharge from sewage pumping stations and sewer bursting discharge, and to propose measures to mitigate these impacts;

(vii) identify the alignment of the sewerage to Siu Ho Wan Sewage Treatment work;

(vi) set out the design, operation and maintenance requirements for any proposed sewage treatment facilities, such as pumping station(s) and central pre-treatment facilities for food catering effluent (if recommended), including electrical and mechanical components to eliminate the problem of septicity incurred in long

rising main(s) during low flows and to facilitate maintenance. The design, operation and maintenance requirements for the proposed sewage treatment facilities shall be agreed by DSD and EPD. (Twin rising mains for each pumping station should be provided to make sure that the proposed sewage rising mains are maintainable without shutting down and discharging untreated sewage into the sea directly).

3.8.5 Waste Management Implications

3.8.5.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing waste management implications as stated in Annexes 7 and 15 of the TM, respectively.

3.8.5.2 The assessment of waste management implications shall cover the following in the construction and operational stages of the developments proposed within the scope of EIA study as defined in section 3.2 above.

(i) Analysis of Activities and Waste Generation

The Applicant shall identify the quantity, quality and timing of the waste arising as a result of the construction and operational activities, based on the sequence and duration of these activities.

(ii) Proposal for Waste Management

(a) Prior to considering the disposal options for various types of wastes, opportunities for reducing waste generation shall be fully evaluated.

(b) Having been taken into account all the opportunities for reducing waste generation, the types and quantities of the wastes required to be disposed of as a consequence shall be estimated and the disposal options for each type of waste described in detail. The disposal method recommended for each type of wastes shall take into account the result of the assessment in (d) below.

(c) The Applicant shall identify the designated disposal site for construction waste generated from the proposed works.

(d) The impact caused by handling (including labeling, packaging & storage), collection, and disposal of wastes (including solid waste arising from sewage pumping stations, e.g. grits and sludge), shall be addressed in detail. This assessment shall cover but not limited to the following areas :

- potential hazard;
- air and odour emissions;
- noise;

- wastewater discharge;
- floating refuse along the water front and the piers;
- pest nuisance; and
- public transport.

(e) The Applicant shall recommend effective measures to be taken to minimise the impacts and nuisance (including pest control measures at temporary refuse collection points for storage of waste pending disposal).

3.8.5.3 The Applicant shall adopt the design, the general layout, the construction method and the programme that will maximise the use of public fill for the reclamation works.

3.8.6 Hazard to Life (Storage, use, transport, handling and processing of dangerous goods)

3.8.6.1 The Applicant shall follow the criteria for evaluating hazard to life as stated in Annex 4 of the TM.

3.8.6.2 The Applicant shall include the following in the risk assessments:

(i) identification of all hazardous scenarios associated with the storage, use, transport, handling and processing of dangerous goods (including fireworks and sodium hypochlorite/chlorine) during operation stages. Hazard identification should fully take account past incident data, in particular for fireworks;

(ii) execution of a Quantitative Risk Assessment expressing population risks in both individual and societal terms;

(iii) comparison of individual and societal risks with the Criteria for Evaluating Hazard to Life stipulated in Annex 4 of the TM;

(iv) identification and assessment of practicable and cost-effective risk mitigation measures by means of cost-benefit analys is;

(v) determining whether the theme park and its associated facilities will pose acceptable levels of risk to the public off-site and the visiting population after mitigation; and

(vi) Separate risk assessments will be required for visiting population (on-site) and off-site population taking into account hazards from fireworks and sodium hypochlorite/chlorine.

3.8.6.3 The Applicant shall approach the Director for detailed requirements for risk assessment for dangerous goods.

3.8.7 Ecological Impact (Terrestrial and Aquatic)

3.8.7.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing ecological impact as stated in Annexes 8 and 16 of the TM respectively during the construction and operational phases. The assessment shall include the ecological survey of the "Assessment Area" as defined in section 3.8.7.2 below

3.8.7.2 The "Assessment Area" for the purpose of terrestrial ecological assessment shall include all areas within 500m distance from the scope of EIA study as defined in section 3.2 above, or the area likely to be impacted by the proposed developments. The "Assessment Area" for the purpose of marine ecological assessment shall be the same as the "Assessment Area" for water quality impact assessment.

3.8.7.3 In the ecological impact assessment, the Applicant shall examine the flora, fauna and other components of the ecological habitats within the "Assessment Area". The aim shall be to protect, maintain or rehabilitate the natural environment. In particular, the proposed project shall avoid impacts on recognized sites of conservation importance and other ecological sensitive areas. The assessment shall identify and quantify as far as possible the potential ecological impacts associated with the proposed development.

3.8.7.4 The assessment shall include the following major tasks:

(i) review and incorporate the findings of relevant studies including the on-going EIA of the Northshore Lantau Development Feasibility Study (NSLDFS) and collate all the available information regarding the ecological characters of the "Assessment Area" (wet- and dry-season ecology surveys have been undertaken under the NLSDFS which commenced in June 1998 covering the scope of the project as mentioned in section 1.2 above)

(ii) evaluate the information collected and identify any information gap relating to the assessment of potential ecological impacts to the terrestrial and aquatic environment;

(iii) carry out any necessary field surveys and investigations to fill in the information gap, if any, and to fulfil the objectives of the EIA study;

(iv) present all relevant survey findings including previous surveys conducted in the Northshore Lantau Feasibility Development Study EIA and relevant studies together with surveys carried out under this study;

(v) establish the general ecological profile and describe the characteristics of each habitat found; major information to be provided shall include:

(a) description of the physical environment;

(b) habitat maps of suitable scale (1:1000 to 1:5000) showing the types and locations of habitats in the "Assessment Area";

(c) ecological characteristics of each habitat type such as size, vegetation type, species present, dominant species found, species diversity and abundance, community structure, inter-dependence of the habitats and species, and presence of any features of ecological importance;

(d) representative colour photographs of each habitat type and any important ecological features identified;

(e) species found that are rare, endangered and/or listed under local legislation, international conventions for conservation of wildlife/habitats or red data books;

(vi) investigate and describe the existing wildlife uses of various habitats with special attention to:

(a) woodlands;
(c) natural coastline including rocky and sandy shores;
(d) coastal bay;
(e) natural stream courses;
(f) marine life and vertebrates, in particular the Chinese White Dolphin *(Sousa chinensis)* and Finless Porpoise;
(g) mammals, such as barking deer, which may use the area as part of their range; and
(h) any other habitats and wildlife groups identified as having special conservation interests by the study.

(vii) describe all recognized sites of conservation importance in the proposed development site and its vicinity and assess whether these sites will be affected by the proposed developments or not;

(viii) using suitable methodology, identify and quantify as far as possible any direct, indirect, on-site, primary, secondary and cumulative ecological impacts such as destruction of habitats, reduction of species abundance/diversity, loss of feeding grounds, reduction of ecological carrying capacity and habitat fragmentation; and in particular the following:

(a) habitat loss and disturbance to wildlife, such as barking deer, during construction and operation stages, including the impacts due to fireworks and laser shows on the wildlife;
(b) impacts associated with dredging and filling operations during construction;

(c) deterioration of environmental qualities (e.g. water qualities) and the subsequent impacts to the biological communities during operation stage; and

(d) impacts on ecology due to sewer bursting and emergency discharge from sewage pumping stations should also be assessed.

(ix) consider and evaluate alternative design scheme to minimize the adverse impacts to the ecological system(s). Amount other measures, consideration shall be given to the feasibility to retain the natural coastlines on the both sides of the proposed lake and the coastline at the open channel. Comparative assessment of impacts on reclamation and non-reclamation of the mentioned coastline shall be included;

(x) evaluate the significance and acceptability of the ecological impacts identified using well-defined criteria;

Assessment of Impacts on Chinese White Dolphins *(Sousa chinensis)* and Finless Propoise

(xi) review and incorporate the findings of relevant studies including the previous dolphins studies as mentioned in section 3.4 above and collate all the available information regarding the ecological characters of the "Assessment Area" ;

(xii) evaluate the information collected and identify any information gap relating to the assessment of potential impacts on the Chinese White Dolphins and Finless Propoise;

(xiii) carry out necessary field surveys and investigations to fill the information gaps identified, if any, and to fulfil the objectives of the EIA study;

(xiv) present all relevant survey findings including previous surveys conducted in relevant studies together with surveys carried out under this study;

(xv) assess the impacts on the Chinese White Dolphin and Finless Propoise due to loss in habitat and food supply;

(xvi) assess the cumulative impacts of reclamation around Lantau Island on the dolphins;

(xvii) identify precautionary and mitigatory measures for protection of the Chinese White Dolphins and Finless Propoise. The proposed measures shall include those recommended in previous EIA studies and dolphins studies, such as ecological monitoring on the dolphins during construction phase;

Ecological Mitigation/Compensation Measures

(xviii) recommend all possible alternatives (such as modifications of layout and design) and practicable mitigation measures to avoid, minimize and/or compensate for the adverse ecological impacts identified, such as layout and designs to recreate the natural intertidal and subtidal shores lost through reclamation;

(xix) evaluate the feasibility and effectiveness of the recommended mitigation measures and define the scope, type, location, implementation arrangement, subsequent management and maintenance of such measures;

(xx) determine and quantify as far as possible the residual ecological impacts after implementation of the proposed mitigation measures;

(xxi) evaluate the severity and acceptability of the residual ecological impacts using well-defined criteria. If off-site mitigation measures are considered necessary to mitigate the residual impacts, the guidelines and requirements laid down in the Planning Environment & Lands Bureau Technical Circular (PELB TC) No. 1/97 "Guidelines for Implementing the Policy on Off-site Ecological Mitigation Measures" (or any subsequent technical circular issued to replace PELB TC No. 1/97 on this subject) shall be followed;

(xxii) identify and present an adequate package of measures, both on-site and off-site, to fully compensate all ecological losses due to the project; and

(xxiii) review the need for and recommend any ecological monitoring programme required.

3.8.8 Fisheries Impact

3.8.8.1 Fisheries Impact Assessment shall follow the criteria and guidelines as specified in Annexes 9 and 17 of the TM respectively. The "Assessment Area" for the purpose of the fisheries impact assessment shall include the scope of EIA study as defined in section 3.2 above, and its adjacent area of potential impact. The assessment shall review and collate existing information to provide adequate and accurate data for prediction and evaluation of impacts of the proposed developments on fisheries. The assessment shall include the following:

(i) description of the physical environmental background;

(ii) description and quantification as far as possible of the existing fisheries activities, with special attention on fish culture zones near Ma Wan;

(iii) description and quantification as far as possible of the existing fisheries resources;

(iv) identification of parameters and area that are important to fisheries;

(v) identification and quantification as far as possible of any direct/indirect and on-site/off-site impacts to fisheries, including loss of habitats, nursery and spawning grounds and those impacts on fishery due to sewer bursting and emergency discharge from sewage pumping stations;

(viii) evaluation of impacts on the Ma Wan fish culture zones as a result of water quality changes during construction stage including impacts on fish growth and fatality;

(ix) evaluation of impacts of fish growth at Ma Wan Fish Culture Zones due to water current changes after completion of the project;

(x) evaluation of impacts on fisheries during construction and operation stages in areas around Penny's Bay, Discovery Bay, Ma Wan and other affected areas and the loss of habitat and food supply for marine mammals. The Applicant shall make proposals for any practicable alternatives or mitigation measures to prevent/minimize adverse impacts on fisheries;

(xi) evaluation of cumulative impacts of loss of natural coastline on Lantau and surrounding areas on marine mammals and fisheries;

Fisheries Mitigation/Compensation Measures

(xii) identify practical mitigation measures to avoid/minimize the potential impacts on the fisheries;

(xiii) identify and present an adequate package of measures to fully compensate all the losses due to the project. Among others measures, the deployment of artificial reefs shall be assessed and considered; and

(xiv) determine the need and, if necessary, make appropriate recommendation for a fishery monitoring and audit programme.

3.8.9 Impact on Cultural Heritage

3.8.9.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing impacts on cultural heritage as stated in section 2 of both Annexes 10 and 19 of the TM respectively. The detailed criteria for cultural heritage impact assessment are enclosed in Appendix 2 to be followed.

3.8.9.2 The heritage impact assessment shall be conducted for the archaeological impacts to known archaeological sites including, but not limited to, those at Wan Tuk, Chok Ko Wan and Pak Tau Kwu.

3.8.9.3 The heritage impact assessment shall focus on the evaluation of impacts on archaeological areas, historic buildings and cultural heritage and proposals for any mitigation measures with detailed elaboration on scope of work including:

(i) heritage resources of archaeological areas and historic buildings shall be identified as far as practicable through reference to appropriate records, such as the archives of the Antiquities and Monuments Office (AMO) of the Home Affairs Bureau, and, where appropriate, through consultations with relevant village representatives, appropriate academic sources and other Government sources, including the Lands Department, District Offices, etc.;

(ii) in case that the above information sources prove inadequate or if parts of the proposed project area have not been adequately studied before, field surveys and site investigations shall be conducted to assemble the necessary data; and

(iii) the criteria to be adopted to assess the level of direct and indirect impacts to the heritage resources and to develop appropriate mitigation measures, shall be established in close liaison with AMO during the course of the EIA Study.

3.8.9.4 The Applicant shall review and incorporate the findings of previous marine archaeological investigation (MAI) at the proposed reclamation area and carry out additional investigation as necessary to adequately assess the cultural and heritage value of the underwater archaeological sites at Penny's Bay. The MAI to be conducted shall employ appropriate maritime geophysical survey techniques to be agreed with AMO and EPD. An example of such techniques would be the use of conventional side scan sonar at 25 metre centres to scan the seabed for the detection of potential existence of archaeological resources, wrecks of ancient trade ships, etc. A detailed maritime geophysical survey report of the reclamation area shall be prepared and studied by professional marine archaeologist so that archaeological information can be retrieved from the survey data. Based on the archaeological information retrieved, the archaeologist shall determine whether any cultural remains do exist within the reclamation area. Upon receipt of the MAI report, the Applicant shall agree with AMO and EPD to decide whether further underwater archaeological investigation shall be undertaken to identify the cultural remains. Mitigation measures shall be designed and the appropriate marine archaeological works shall be carried out in order to rescue the cultural remains and if found necessary.

3.8.10 Landscape and Visual Impact

3.8.10.1 The Applicant shall follow the criteria and guidelines for evaluating and assessing landscape and visual impacts as stated in Annexes 10 and 18 of the Technical Memorandum. The assessment shall cover all items classified as Designated Project under Schedule 2 of the EIAO. Both construction and operation impacts shall be assessed.

3.8.10.2 The assessment area for the landscape impact assessment shall include all areas within a 500m distance from the proposed project. The assessment area for the visual impact assessment shall be defined by the 8-km radius visual envelope from the proposed project.

3.8.10.3 The Applicant shall review relevant outline development plans, outline zoning plans, layout plans, planning briefs and studies which may identify areas of high landscape value, and recommend green belt and conservation area designations. Any guidelines on urban design concept, landscape framework, designated view corridors, and open space network that may affect the appreciation of the project should also be reviewed. The aim is to gain an insight to the future outlook of the area so that the project can fit into surrounding setting. Any conflict with statutory town plan(s) should be highlighted and appropriate follow-up action should be recommended.

3.8.10.4 The Applicant shall describe, appraise and analyse the existing landscape resources and character of the assessment area. The sensitivity of the landscape framework and its ability to accommodate change shall be particularly focused on. A system should be derived for judging impact significance. The Applicant shall identify the degree of compatibility of the proposed project with the existing landscape. The assessment shall quantify the potential landscape impacts as far as possible, so as to illustrate the significance of such impacts arising from the proposed project. Clear mapping of the landscape impact is required.

3.8.10.5 The Applicant shall assess the visual impacts of the proposed project(s). Clear illustrations of visual impact assessment are required. The assessment shall include the following:

(i) identification and plotting of visibility contours* of the proposed project within the assessment area;

(ii) identification of the key groups of sensitive receivers within the visibility contours and their views at both ground/sea levels and elevated vantage points;

(iii) description of the visual compatibility of the project with the surrounding, and the planned setting and its obstruction and interference with the key views of the adjacent areas. Among other receivers, sensitive receivers shall include hikers, users of recreational water users, ferry users and other residences with view across to Lantau; and

(iv) the severity of visual impacts in terms of distance, nature and number of sensitive receivers. Nighttime glare and activities such as fireworks shall be considered in the assessment. The visual impacts of the project with and without mitigation measures shall also be included so as to demonstrate the effectiveness of the proposed mitigation measures.

(Note *: Visibility Contour (VC) is the graduation of potential visibility of a development as viewed from surrounding contours. It refers to the altitude or elevation of the derived by projecting the height of the proposed development across a contour map of the surrounding area to show the extent of areas from where the development can be viewed and at which locations the development will be screened by the landform or by existing woodland. The VC map can be established by creating a sector of 5 or 10 degree in a radial pattern and projecting from the highest point of the development to the land profile generated from the contours within the sector to show the exposed and screened areas. Visual screening offered by existing woodlands

can be determined by adding tree heights to altitude to show the true height of the trees. The accuracy of the VC should be verified by field survey.)

3.8.10.6 The Applicant shall evaluate the merits of preservation in totality, in parts or total destruction of existing landscape and the establishment of a new landscape character area. In addition, alternative design that would avoid or reduce the identified landscape and visual impacts shall be evaluated for comparison before adopting other mitigation or compensatory measures to alleviate the impacts. The Applicant shall recommend mitigation measures to minimize the adverse effects identified above, including provision of a landscape design. The mitigation measures shall include preservation of vegetation, transplanting of mature trees, provision of screen planting and road side berms, revegetation of disturbed land, compensatory planting, provisioning of amenity areas and open spaces, provision of finishes to structures, deposition of buildings, colour scheme and texture of material used and any measures to mitigate the impact on existing land use. Parties shall be identified for the on going management and maintenance of the proposed mitigation works to ensure their effectiveness throughout the operation phase of the project. The mitigation measures proposed shall not only be concerned with damage reduction but should also include consideration of potential enhancement of existing landscape. A practical programme and funding proposal for the implementation of the recommended measures shall be provided.

3.8.10.7 Coloured perspective drawings, plans and section/elevation diagrams, annotated oblique aerial photographs, photo-retouching and computer-generated photomontage shall be adopted to fully illustrate the landscape and visual impacts of the proposed project(s) to the satisfaction of the Director. All computer graphics shall be compatible with Microstation DGN file format. The Applicant shall record the technical details such as system set-up, software, data files and function in preparing the illustration which may need to be submitted for verification of the accuracy of the illustrations.

3.8.10.8 To facilitate the landscape and visual impact assessments (LVIA), a plan showing the nature and layout of different uses within the theme park including key architectural/design features, building heights, development intensities, internal circulation system and broad landscaping proposals would also be required.

3.8.10.9 The environmental impact assessment of the theme park shall include the visual impact of the general proposed design features and activities which will be conducted within the theme park with illustrative materials to facilitate public understanding of the project. Visual impact assessment shall cover construction and operational stage measured from sensitive receivers of representative viewpoints.

3.8.10.10 When preparing the LVIA on the proposed road works and essential infrastructural requirements, the height and bulk of the proposed works inclusive of all ancillary facilities/structures such as noise barriers, slope cutting, vent shaft, embankments, viaducts, tunnel portals, retaining structures, etc shall be indicated clearly. Their

impacts on the surrounding landscape shall be shown in 3-dimensional illustrations (including photomontages).

3.8.10.11 A system should be derived for judging landscape and visual impact significance. The predicted impacts should be a function of the sensitivity and the magnitude of change. Presentation of landscape impacts at construction and operation stages in table form should include items covering existing landscape resources, source of impact, type of impact, magnitude of change, landscape sensitivity, mitigation measures and residual impacts. Similarly, the presentation of visual impacts at both construction and operation stages should include, but not limited to, location of key visually sensitive receivers (VSR), type of VSR, minimum distance from VSRs, sensitivity, primary source of impact and magnitude of change, mitigation measures and residual impacts. Illustration materials should be prepared to facilitate understanding of the predicted impacts arising from the project.

3.8.10.12 As an integral part of the EIA, environmental impacts on land uses shall also be assessed, including those on the cultural heritage/archeological features, works areas and temporary uses, land take, relocation / reprovisioning and compatibility with existing/subject to more refined scope for the project(s).

3.8.11 Requirement for the identification of projects falling under Schedule 2 (Designated Projects) of the EIAO

3.8.11.1 The Applicant shall identify clearly in the EIA report all items within the Scope of the EIA study, as defined in section 3.2 above, that are classified as Designated Projects (DPs) under Schedule 2 of the EIAO.

3.8.11.2 For those DPs identified in section 3.8.11.1 above, of which the environmental impacts have been adequately addressed in this EIA study in accordance with the Study Brief and TM requirements, a separate schedule of mitigation measures shall be provided for each DP in this EIA report in the format stipulated in section 3.8.11.3 below.

3.8.11.3 Any DP identified in section 3.8.11.1 above that require further detailed EIA studies to assess outstanding environmental issues shall be clearly identified and listed in an easily understandable format in the EIA report. The indicative scope of the detailed EIA studies required to adequately address the outstanding environmental issues of these DPs shall be set out in the EIA report."

3.8.12 Impacts Summary

To facilitate easy retrieval of important information, an impacts summary in the form of a table, or any other form approved by the Director, showing the assessment points, results of impact predictions, relevant standard or criteria, extent of exceedance predicted, if any, mitigation measures proposed and residual impacts, if any, after mitigation measures are implemented, etc., should be given at the end of each chapter on individual impact in the

EIA report as well as the Executive Summary.

3.8.13 Summary of Environmental Outcomes

The EIA report shall contain a summary of the key environmental outcomes arising from the EIA study, including the population and environmentally sensitive areas protected, environmentally friendly designs recommended, key environmental problems avoided, compensation areas included and the environmental benefits of environmental protection measures recommended.

3.8.14 Environmental Monitoring and Audit (EM&A) Requirements

3.8.14.1 The Applicant shall identify and justify in the EIA study whether there is any need for EM&A and/or environmental management system (EMS) activities during the construction and operation phases of the proposed developments and, if affirmative:

(i) to define the scope of the EM&A requirements for the proposed developments in the EIA study; and/or

(ii) to set out the EMS requirements for the construction and operation of the proposed developments to achieve satisfactory environmental performance.

3.8.14.2 Subject to the confirmation of EIA study findings, the Applicant shall comply with the requirements as stipulated in Annex 21 of the TM.

3.8.14.3 The Applicant shall prepare a project implementation schedule (in the form of a checklist as shown in Appendix 3 or as approved by the Director) containing all the EIA study recommendations and mitigation measures with reference to the implementation programme. To facilitate issue of Environmental Permits (EPs) in future, the implementation schedules shall be grouped under individual works packages in separate DPs where applicable.

3.8.15 Monitoring of Noise Impacts during Operation of the Proposed Developments

The Applicant should note the requirement stipulated in paragraph 8.1 of the TM that an operational noise monitoring programme should be proposed to verify the traffic noise predictions or the effectiveness of noise mitigation measures.

4. DURATION OF VALIDITY

This EIA study brief is valid for 24 months from the date of issue. If the EIA study does not commence within this period, the Applicant shall apply to the Director for another EIA study brief afresh before commencement of the EIA study.

5. REPORT REQUIREMENTS

5.1 In preparing the EIA report, the Applicant shall refer to Annex 11 of the TM for the contents of an EIA report. The Applicant shall also refer to Annex 20 of the TM which stipulates the guidelines for the review of an EIA report.

5.2 The Applicant shall supply the Director with the following number of hard copies of the EIA report and the Executive Summary:

(i) 50 hard copies of the EIA report in English and 80 hard copies of the Executive Summary (each bilingual in both English and Chinese) as required under section 6(2) of the EIAO to be supplied at the time of application for approval of the EIA report, unless advised otherwise by the Director;

(ii) where necessary, addendum to each copy of the EIA report and the Executive Summary submitted in (i) above, upon advice by the Director.

(iii) for the purpose of the public inspection required under section 7(1) of the EIAO, 50 hard copies of the EIA report and 80 hard copies of the Executive Summary (each bilingual in both English and Chinese), including any addendum if required in section 5.2 (ii) above, to be supplied to the locations stipulated in the "Guidance Note on Advertisement and Public Inspection of Documents" issued under the EIAO, unless advised otherwise by the Director;

(iv) 20 hard copies of the EIA report in English and 50 hard copies of the Executive Summary (each bilingual in both English and Chinese), including any addendum if required in section 5.2 (ii) above, to be supplied to the Secretary of Advisory Council on the Environment (ACE), upon advice by the Director for consultation with the ACE, as required under section 7(5) of the EIAO.

(v) 5 hard copies of the EIA report in English and 10 hard copies of Executive Summary (each bilingual in both English and Chinese), with any addendum if required in section 5.2 (ii) above, for deposition in the Register, if and when the EIA report is approved by the Director, as required under section 8(5) of the EIAO.

5.3 The Applicant shall make additional hard copies of the above documents available to the public, subject to payment by the interested parties of full costs of printing.

5.4 In addition, to facilitate the public inspection of the EIA Report via the EIAO Internet Website, the Applicant shall provide electronic copies of both the EIA Report and the Executive Summary Report prepared in HyperText Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF version 4.0 or later), unless otherwise agreed by the Director. For the HTML version, a content page capable of

providing hyperlink to each section and sub-section of the EIA Report and the Executive Summary Report shall be included in the beginning of the document. Hyperlinks to all figures, drawings and tables in the EIA Report and Executive Summary shall be provided in the main text from where the respective references are made. All graphics in the report shall be in interlaced GIF format unless otherwise agreed by the Director.

5.5 The electronic copies of the EIA report and the Executive Summary shall be submitted to the Director at the time of application for approval of the EIA Report.

5.6 When the EIA Report and the Executive Summary are made available for public inspection under section 7(1) of the EIA Ordinance, the content of the electronic copies of the EIA Report and the Executive Summary must be the same as the hard copies and the Director shall be provided with the most updated electronic copies.

5.7 To promote environmentally friendly and efficient dissemination of information, both hard copies and electronic copies of future EM&A reports recommended by the EIA study shall be required and their format shall be agreed by the Director.

6. OTHER PROCEDURAL REQUIREMENTS

6.1 During the EIA study, if there is any change in the name of Applicant for this EIA study brief, the Applicant in this study brief must notify the Director immediately.

6.2 If there is any key change in the scope of the project mentioned in section 1.2 of this EIA study brief and in Project Profile No. PP-066/1999, the Applicant must seek confirmation from the Director in writing on whether or not the scope of issues covered by this EIA study brief can still cover the key changes, and the additional issues, if any, that the EIA study must also address. If the changes to the project fundamentally alter the key scope of the EIA study brief, the Applicant shall apply to the Director for another EIA study brief afresh.

--- END OF EIA STUDY BRIEF ---

December1999
Environmental Assessment and Noise Division,
Environmental Protection Departmen

Description of Northshore Lantau Development

1 PROJECT DESCRIPTION

1.1 INTRODUCTION

The proposed developments within the Northshore Lantau Development Feasibility Study (NLDFS) Project Area are largely to be built on reclaimed lands to be formed between 2000 to 2028. The main feature involves the construction of a two-phase world-class International Theme Park at Penny's Bay together with its related developments and supporting infrastructures and services. Key elements of the Project as shown on the draft Recommended Outline Development Plan (RODP), which can be broadly divided into five planning areas, are described in *Section 1.4.*

1.2 SITE LOCATION AND HISTORY

The NLDFS Project Area comprises the north-eastern section of Lantau Island. The Study Brief gives the total Study Area of 2,600 ha, of which approximately 1,500 ha on land. The Study Area is something less than 10% of the total area of Lantau Island, with a coastline of about 8.5 km to the north, 4 km to the east, and 2.5 km to the south. The NLDFS Project Area covers the north-eastern part of Lantau Island which comprises generally three portions:

- Northshore Lantau which stretches along the northern shoreline of Lantau Island between Tai Ho and Kwai Shek;
- Tsing Chau Tsai which is an upland area at North Lantau; and
- Penny's Bay Reclamation which includes the broader Penny's Bay area stretching between Sz Pak Tsui and Pa Tau Kwu, Northeast Lantau between Pa Tau Kwu and Tso Wan, and the section of Chok Ko Wan Link Road stretching between Yam O Interchange and the Route 10 - North Lantau to Yuen Long Highway toll plaza at Fa Peng.

North-east Lantau is characterised by steep terrain and rugged relief comprising limited pockets of flat land dispersed along the coast with a saddle at Ngong Shuen Au cutting the area into two uplands. The eastern upland is dominated by hilly relief with Fa Peng Teng (273 m) as the central peak surrounded by lower ranges on all directions, including Tai Yam Teng (186 m) to the west, Ng Kwu Leng (115 m) to the north and a hilltop at Pa Tau Kwu (120 m) to the south. The western upland, with Tai Shan (291 m) as the highest point.

The Project Area is surrounded by deep water, especially to the north where the sea is 30 m deep at only 200 m from the shore. At Penny's Bay and the area around Siu Ho Wan, the water is much shallower, with a depth of 10 m being 1 km from the shore.

The eastern part of the Project Area including the proposed reclamations at Yam O, Tsing Chau Tsai East, and Penny's Bay fall within the Draft North-East Lantau Outline Zoning Plan No. S/I-NEL/5 (OZP) gazetted on 13 August 1999. The north-western part of the Project Area falls within the Siu Ho Wan Layout Plan (L\I-SHW/D).

1.3 *EXISTING MAJOR DEVELOPMENTS WITHIN THE PROJECT AREA*

The village sites identified within the Project Area include recognised villages at Tai Chuen, Fa Peng, Pa Tau Kwu, Tsing Chau Tsai, Luk Keng and Ta Pang Po and non-recognised villages located around Ngong Shuen Au, Tso Wan and Sze Pak areas (*Figure 1.3a*). Field surveys conducted confirmed that most of the villages were abandoned and the only ones with inhabitation were Luk Keng and Tso Wan.

The Cheoy Lee Shipyard currently occupying an area of about 19 ha is situated at the lead of Penny's Bay (*Figure 1.3b*). The area accommodates facilities for the shipyard, glass reinforced plastic (GRP) mould storage, two wet boat launching basins, three building berths within launching facilities, a slipway, and an array of buildings housing workshops, offices, stores, canteen and toilets. The shipyard commenced operations in the 1960's and is primarily involved in the construction and repair of GRP yachts and boats, and steel ships up to about 80 m in length. The decommissioning of this shipyard will be the subject of a separate future Schedule 2 EIA study to be commissioned by CED.

The Yiu Lian Shipyard, with a site area of about 0.8 ha and two floating docks of overall length of 334 m (Floating Dock No. 3 of 252 m and No.5 of 82 m), located at To Kau Wan on the northern coastline. The main operation of the shipyard is ship repairing which covers container vessels, general cargo vessels, bulk carriers, tankers and passenger vessels. The Government Lease under which the shipyard is held expires in 2008.

The log pond located along the northern shore of Yam O Bay is operated under short-term tenancy (STT) and the Government can give 3 months notice for the operators to vacate. The facility makes use of shallow seawater in a sheltered bay to store large logs until required for use. It consists of piles driven into the seabed in a series of bays.

Hong Kong Salvage and Towage (HKST) currently moors their crane barge "Proteus 1" north of Yam O. The 350 tonne crane barge is used for servicing HKST's fleet of tugs as well as being available for lease to undertake heavy lifting works.

A CLP power station is located at the eastern side of Penny's Bay. This gas turbine plant (GTP) was commissioned in 1992 with a generating capacity of 300 MW and serves as a peak load and emergency back-up facility for the airport, Tung Chung and the future developments along NLH and the Project Area. There are three chimneys with a stack height of 50 m at the GTP.

The electricity substation, near Sham Shui Kok, is part of CLP's electricity distribution system and is directly connected to Penny's Bay GTP. A series of power lines run from the substation to Discovery Bay and Tung Chung.

An MTR depot is located mainly on reclaimed land at Siu Ho Wan serving the Tung Chung and Airport railways. The main activities include stabling, repair, overhaul and cleaning the trains. The site has been zoned Comprehensive Development Area (CDA) under the Siu Ho Wan Layout Plan which can be redeveloped for housing and commercial purposes by decking over the depot. However, there is currently no firm commitment from either the Government or MTRC on the redevelopment programme.

The North Lantau Transfer Station (NLTS) at Sham Shui Kok is a refuse transfer station operated by EPD. The NLTS was commissioned in April 1998 and has a design throughput of 1200 tonnes day^{-1}. The station currently accepts solid wastes from Tung Chung New Town, Hong Kong International Airport, and the MTR Siu Ho Wan Depot. Wastes are compacted into containers for bulk transfer by marine vessels to the Western New Territories (WENT) landfill for disposal. The NLTS is equipped with odour control facilities and off-site odour impacts are not envisaged.

The Siu Ho Wan Sewage Treatment Works (STW) has been designed for a peak flow of 3,750 ls^{-1} (2011) and 5,000 ls^{-1} (ultimate) by providing preliminary treatment prior to discharge through the marine outfall. The Outlying Islands Sewerage - Stage I Phase I project has recommended to upgrade the STW to chemically enhanced primary treatment (CEPT) plus ultra violet (UV) light disinfection.

The Siu Ho Wan Water Treatment Works (WTW) is about 100 m south of the NLH and is bounded by the Siu Ho Wan STW in the southwest. The WTW receives its water principally from Tai Lam Chung Reservoir via a submarine water pipeline and currently has capacity for treatment 150 million litres/day. There are plans to upgrade the WTW to meet the fresh water demand in North Lantau. It is planned the WTW will eventually extend treated water supply to the developments proposed in the NLDFS.

1.4 *DEVELOPMENT PROGRAMME*

Planning Area 1 : Southern Reclamation at Penny's Bay

Area 1A - International Theme Park/ Resort Hotel

An area of about 180 ha to the south of Penny's Bay has been planned for the International Theme Park and hotel. This area covers both the theme park itself (Phases I and II) and a resort hotel area. The area assigned stays within the limit of reclamation previously gazetted for Container Terminals 10 and 11 in the North-East Lantau Port OZP. A 3.5 km long Resort Road (District

Distributor) with a design speed of 70 $kmhr^{-1}$ has been planned around the International Theme Park.

The International Theme Park will be developed into two phases. Phase I of the theme park (western portion of the site) is expected to be opened in second quarter of 2005 according to the current schedule. The annual attendance is assumed to be 7.5 million upon opening of the theme park (daily attendance of 39,000). Full completion (built-out) of Phase II is planned for about 2024 and is expected to attract about 20 million visitors per year.

The International Theme Park (Phase I) would be a "Magic Kingdom" type park and would include attractions (for example, rides, shows, and parades), food and beverage locations, shops and service facilities. The maximum building height of the International Theme Park, as specified in the development schedule of the draft RODP, is 100 m. Information provided by the Theme Park operator - Hong Kong International Theme Parks (HKITP) indicated that while the design of the International Theme Park will be of predominantly low-rise, certain structures may exceed 50 m. These structures will be located mainly at the south-eastern portion of the Phase I, which is more than 750 m from the Penny's Bay GTP. At this stage the conceptual design of the Phase II is not available hence the maximum allowable building height of 100 m, as specified in the draft OZP, has been assumed in this assessment. Phase II of the International Theme Park is located at approximately 750 m from the Penny's Bay GTP. The height of buildings/ structures within the International Theme Park will be reviewed in the EIA on *Construction of an International Theme Park in Penny's Bay of North Lantau and Its Essential Associated Infrastructures.*

Two ferry piers (about 1 ha) has been planned to locate on the southern waterfront of the International Theme Park to provide visitors with direct marine access (for both staff and guests) to the theme park and its associated developments from Central, Kowloon or nearby Discovery Bay. Subject to demand, licensed ferry services will be tendered. It is envisaged that vessels used will be the ones with speed between 24 knots and 33 knots and a capacity of about 300 to 500 passengers. There will be no permanent buildings and no structures taller than 10 m on the Ferry Pier.

An area of about 53 ha of reclaimed land at the water front of Penny's Bay has been designated for hotel uses. A chain hotels with low-rise structures is intended to provide overnight accommodation primarily to visitors of the theme park. The hotel development associated with Phase I of the International Theme Park development will have about 1,400 hotel rooms, which is also expected to be opened in 2005. Ultimately five individually-themed hotels would be built with an aggregate of approximately 7,000 rooms. The maximum building height of the International Theme Park hotels, as specified in the development schedule of the Draft RODP, is 40 m.

Construction of the International Theme Park (Phase I) and hotels is currently assumed to be commenced in Q2 of 2002 for a period of 36 months.

Construction of the Phase II of the theme park is currently assumed to be commenced in Q3 of 2008.

The International Theme Park is a Schedule 2 Designated Project under the EIAO. Environmental impacts arising from its construction and operation have been assessed in the EIA on *Construction of An International Theme Park in Penny's Bay of North Lantau and Its Essential Associated Infrastructures* (see *Section 1.6*).

Area 1B - Government, Institution or Community (G/IC) Facilities

A strip of land of about 25 ha to the north of the International Theme Park boundary has been assigned for supporting G/IC facilities related to security, rescue, parking and public transport. It will include the Penny's Bay Rail Station and the following facilities will be provided :
divisional police station,

- divisional fire station (including an ambulance station),
- bus terminus,
- rail station,
- car park,
- coach park,
- petrol filling/ service station,
- telephone exchange, and
- other utility services.

Two vehicle parking areas located to the north of the Theme Park will be provided by HKITP one for coach and one for car parking: East Public Carpark and West Public Carpark. The parking areas will be located adjacent to the northern boundary of the Theme Park, to the south of Road P2 and on either side of the PTI. These parking areas will have a total combined area of about 11 ha and will provide parking for 300 - 600 tour coaches and 1,000 - 2,000 (Phase I - Opening Day - Phase II- Build Out, respectively) private cars. The maximum height of the parking structure is 15 m. Due to the nature of the parking areas, landscaping will be primarily on the perimeter of the parking areas.

The maximum building height of the G/IC facilities, as specified in the development schedule of the Draft RODP, is 20 m.

Area 1C - Theme Park Extension Area or Other Tourism Uses

An area of approximately 70 ha located at the south-eastern end of the Penny's Bay reclamation and adjacent to the International Theme Park (Phase II) has been reserved for possible extension of the theme park (Phase III). Construction of the proposed theme park extension is currently assumed to be commenced in Q2 of 2026 for a period of 27 months.

The Theme Park Extension is a Schedule 2 Designated Project under the EIAO which will be subject to a separate detailed EIA prior to its construction in the future (see *Section 1.6*).

Area 1D - Water Recreation Centre

The Water Recreation Centre (about 32 ha) to the north-west of the Theme Park includes an artificial lake (about 12 ha) and associated amenities (car park, access roads, footpaths, trail and boat store and landscaping). The lake will serve the irrigation purpose of the International Theme Park, as well as providing scope for public water recreation (secondary contact) uses and serve as a landscape feature. Possible public water recreation activities on the lake include boating, sailing, canoeing, etc.. The WRC will be managed by HKITP.

Planned uses for the Water Recreation Centre may include a boating facility, changing rooms, restaurant/dining, refreshment kiosk, canteen, and place of recreation. Secondary uses may include storage, kitchens and food preparation areas, administrative offices, car and coach parking, and utility installation. A small building to serve the public will be located on site in order to house water recreation uses. The number of buildings and structures around the lake will be minimised and will be low-density and low-rise (6 m maximum height) in nature.

The artificial lake will be filled with fresh water comprising the runoff from the natural surrounding slopes. Catchwaters are proposed at the toe of the natural slopes to collect runoff and convey it to two locations from which will be diverted to flow into the lake via box culverts. It is understood that water required to maintain the lake water levels between periods of wet weather would be obtained from WSD's main supply of untreated water from Tai Lam Chung Reservoir.

The area of the lake is approximately 12 ha with bottom level of +1.0 mPD and a top water level of +7.5 mPD.

To prevent loss of fresh water from the lake into the surrounding porous fill or contamination of the fresh lake water by saline water seeping through the lower levels of the porous reclamation fill, it is proposed that the lake would be lined by a geosynthetic liner system that would include a high density polyethylene (HDPE) geomembrane sandwiched between protective geotextiles.

Construction of the WRC is currently assumed to be commenced in Q3 of 2003 for completion in Q4 of 2004. The excavation of the lake commenced in Q2 of 2001.

The Water Recreation Centre is a Schedule 2 Designated Project under the EIAO. Environmental impacts arising from its construction and operation have been assessed in the EIA on *Construction of An International Theme Park in*

Penny's Bay of North Lantau and Its Essential Associated Infrastructures (see *Section 1.6*).

Planning Area 2 : North Western Reclamation/Existing Luk Keng Headland

Area 2A : Eco Park

An Eco Park has been proposed on the Luk Keng Headland covering the Luk Keng Bay. The aim of the park is to provide passive recreation in an unspoilt environment which includes woodland and natural coastline. Eco-friendly activities such as viewing areas, broadwalk, and environmental education centre and an information centre or aviaries could be considered. The eco-park would act as a buffer between the more commercial tourism uses on the Theme Park Gateway to the east and the planned residential areas at Siu Ho Wan to the west.

Planning Area 3 : North Eastern Reclamation at Yam O

Area 3A : Theme Park Gateway

A site covering some 20 ha has been proposed for the Theme Park Gateway which comprises of the Yam O Station for the Penny's Bay Rail Link and a Public Transport Interchange. The aim of the development is to provide a high quality gateway function for visitors arriving at the Northshore Lantau for a total "tourism experience" which incorporates all the attractions planned in the Study Area. The development will include retail facilities, hotel and serviced apartments. There will also be office space in the development to build on synergies of land uses aimed for the business traveller.

An information centre, ticket sales, post office and police reporting centre, will also be accommodated in the site. In addition, there will also be public car parking, public open space and a pedestrian link network. Maximum building height of the Theme Park Gateway, as specified in the development schedule of the Draft RODP, is 30 m.

Construction of the theme park gateway is currently assumed to be commenced in Q1 of 2014 for a period of 39 months.

Area 3B : Cross Boundary Ferry Terminal

A Cross Boundary Ferry Terminal (CBFT) has been proposed which comprises a main pier (380 m long by 60 m wide) with 2 finger piers. The terminal building (located above the main pier) will include facilities for Immigration Department, Customs and Excises Department, Hong Kong Police Force, Marine Department, Electrical and Mechanical Services Department, Medical and Health Department, control centre, drop-off and pick-up, baggage handling, departure/ arrival, dining area, carpark and various utility services. This ferry terminal could serve mainland visitors for the International Theme Park or other tourism/ recreation uses proposed.

Construction of the first CBFT is currently assumed to be commenced in Q1 of 2017 for completion in Q2 of 2018. Construction of the second CBFT is currently assumed to be commenced in Q3 of 2029 for completion in Q2 of 2031.

Area 3C : Tourist and Convention Village

The proposed Tourist and Convention Village situated adjacent to the CBFT will occupy an area of approximately 20 ha. The development will accommodate a large convention centre accompanied by a low-density type resort hotel. It is assumed in this EIA that the resort hotel will be equipped with central air-conditioning system and will not be relying on openable windows for ventilation. The maximum building height of the Tourist and Convention Village, as specified in the development schedule of the Draft RODP, is 40 m.

Construction of the Tourist and Convention Village is currently assumed to be commenced in Q1 of 2018 for completion in Q2 of 2020.

Area 3D : Technodrome

The proposed Technodrome will form a major landmark feature covering some 20 ha to the east of the Tourist and Convention Village. It is aimed at providing hi tech entertainment and educational facilities which use state-of-the-art equipment set in a futuristic environment. The development could include IMAX theatres and other visual presentations based on themes related to the natural world, space or aerospace or marine issues. This is characterised by futuristic buildings and is mostly focused on indoor recreational and educational activities.

Construction of the Technodrome is currently assumed to be commenced in Q1 of 2020 for completion in Q2 of 2022.

Area 3E : Waterfront Promenade

A promenade of about 2 km along and 30 m wide has been proposed along the waterfront of the proposed reclamation at Yam O. The promenade may be connected to the Eco Park footpaths in the future depending on the detailed design.

Area 3F : Service Area

A site of about 1.8 ha is proposed as service area for all developments within the northern reclamation. Initial concept for the service area is to include a refuse collection point and a petrol/ LPG station. Coach parking to serve the Technodrome and Tourist Convention Village could also be accommodated within the service area. The maximum building height within the service area, as specified in the development schedule of the Draft RODP, is 25 m.

Area 3G : Bus Depot and Coach Parking

A site of about 5.4 ha has been allocated for coach parking and bus depot south of the Technodrome and Tourist and Convention Centre. The development is intended to serve both these developments. The maximum building height of the bus depot and coach parking area, as specified in the development schedule of the Draft RODP, is 25 m.

Planning Area 4 : North-Western Reclamation at Siu Ho Wan

Area 4A and 4B : Residential (R2)

Housing development at Siu Ho Wan is planned as an extension to Tai Ho New Town. It will extend the R2 housing developments planned under the Remaining Development on Tung Chung and Tai Ho Comprehensive Feasibility Study. The proposed housing development will provide about 5,500 residential units with a planning population of about 13,700. The proposed housing development will be built after the completion of the CDA development on the existing MTRC Siu Ho Wan Depot. The maximum building height assumed within the development is 84 m.

The residential development will be constructed after the completion of the MTR Siu Ho Wan Depot redevelopment. Construction of the residential development is assumed in this EIA to be commenced in Q1 of 2017 for a period of 39 months.

Area 4C : Schools

One primary and one secondary school have been planned within the proposed housing development for the residents.

Construction of the two schools is assumed to be tied in with the proposed housing development for completion in 2021.

Area 4D: Open Space

An open space of 10 ha has been planned immediately to the east of the residential area. The open space will link up with the waterfront promenade.

Area 4E : Marine Unit of Special Duties Unit

A site of about 1 ha at Sham Shui Kok to the east of the North Lantau Transfer Station has been planned for a new Special Duties Unit (SDU) Marine Base and the Small Boat Division (SBDIV) of the Marine Police. The facility will have marine access (two concrete piers) and car parking facilities for some 80 to 100 vehicles.

Planning Area 5 : Eastern Reclamation at Fa Peng (Tsing Chau Tsai East)

Area 5A : Recreational

The proposed reclamation at Fa Peng provides a land parcel of approximately 32 ha. The site has been reserved mainly for recreational purpose to tie in with the development theme of the Study Area. A promenade of approximately 1.5 km long and 30 m wide has been proposed along the waterfront of the proposed reclamation, allowing pedestrians views of Lantau Link and Tsing Ma Gateway area.

Construction of the recreational development at Tsing Chau Tsai East is currently assumed to be commenced in Q1 of 2024 for a period of 63 months.

Tso Wan Village Expansion Area

A Village Expansion Area to accommodate 62 small houses has been planned at Tso Wan which is a small-medium sized inhabited unrecognised village. Currently the village contains less than 30 buildings some of which are in good condition and show signs of intermittent habitation.

1.5 MAJOR ROADS AND RAILWAY

North Lantau Highway (NLH)

The main highways arterial route in Lantau is the NLH. NLH is a dual 3-lane expressway which runs in a south west - north east alignment along the northern shores of Lantau Island. The NLH serves as the main road link between the Hong Kong International Airport and the rest of the HKSAR.

The stretch of NLH within the Project Area consists of the Kap Shui Mun Bridge in the north, making landfall at +54 mPD at Tai Chuen, to a toll plaza at +46 mPD, across the Tsing Chau Wan and Ta Shui Wan viaducts onto the reclamation.

The Yam O Interchange of NLH has been constructed at Ngong Shuen Au with slip roads, which will ultimately link to Route 10 via the CKWLR.

Road P1

Road P1 is intended as a primary distributor road serving all the developments alongside the North Lantau Highway (NLH). The road runs essentially parallel to the NLH and north of it. Road P1 has multiple access points to the developments proposed in the RODP whilst providing only limited connections with the NLH. According to the Final Preliminary Engineering Report, traffic figures indicate that the road should be Dual-3 standard south of the proposed Eco Park at Luk Keng, and Dual-2 east of this point.

Road P1 commences west of MTRC Siu Ho Wan Depot, passes around the Depot on its northern seaboard, runs parallel to the NLH for about 2.7 km before entering the western portal of the Yam Tsai tunnel, and then connects with the NLH. The connections with the NLH is via the two existing end of the slip roads (namely Link Roads 5 & 6) of the Yam O Interchange. Road P1 will be mostly run on at-grade road formed by reclamation, except for the section between the western tunnel portal and Sham Shui Kok which will be running on an elevated structure to avoid the encroachment to the existing sub-marine cables under this area.

A 760 m long Yam Tsai tunnels are provided under the proposed Eco Park at Luk Keng. After exiting the eastern portal of the Yam Tsai Tunnel, Road P1 crosses an embayment near Yam O Wan on at-grade road with a T-junction at the eastern end, which provides access from Road P1 to the International Theme Park. The Yam Tsai Tunnel avoids extension of the present Yam O cutting into the proposed Eco Park or the construction of an elevated viaduct adjacent to the cutting which minimise the potential landscape and visual impact to the Eco Park.

The design speeds of Road P1 are 100 km/hr and 85 km/hr for the mainline and link roads, respectively.

Road P1 is a Schedule 2 Designated Project under the EIAO which will be subject to a separate detailed EIA prior to its construction in the future (see *Section 1.6*).

Construction of Road P1 is envisaged to commence in Q1 of 2015 for completion in Q4 of 2016.

Road P2

The proposed Road P2 will be dual two lanes and of about 4 km long with two roundabouts. Road P2 commences from the proposed development at Yam O and extends the existing Cheung Tung Road at Yam O interchange from P1 Junction and then connected to Penny's Bay Roundabout, provides a link from North Lantau to CKWLR and the International Theme Park, and continuous along the southern coastal line. The road will descend from a level of +30.8 mPD at Yam O with an average gradient of +1.5% to the Penny's Bay Roundabout. It will primarily run on an elevated structure. Road P2 will be in the form of dual-2 arrangement with a design speed of 70 km/hr and with 4 meters verge on each sides.

Construction of Road P2 from Yam O to the Penny's Bay roundabout is envisaged to commence in early 2003 with construction works completed within about 28 months.

Road P2 is a Schedule 2 Designated Project under the EIAO. Environmental impacts arising from its construction and operation have been assessed in the

EIA on *Construction of An International Theme Park in Penny's Bay of North Lantau and Its Essential Associated Infrastructures* (see *Section 1.6*).

CKWLR is a key component of the Northshore Lantau study area, providing free flowing interchange between the North Lantau Highway (NLH), and the Route 10 - North Lantau to Yuen Long Highway (Route 10-NLYLH) and the Route 10 - Hong Kong Lantau Link (Route 10 - HKLL). In addition to this function, the CKWLR provides arterial access to the future developments on the Penny's Bay and Tsing Chau Tsai East reclamations. The CKWLR joins the NLH via the Yam O Interchange, and Route 10-NLYLH via the Pa Tau Kwu Interchange. The design speed of CKWLR is 100 km/hr.

The CKWLR also connects to the district and local road network serving the new reclamation areas in Penny's Bay and potentially to Tsing Chau Tsai East as well. These connections will be via roundabouts located at Penny's Bay (referred to as the Penny's Bay roundabout) and at Pa Tau Kwu (referred to as the Pa Tau Kwu roundabout).

Environmental impacts on the CKWLR sections within the Project Area of the EIA on *Construction of An International Theme Park in Penny's Bay of North Lantau and Its Essential Associated Infrastructures* has been broadly addressed in the theme park EIA report. Detailed assessments of the construction and operation of the road have been included in the NSLDFS EIA report.

Construction of CKWLR (Yam O to Penny's Bay Interchange section) is scheduled to commence in Q3 of 2002 for completion in Q1 of 2005. The section from Penny's Bay Interchange to R10-NLYLH toll plaza will be constructed from Q3 of 2003 for completion in Q3 of 2005. While the section connected from R10-NLYLH toll plaza to R10-HKLL (including the Pa Tau Kwu Interchange) will be constructed from Q2 of 2028 for completion in Q2 of 2030.

Route 10 - NLYLH

Route 10 - NLYLH is proposed as a dual 3-lane carriageway between Northshore Lantau and Yuen Long. It is scheduled for completion in 2007 and will provide a second road crossing to Lantau Island to relieve the Lantau Link and also Route 3 Country Park Section, Ting Kau Bridge and part of Tuen Mun Road.

Discovery Bay Tunnel

Discovery Bay Tunnel comprises of a 2 km single 2-lane carriageway from Discovery Bay to Siu Ho Wan. The tunnel is scheduled to be in operation in mid- 2000.

Route 10 - HKLL

Route 10 - HKLL is proposed as a dual 3-lane all-weather carriageway between the Pa Tau Kwu Interchange on Lantau Island and the road network in the proposed Green Island Reclamation. The need and timing of the R10-HKLL are subject to review under separate studies. For the purpose of this EIA, the road has been assumed to be available in 2027.

Tuen Mun - Chek Lap Kok Link

Tuen Mun - Chek Lap Kok Link is prepared as a dual 3-lane carriageway. The need and timing of the TM-CLK Link are subject to review under separate studies. For the purpose of this EIA, the road has been assumed to be available in 2017.

MTR Airport Express and Tung Chung Line

The twin track electrified railway serving Tung Chung (the Tung Chung Line) and the Airport Express Rail Link traverse the entire northern shore of the Project Area. The railway runs under the road level of Kap Shui Mun Bridge into a section of tunnel at Tai Chuen, diverting south of the alignment of NLH before crossing under the north end of toll plaza out onto embankments at Tai Tsing Chau (+15 mPD) and down to the reclamation at +5.5 mPD where it generally runs parallel to the highway.

MTR Penny's Bay Rail Link

As described in *Section 2* of the Penny's Bay Rail Link EIA Report, a new 3.6 km long rail line, partly in a tunnel from Yam O to Penny's Bay with new stations at Yam O and at Penny's Bay [1] has also been planned. The PBRL is to be constructed at grade on the Penny's Bay Reclamation, with a tunnel of approximately 850 m through Tsing Chau Tsai headland. Portions of the track will be depressed in the vicinity of Penny's Bay Rail Station and will be shielded from the International Theme Park by earth bunding alongside the PBRL alignment. At Yam O, the alignment is at-grade, situated on the existing reclamation level as it passes under the roads of the North Lantau Highway. Yam O Station and the Penny's Bay Rail Link are expected to be opened for passenger service in February 2005, which will be approximately 36 months from the date of construction commencement.

The Penny's Bay Rail Link is a Schedule 2 Designated Project under the EIAO. Environmental impacts arising from its construction and operation for the section from Yam O to Penny's Bay have been assessed under the EIA Study Brief No. ESB-043/1999 - *Construction of An International Theme Park in Penny's*

[1] Penny's Bay Rail Station is referred to as Disneyland Station in the EIA Report for the PBRL in Annex M. This is only a working name. The formal name of the Penny's Bay Rail Station will be determined in due course.

Bay of North Lantau and Its Essential Associated Infrastructures (see *Section 1.6*). The proposed extension of the PBRL to the Tsing Chau Tsai East Reclamation and Hong Kong Island, as shown in the draft RODP, will be subject to further EIA for its environmental permit application.

1.6 EIA ORDINANCE REQUIREMENTS AND DESIGNATED PROJECTS

The Project comprises a number of individual elements which are classified as Designated Projects (DPs) under Schedule 2, Part I of the EIAO; DPs require an EIA and Environmental Permit (EP) before their construction and operation. The DPs that have been identified are presented in *Table 1.6a.*

Table 1.6a Schedule 2 Designated Projects

Schedule 2	Description	Schedule 2 EIAO Reference
Part I - A - Roads, Railways and Depots	• Approx. 3.5 km long Chok Ko Wan Link Road (Expressway Standard)	Part I - A.1
	• Approx. 4 km long Road P1 (Primary Distributor)	Part I - A.1
	• Approx. 5 km long Road P2 (Primary Distributor)	Part I - A1
	• Approx. 3.5 km long Resort Road (District Distributor)	Part I - A.1
	• Penny's Bay Rail Link and its associated stations (including 850 m of tunnel)	Part I - A.2, A.4 and A.7
Part I - C - Reclamation, Hydraulic and Marine Facilities, Dredging and Dumping	• All reclamation works more than 5 ha in size including Penny's Bay Stages I and II (280 ha), Yam O (10 ha), Northshore Lantau (65 ha), Tsing Chau Tsai East (74 ha), Theme Park Extension (80 ha), and Siu Ho Wan (39 ha)	Part I - C.1, C.2, C.11 and C.12
Part I - I - Waterways and Drainage Works	• Water Recreation Centre 12 ha artificial lake (designed as a flood storage pond)	Part I - I.2 and O.8
	• Stormwater drainage channel (discharges within 300 m of any existing archaeological site).	Part I - I.1(b) (ii)
Part I - O - Tourist and Recreational Developments	• International Theme Park (Phases I and II) at Penny's Bay and associated developments with an area of about 180 ha	Part I - O.8
	• Theme Park (Phase III) extension to the south of Pa Tau Kwu with an area of about 70 ha	Part I - O.8
Part II - Decommissioning Projects	• Decommissioning of Cheoy Lee Shipyard with an area of about 19 ha	Part II - Item 17

Apart from the CKWLR section from Yam O Interchange to R10 toll plaza which has been designed to Preliminary Design level which has been assessed in detailed to the Schedule 2 EIA level for the Project Proponent's environmental permit (EP) application, all other Schedule 2 DPs are subject to separate EIAs for their EPs application. A total of 9 DPs have been included in the concurrent Schedule 2 EIA on *Construction of An International Theme Park in*

Penny's Bay of North Lantau and Its Essential Associated Infrastructures. These include :

- Penny's Bay Reclamation (about 280 ha);
- Yam O Reclamation for the temporary PTI (10 ha);
- The International Theme Park Phases I and II (about 180 ha including hotels);
- Stormwater drainage channel discharge to the east of Penny's Bay within 300 m of the existing Pa Tau Kwu archaeological site;
- The 3.6 km Penny's Bay Rail Link (including 850 m of tunnel) and its associated Yam O Station and Penny's Bay Rail Station;
- Road P2 (approximately 4 km long section of distributor road standard);
- Resort Road (approximately 3.5 km long of distributor standard);
- The artificial lake (about 12 ha) at the Water Recreation Centre; and
- Approximately 1.5 km section of Chok Ko Wan Link Road.

The findings of the EIA Study for the *Construction of an International Theme Park in Penny's Bay of North Lantau and Its Essential Associated Infrastructures* will be broadly discussed in this report along with the evaluation of the cumulative environmental impacts.

The NLDFS EIA assumes that the large-scaled recreational development such as the Technodrome and the Tsing Chau Tsai East recreational area are not considered as Schedule 2 Designated Projects under the EIAO. This may have to be reviewed in the future when the detailed design of the proposed developments are available.

Schedule 2 DPs identified within the draft RODP which require further detailed assessments for their environmental permits application including the follows :

- Road P1 (Primary Distributor) of about 4 km;
- Distributor Road for the Theme Park (Phase III) Extension (about 1 km);
- Penny's Bay Rail Link extension from International Theme Park to Tsing Chau Tsai East Reclamation and Hong Kong, and its associated stations;
- Reclamations proposed at Northshore Lantau (65 ha), Tsing Chau Tsai East (74 ha), Theme Park Extension (80 ha), and Siu Ho Wan (39 ha) including Special Duties Unit and Small Boat Division Marine Base and Road P2 (Siu Ho Wan to Ta Pang Po section);
- Theme Park (Phase III) Extention Development (about 70 ha); and
- Decommissioning of Cheoy Lee Shipyard.

1.7 *EIA STUDY ASSESSMENT AREAS*

Various boundary conditions for assessing the environmental consequences of the developments included within the scope of the CKWLR EIA have been specified under Clause 4.2 of the Study Brief as below.

The boundary of the "study area" for the purpose of this EIA shall be of 300 m from either side and along the full stretch of the proposed road alignment, except that, for landscape impact and air pollution assessment, the study area shall generally be defined by a distance of 500 m from the proposed road alignment. However, all sensitive receivers regarding the visual impact assessment shall be assessed regardless of the distance from the proposed road alignment.

With respect to noise impact assessment, the study area may be reduced accordingly if the first layer of noise sensitive receivers, closer than 300 m from the road, provide acoustic shielding to those receivers at further distance behind. All the figures of distance mentioned above shall be measured at the edge of kerb or hard shoulder whichever is applicable.

Where sensitive receptors that may be potentially affected by Project activities have been identified beyond the above boundary conditions, the assessment areas have been extended to cover such areas. Such assessment areas are described in relevant technical sections.

1.8 *RECLAMATION CONSTRUCTION SCHEDULE*

The currently proposed programme for reclamation works is summarised in *Table 1.8a; Figure 1.8a* shows the reclamation elements.

Table 1.8a ***Reclamation Construction Schedule (According to NLDFS Recommendation)***

Activity	Start	Finish
Penny's Bay Reclamation (Stage I)		
Dredging	Q2 2000	Q4 2001
Seawall Construction	Q3 2000	Q2 2002
Filling	Q4 2000	Q2 2002
Surcharge	Q1 2001	Q3 2002
Penny's Bay Reclamation (Stage II)		
Dredging	Q3 2001	Q1 2005
Seawall Construction	Q4 2001	Q3 2005
Filling	Q2 2003	Q2 2007
Surcharge	Q3 2003	Q4 2008
Yam O (10 ha)		
Dredging	Q4 2001	Q4 2002
Seawall construction	Q3 2002	Q1 2003
Filling	Q4 2002	Q2 2003
Surcharge	Q1 2003	Q3 2003
Northshore Lantau		
Dredging	Q1 2012	Q2 2017
Seawall construction	Q2 2012	Q3 2017
Filling	Q3 2012	Q4 2017
Surcharge	Q4 2012	Q1 2018
Siu Ho Wan		
Dredging	Q3 2014	Q2 2015
Seawall construction	Q4 2014	Q3 2015
Filling	Q1 2015	Q4 2015
Surcharge	Q2 2015	Q1 2016
Fa Peng (Tsing Chau Tsai East)		
Dredging	Q2 2022	Q3 2025
Seawall construction	Q3 2022	Q4 2025

Activity	Start	Finish
Filling	Q4 2022	Q1 2026
Surcharge	Q1 2023	Q2 2026
Theme Park Extension		
Dredging	Q2 2026	Q3 2027
Seawall construction	Q3 2026	Q4 2027
Filling	Q4 2026	Q1 2028
Surcharge	Q1 2027	Q2 2028

Note: Q1 represent first quarter etc.
For the purpose of this EIA, the Penny's Bay (Stage II) reclamation works is based on a fast track programme to ascertain the worst possible adverse environmental impacts.

Penny's Bay Reclamation

The Penny's Bay Reclamation was gazetted under the Foreshore and Seabed (Reclamations) Ordinance on 15 and 22 October 1999. Reclamation of about 280 ha of land within Penny's Bay using marine sand fill and public filling materials.

Stage I of the Penny's Bay Reclamation, which will commence in Q2 of 2000 for completion in Q3 of 2002, comprises formation of 200 ha of land at Penny's Bay. It comprises dredging and reclamation works of 126 ha for the International Theme Park Phase I and 74 ha outside the theme park (Phase I) area including the Water Recreation Centre, road infrastructures and the Government, Institution and Community facilities. Dredging in Penny's Bay is expected to be carried out using a maximum of 3 large Trailing Suction Hopper Dredger (TSHDs), commonly referred to as a trailer dredger, 1 medium sized TSHD and 5 grab dredgers. The maximum cumulative dredging rate for this equipment spread will be about 634,000 m^3 $week^{-1}$. Stage II reclamation works for the International Theme Park (Phase II) are currently envisaged to be completed by Q1 of 2006.

A permanent 3.5 km seawall comprising sloping and vertical blockwork will be constructed around the seaward boundary of the reclamation to protect the reclamation site from wave and tidal action. The seawall will be constructed to achieve a minimum height of +6.5 m mPD (after settlement). A wave return structure (about 0.5 m high) will be provided on top of the seawall to protect against overtopping.

Filling will be carried out by a maximum of 6 large THSDs; each will have a nominal capacity of 165,800 m^3 $week^{-1}$; the maximum anticipated filling rate will be 994,800 m^3 $week^{-1}$. Marine sand and public fill will be will be used for the both the Stage I and II reclamations. It is estimated that some 65 Mm^3 of sand, 2 Mm^3 of public fill will be required for Stage I reclamation. Stage II reclamation is expected to require some 7.4 Mm^3 of sand, 11 Mm^3 of public fill, of which 2.5 Mm^3 is used for surcharge material.

It is currently envisaged that the majority of Project fill material will be sourced from the Wailingding Marine Borrow Area which is in Mainland waters. A small portion of the sand fill material is likely to be obtained from

the East Lamma Channel Marine Borrow Area, which is allocated by the Fill Management Committee (FMC).

Yam O Reclamation (10ha)

A 10 ha reclamation has been proposed at Yam O for the construction of a temporary public transport interchange and for part of the Road P2. Dredging of the seawall will be commenced in Q1 2002 and the entire reclamation works is expected to be completed in Q3 2003. Dredging is expected to be carried out using a single grab dredger working at a rate of about 2,000 m^3 day^{-1}. A seawall of about 0.7 km long will be constructed to retain the fill.
The Yam O Reclamation requires approximately 1.7 Mm^3 of fill material, public fill will be used as far as practicable for the reclamation. It is estimated that about 1.2 Mm^3 (about 70% of the fill requirement) of public fill will be used for the reclamation and the balance will be sand fill (about 500,000 m^3 which will mainly used for the construction of the seawall and the sand blanket laid on top of the marine mud left in place). Filling will be carried out by bottom dumping from split barges at a working rate of 14,000 m^3 day^{-1}.

Northshore Lantau

An additional 65 ha reclamation has been proposed along the northshore of the Project Area from Yam O to To Kau Wan. Dredging of the seawall will be commenced in Q1 2012 and the entire reclamation works is expected to be completed in Q1 2018. Dredging in northshore reclamation is expected to be carried out using a maximum of 1 grab dredger. The maximum dredging and filling rates for the Northshore Lantau reclamation are estimated to be 2,000 m^3 day^{-1} and 8,000 m^3 day^{-1}, respectively. A seawall of about 3.2 km long will be constructed to retain the fill.

The total fill volume is estimated to be approximately 4.7 Mm^3, of which about 3.3 Mm^3 will be by public filling. In addition, total surcharge volume is estimated to be 2.3 Mm^3 by public filling.

Tsing Chau Tsai East

Reclamation at Tsing Chau Tsai East from Sam Chuen to Pa Tau Kwu comprises a total area of 74 ha. The reclamation will be formed in three periods, namely CKWLR Phase I reclamation for CKWLR and R10-NLYLH sections including the R10 toll plaza, CKWLR Phase II reclamation for the CKWLR section connected to the R10-HKLL and the Pa Tau Kwu Interchange, and the Fa Peng reclamation for proposed recreational uses.

The CKWLR Phase I reclamation (17 ha) will be reclaimed from Q1 of 2002 for completion in Q1 of 2004 to provide land for the construction of CKWLR section (north of Pa Tau Kwu to the Route 10 toll plaza), the R10 toll plaza and the R10 section (Sam Chuen to Fa Peng). The volume of fill required for CKWLR Phase I reclamation is estimated to be approximately 2.5 Mm^3, of

which about 1.6 Mm^3 will be by public filling. The surcharge volume is estimated to be 1 Mm^3 by public filling.

The CKWLR Phase II reclamation (25 ha) for the CKWLR connection to R10-HKLL including the Pa Tau Kwu Interchange will be commenced in Q2 of 2006 for completion in 24 months. The volume of fill required for CKWLR Phase II reclamation is estimated to be approximately 3.7 Mm^3, of which about 3 Mm^3 will be by public filling. The surcharge volume is estimated to be 1.5 Mm^3 by public filling.

The Fa Peng Reclamation comprises an area of 32 ha. Dredging of the seawall of the Fa Peng reclamation will be commenced in Q2 2022 for completion in 48 months. The volume of fill required for Fa Peng reclamation is estimated to be approximately 4.7 Mm^3, of which about 3.8 Mm^3 will be by public filling. The surcharge volume is estimated to be 1.9 Mm^3 by public filling.

Dredging in TCT East is expected to be carried out using a maximum of 3 grab dredgers. The maximum dredging and filling rates for the TCT East reclamation are both estimated to be 6,000 m^3 day^{-1}. A seawall of about 2.5 km long will be constructed to retain the fill.

The total fill volumes is estimated to be approximately 10.8 Mm^3, of which about 8.6 Mm^3 will be by public filling. Total surcharge volume is estimated to be 4.4 Mm^3 by public filling.

Theme Park (Phase III) Extension

Reclamation of about 80 ha has been proposed between Pa Tau Kwu south and Phase II of the International Theme Park for the possible Phase III Theme Park extension or other recreational uses. Dredging of the seawall will be commenced in Q2 2026 and the entire reclamation works is expected to be completed in 24 months. Dredging in the theme park extension is expected to be carried out using a maximum of 3 grab dredgers. The maximum dredging and filling rates for this reclamation are estimated to be 6,000 m^3 day^{-1} and 28,000 m^3 day^{-1}, respectively. A seawall of about 1 km long will be constructed to retain the fill.

The total fill volume is estimated to be approximately 14 Mm^3, of which about 12 Mm^3 will be by public filling. Total surcharge volume is estimated to be 4.8 Mm^3 by public filling.

Siu Ho Wan

Reclamation of 39 ha has been proposed from Ta Pang Po to Siu Ho Wan for the Road P1 section (8 ha), the SDU Base (1 ha), and the proposed R2 residential development and schools (30 ha). Dredging of the seawall will be commenced in Q3 2014 and the entire reclamation works is expected to be completed in Q1 2016. Dredging in Siu Ho Wan is expected to be carried out using a maximum of 2 grab dredgers. The maximum dredging and filling

rates for this reclamation are estimated to be about 4,000 $m^3 day^{-1}$ and 20,000 $m^3 day^{-1}$, respectively. A seawall of about 3.7 km long will be constructed to retain the fill.

The total fill volume is estimated to be approximately 3.3 Mm^3, of which about 2.1 Mm^3 will be by public filling. Total surcharge volume is estimated to be 1.6 Mm^3 by public filling.

Table 1.8b ***Reclamations Proposed within the Project Area***

Reclamation	Area (ha)	Fill Volume - Sandfill (Mm^3)	Fill Volume - Public Fill (Mm^3)	Total Fill Volume (Mm^3)	Surcharge Volume - Public Fill (Mm^3)	Total Surcharge Volume (Mm^3)
Penny's Bay Stage I	200	65	2	67*		
Penny's Bay Stage II	80	7.4	11	18.4*		
Northshore	65	1.4	3.3	4.7	2.3	2.3
Yam O	10	0.5	1.2	1.7	0.3	0.3
Siu Ho Wan	39	1.2	2.1	3.3	1.6	1.6
TP PIII Extension	80	2.4	11.8	14.2	4.8	4.8
TCT East	74	2.2	8.6	10.8	4.4	4.4

* Includes 2.5Mm^3 surcharge material.

1.9 PROJECT ROADS CONSTRUCTION WORKS SCHEDULE

A tentative schedule for all temporary and permanent road construction works for the Project is provided in *Table 1.9a.*

Table 1.9a ***Tentative Schedule for Major Road Construction Works***

Activity	Start	Finish
Temporary Access Road	Q3 2000	Q4 2000
CKWLR (Yam O to Penny's Bay Interchange)	Q4 2002	Q1 2005
CKWLR (Penny's Bay Interchange to R10 toll plaza)	Q4 2003	Q3 2005
Road P2 (Northshore development to International Theme Park West)	Q1 2003	Q1 2005
Road P2 (Theme Park East Roundabout to Pa Tau Kwu Interchange)	Q1 2006	Q1 2008
Resort Roads (Theme Park Phase I)	Q1 2003	Q1 2004
Road P1	Q1 2015	Q4 2016

Chok Ko Wan Link Road

Civil Engineering Department will be the Project proponent for the construction of the CKWLR.

Key identified constraints for the alignment of the western section of the CKWLR include the Yam O Interchange, the proposed Penny's Bay Rail Link, the CLP power station, the need to provide a drainage reserve and the need to connect to Road P2.

The required works for the construction of the CKWLR will include the use of heavy plant for excavation, drilling, piling, concreting, surfacing and

structures construction. Key activities will include:

- Decommissioning of Cheoy Lee Shipyard;
- Excavation works;
- Blasting works;
- Slope protection works;
- Construction of road foundations and superstructures; and
- Road surfacing and construction of road sections.

Construction of the CKWLR from Yam O to Penny's Bay Interchange is envisaged to commence in October 2003 with construction works completed within about 15 months.

The volume of excavation and dredged material to be generated from the construction of CKWLR are 3 Mm^3 and 1.8 Mm^3, respectively. The excavation and dredged material generation rates are estimated to be 6,400 m^3 day^{-1}, and 6,000 m^3 day^{-1}, respectively. Any excavated surplus material will be used within Penny' s Bay. Dredged material to be disposed off site to marine mud disposal site is estimated to be 3,000 m^3 day^{-1}.

Worst-case road traffic data (design flow, percentage heavy goods vehicles and design speed) for the above road and used for air and noise impact assessment is summarised in *Figure 1.9a.*

1.10 *STORMWATER DRAINAGE, SEWERAGE AND OTHER UTILITIES*

Stormwater Drainage System

To minimise the potential for water pollution, stormwater collected from the International Theme Park development and roads, the currently proposed urban trunk drainage system (with the exception of the CLP site) will flow towards the east and discharge to the Kap Shui Mun Channel. This drainage structure is expected to comprise of a two to three cell box culvert (3.5 m wide and 3.5 m height each) arrangement with a length of about 1.7 km, the eastern stormwater drainage channel comprises an *EIAO Schedule* 2 Designated Project, as it discharges within 300 m of the existing Pa Tau Kwu archaeological site.

Stormwater runoff from natural hill slopes surrounding Penny's Bay, landscaped areas of the new reclamation will be collected into a separate catchwater system for discharge to the sea via an open channel of about 2.2 km in length at the southwest corner of the reclamation.

It is proposed that drainage from the Theme Park and hotel areas will discharge to the sea via a number of 1-3 cell box culverts on the southern shoreline of the reclamation.

Road surface runoff at the Luk Keng area will be diverted away from the proposed Yam O waterway and discharged to the west of the Luk Keng headland.

A conceptual drainage layout plan for the Project is provided in *Figures 1.10a-1.10c*, the provisional drainage layout for the Theme Park and associated facilities is also shown.

Water Supply

The construction of one fresh water service reservoir, one salt water service reservoir, and one salt water pumping station including laying of the associated water mains will be required to serve the proposed NLDFS developments.

Potential sites allocated for the fresh and salt water service reservoirs on the RODP include Fa Peng and Yam O Tuk.

Sewerage and Sewage Disposal

The preliminary sewerage assessment indicated that sewerage flows generated by developments proposed under the NLDFS can be accommodated by the proposed upgrading of the Siu Ho Wan STW providing the treatment works is upgraded to its ultimate capacity by 2011.

1.11 CONCURRENT PROJECTS

Concurrent ongoing projects in the vicinity of this Project considered in impact assessments for cumulative purposes are described below.

The Route 10 - North Lantau to Yuen Long Highway (Route 10 - NLYLH) southern section comprises the link between the toll plaza at Fa Peng and the interchange to the south of So Kwun Wat. The construction work is scheduled to commence in 2002 for completion in 2007. An EIA has been completed in July 1999 for the Route 10-NLYLH southern section and has been approved under EIAO.

The Remaining Development in Tung Chung and Tai Ho Comprehensive Feasibility Study covers four major development areas in Tung Chung (Centre, West District, Valley and Coast) and four in Tai Ho (West, Central, East and Bay). A Recommended Outline Development Plan has been produced for North Lantau with an ultimate target population of 340,000 for North Lantau at year 2011.

The proposed Dangerous Goods Anchorage (DGA) at Tang Lung Chau provides a total of 72 moorings and has a gross area of 67.5 ha, which is bounded by the centre lines of the surrounding breakwater. According to the Tsuen Wan Bay Further Reclamation, Area 35 Engineering, Planning and Environmental Investigation (TDD, 1999), the latest estimate on the programme for was for commencement of the works in late 2000 for completion in mid 2003.

The proposed reclamation at Sham Tseng covers an area of 16.3 ha located between Ting Kau and Sham Tseng Sewage Treatment Works and Tsing Lung Tau. The dredging and reclamation work was proposed to commence in 2002 for completion in 2004 and the construction of the entire project will complete by 2008.

In addition, a number of possible concurrent projects have been taken into consideration in this EIA. These include dredging and filling at the Container Terminal No. 9 (CT9) reclamation which the construction work was commenced in 1999 for completion (first berth operational) in 2001. Associated with construction of CT9 will be sand borrowing at the West of Sulphur Channel Marine Borrow Area (MBA) and dumping of dredged sediments at the South Tsing Yi MBA and/ or the South Cheung Chau marine disposal ground. Contaminated mud dredged from the CT9 will be disposed at the East Sha Chau Contaminated Mud Pits.

Other reclamation projects considered including Tsuen Wan Bay Reclamation, sand winning at East Lamma Channel Marine Borrow Area, and Lamma Extension power station reclamation.

1.12 *BENEFITS AND DISBENEFITS OF THE PROJECT*

The perceived benefits associated with the proposed tourism and recreational developments are expected to be primarily of an economic nature. The International Theme Park development and associated hotels and RD&E facilities would be expected to strengthen Hong Kong SAR's role as a major tourist destination in Asia and the world and generate substantial employment opportunities during both construction and operation.

In addition, environmental enhancement arising from the Project comprise the following:

- The proposed reclamations require a large amount of fill material and therefore offers a very good opportunity to utilise the public fill generated in the HKSAR. The total volume of public fill to be used for all reclamations within the RODP was estimated to be approximately 53 Mm^3. The use of public will not only alleviate the demand for virgin fill material but also reduce the pressure of disposing inert Construction and Demolition Material (C&DM) at the strategic landfills.

- Tsing Chau Tsai headland has been zoned as Countryside Conservation Area. Woodland replanting has been proposed on the headland which will enhance the natural habitat.

- The Luk Keng headland and the nearby Cheung Sok Island have been zoned Conservation Area in the OZP. An Eco Park has been proposed at Luk Keng under the draft RODP and it is expected that re-creation of

habitats or introduction of new habitats/ species would be required to upgrade the interest of the site and enhance visitor appeal.;

- The deletion of two reclamation areas (about 16 ha) to the south-west and east of Cheung Sok from the North-East Lantau Port OZP has preserved approximately 1 km of natural coastline.

- The EIA for *Construction of an International Theme Park in Penny's Bay of North Lantau and Its Essential Associated Infrastructures* has recommended deployment of 4,350 m^3 Artificial Reefs (ARs) in Hong Kong waters at a site (or sites) to be decided upon consultation with the AFCD. ARs act as fish aggregation devices and provide hard bottom, high profile habitat in areas without natural cover. The AR subsequently will provide food, shelter and a nursery ground for commercial fish and, over the long term enhance fishery stocks. Enhanced fish stocks in the area will not only benefit local fishermen but will also increase the availability of prey items for the seasonal population of marine mammals that use the area. Potential locations for the deployment of the ARs include the area north of the Luk Keng headland, the area between Cheung Chau and Shek Kwu Chau or the area within the boundaries of the Soko Islands group.

- The rubble mound seawalls proposed for the reclamation have been demonstrated to become colonised by subtidal hard surface assemblages after construction.

- A 10 ha Conservation Area has been designated around Pa Tau Kwu may, indirectly benefit the environment of an identified pair of White-bellied Sea Eagles which have one nesting site at Pa Tau Kwu. The indirect benefit during construction may arise through addition of buffer distance from the reclamation and other construction works and in the operational stage indirect benefit may accrue through isolation of the secondary woodland area from the Theme Park and associated developments.

- The use of fabric fender instead of tropical hardwood fender has been recommended in the proposed pier construction. Also, the use of wooden hoarding would not be allowed and metal (aluminium, alloy, etc.) has been recommended to help reducing the construction and demolition (C&D) wastes.

- The current dredged and drained design of Penny's Bay Reclamation will have a 30% decrease in total dredging volume, a 34% in fill volume ,and a 97% reduction in the volume of contaminated sediments requiring disposal comparing to the combined Container Terminals No. 10 & 11 Ancillary Works (Design) and the Design of Reclamation and Edge Structures for Container Terminals 10 and 11 and Back-up Areas (fully dredged option) of the Lantau Port Development - Stage 1 Study.

Potential disbenefits associated with the proposed Project may include:

- Loss of natural shoreline and associated inter-tidal habitats;
- Loss of natural shallow coastal marine habitats;
- Potential impact to natural terrestrial habitats and fauna;
- Increased solid waste generation;
- Potential floating debris due to the use of public fill during reclamation;
- Potential noise impacts;
- Potential air quality impact;
- Potential water quality impacts; and
- Potential landscape, visual and cultural heritage impacts.

These potential disbenefits will be examined in the NLDFS EIA relative to the assessment criteria laid down in the EIAO TM. The main purpose of the Schedule 3 NLDFS EIA Study is to provide a comprehensive impact assessment for the overall development scenario and to avoid/minimise the potential environmental impacts through proper landuse planning and design. Also, opportunities of conserving and enhancing the existing environment have been explored and examined.

For the CKWLR which a more detailed Schedule 2 EIA has been performed for the Project Proponent's environmental permit application, conditions and requirements have been identified, where appropriate, for the detailed design, construction and operation of the Project to mitigate against adverse environmental consequences. The EIA has also included overall environmental acceptability of residual impacts after proposed mitigation measures are implemented.

1.13 *"WITHOUT THE PROJECT" SCENARIO*

A key development objective of the Project is to provide a series of world-class tourism and recreational facilities including the proposed International Theme Park together with its related developments. The proposed developments are also expected to become a core tourist attraction in the HK SAR. Without the Project, the perceived benefits identified in *Section 1.12* will not be realised and environmental impacts described in this EIA will not arise.

Prior to the amendment of the North-East Lantau Port OZP and rezoning of part of the Penny's Bay area for theme park and related recreational usage, the area was designated for the development of Container Terminals 10 and 11. Without the International Theme Park and associated developments, rezoning of the Project area for container terminals and port related uses, including container back-up areas, business park and industrial uses could not be precluded. Such container port and associated development would likely involve 24 hour working leading to associated noise impacts, a higher percentage of heavy good vehicles in the Project Area with air and noise impacts, visual and glare impacts from 24 hour night-time port operation lighting requirements.

On balance, it is considered that the consequences to the environment and adjacent environmental sensitive receivers arising from both the construction and operation of the previously proposed container port s (CT10 and CT11) would be greater than those predicted to arise for the construction and operation of the Theme Park and associated developments.

Acknowledgement

This section is taken from the Northshore Lantau Development Feasibility Study Final Environmental Impact Assessment Report, prepared by ERM-Hong Kong, Ltd for Scott Wilson (Hong Kong) Ltd and in association with City Planning Consultants, Shankland Cox, Wilbur Smith Associates and Brooke International.