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## CHAPTER 1: EXECUTIVE SUMMARY

### 1.1 PROJECT BACKGROUND

- The title of this Project is:

#### **ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR PROPOSED PELICAN PARADISE DEVELOPMENT, TIBAR-TASI TOLU, TIMOR-LESTE**

- The Project is an integrated mixed development with a focus on resort living comprising recreational, commercial, institutional and environment components. It is supported by infrastructure and utilities.
- The Project encompasses 563.04 ha across Post Administration Dom Aleixo, Municipality of Dili, and Post Administration Bazartete, Municipality of Liquica. The site is located ~8 km west of Dili, the capital, and ~2 km southwest of Presidente Nicolau Lobato International Airport. It can be easily accessed via Rua Terra Santa connecting from Dili and Liquica.
- Presently, the Government of the Democratic Republic of Timor-Leste (DRTL) has leased the land to Pelican Paradise Holdings (Timor-Leste), the Project Proponent (PP), for 99 years under a Lease Agreement of State Property, dated 16<sup>th</sup> September 2009 (Contract No. 530 00932). This has since been superseded by a new Lease Agreement, dated 5<sup>th</sup> August 2010 for the development (Contract No 530.01018).
- The Government will deliver the land free of all encumbrances for commencement of development in 2017. The resettlement of any persons living within the Project site and the resettlement plans, are outside the scope of this Environmental Impact Statement (EIS) and Environmental Management Plan (EMP).
- An earlier Environmental Impact Assessment (EIA) Report submitted by Asia Pacific Environmental Consultants Sdn Bhd (ASPEC) in July 2010 was approved on 4<sup>th</sup> May 2012 by the National Directorate for Environment, State Secretariat for Environment, Ministry for Economy and Development, DRTL.
- As the Environmental License has lapsed (two years from the date of Notification in the Schedule), and because of amendments to the Project Masterplan Layout, the PP is now re-submitting a fresh EIS and EMP for an Environmental License as per the developmental requirements of the National Directorate of Pollution Control and Environmental Impact (NDPCEI), DRTL.
- Pelican Paradise Holdings (Timor-Leste), the PP, intends to implement the Project in 2017 and had commissioned ASPEC, the Environmental Consultants, to proceed with the EIS and EMP.

## 1.2 DETAILS OF THE PROJECT PROPONENT

- The Project Proponent (PP) is Pelican Paradise Holdings (Timor-Leste) (PPHTL):

**Pelican Paradise Holdings (Timor-Leste)**

Suite 333B, Timor Plaza  
Rua Presidente Nicolau Lobato  
Comoro, Dom Aleixo  
Dili, Timor-Leste

Tel: +670 7310 7777

E-mail: enquiries@pelican-paradise.com

Website: www.pelican-paradise.com

Attn: Mr Ravi Kathiravelu (Director)  
Dr Jeremiah Chan Kin Meng (Executive Director)

## 1.3 DETAILS OF EIA CONSULTANTS

- The appointed Environmental Consultant:

**Asia Pacific Environmental Consultants Sdn Bhd (ASPEC)**

30-2, Jalan 9/125D  
Taman Desa Petaling  
57100 Kuala Lumpur  
Malaysia

Tel: +603 9057 4392

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E-mail: Lkspec@gmail.com

Website: www.aspec.com.my

Attn: Dr Low Kwai Sim (Director)  
Dr Jamie Chong Li Yean (Executive Director)

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## 1.4 DESCRIPTION OF THE PROJECT

### 1.4.1 Identification of Project

- **Figure 1.4.1** shows the Project area and the coordinates of the Project boundary.

### 1.4.2 Category of the Project

- The NDPCEI had categorised the Project under Category A, vide letter [ref: 353/DNCPIA/XXII/2016 dated 20 December 2016], which requires an Environmental Assessment (EA) that involves the preparation of an EIS and EMP, which is the subject of this submission.

### 1.4.3 Brief Description of the Project

- The Project advocates for an eco-friendly development with the following design aspirations:
  - (i) Good access.
  - (ii) Efficient and sustainable use of natural resources.
  - (iii) Economic, social and cultural interactions.
  - (iv) Urban and environmental enrichment.
  - (v) Sufficient utilities and amenities.
- The Project has four major components:
  - (i) Commercial component: comprises an 18-hole golf course, hotels, service apartments, residential units and commercial centres.
  - (ii) Institutional component: comprises a youth development and community centre, a school and a hospital.
  - (iii) National and environmental component: comprises parks and hill areas which will be reforested.
  - (iv) Infrastructure and utility component: comprises a utility centre, sewage treatment plant (STP) and water recycling plant, etc.
- **Table 1.4.1** and **Figure 1.4.2** showed the land usage in the 13 Plots in the Project area. A total of 62.94% will remain as hill forests, which is the largest component; followed by commercial (26.95%) and residential development (8.09%); institutions (1.46%); and infrastructure and utilities (0.56%).
- The Project does not include the areas under Plot 12, which is for a large iconic national public park to be developed by the Government separately.
- The Project will be developed in three phases over six years with overlapping development in three phases.
- The 2<sup>nd</sup> hotel (Plot 10) will be developed later depending on the expansion of the Presidente Nicolau Lobato International Airport and growth of tourism in the country, and is likely to be in Phase 3.

**Table 1.4.1: Development Components**

No	Development	Area (ha)	Percentage (%)
<b>Commercial Component</b>			
1	Plot 1: 5-Star Hotel (464-room)	27.15	4.82
2	Plot 2: 18-Hole Championship Standard Golf Course	98.19	17.44
3	Plot 3: Service Apartments (93 units)	5.91	1.05
4	Plot 7: Commercial Centre 1	9.25	1.64
5	Plot 8: Residential Units	14.56	2.58
6	Plot 9: Residential Units	31.00	5.51
7	Plot 10: 2 <sup>nd</sup> Hotel	9.68	1.72
8	Plot 13: Commercial Centre 2	1.55	0.28
	<b>Sub-total</b>	<b>197.29</b>	<b>35.04</b>
<b>Institutional Component</b>			
9	Plot 5: School	3.00	0.53
10	Plot 6: Hospital	3.04	0.54
11	Plot 14: Youth Development and Community Centre	2.17	0.39
	<b>Sub-total</b>	<b>8.21</b>	<b>1.46</b>
<b>National and Environmental Component</b>			
12	Plot 11: Forest Reserve Area (Reforestation)	354.38	62.94
	<b>Sub-total</b>	<b>354.38</b>	<b>62.94</b>
<b>Infrastructure and Utility Component</b>			
13	Plot 4: Hotel Service Support Centre (Utility Centre)	3.16	0.56
	<b>Sub-total</b>	<b>3.16</b>	<b>0.56</b>
	<b>Grand Total</b>	<b>563.04</b>	<b>100</b>

Note: The acreage of public park (Plot 12 – 58.80 ha) which will be developed by the Government of Timor-Leste is not included in the total area of Project site (563.04 ha).

#### 1.4.4 Justification and Need for Project

- The need to develop the Project is altruistically predicted on a number of strategic factors underpinning the scope of works (see **Chapter 4: Description of the Project**) as follows:
  - (i) Promote tourism activities in Timor-Leste.
  - (ii) Integrated development planning and future growth.
  - (iii) Socio-economic development.
  - (iv) Conserve and rehabilitate the environment.

## 1.5 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

- **Table 1.5.1** provides the environmental policies, legislations and regulations for the EIS and EMP. Standards and guidelines for environmental quality benchmarking from the World Health Organisation (WHO), Malaysia and other Association of Southeast Asian Nations (ASEAN) countries will be referred to when there is a lack in Timor-Leste.

**Table 1.5.1: Legislations, Regulations, Guidelines and Standards Related to the Project**

Components	Legislation, Regulation, Standard and Guidelines
Environmental Assessment	<p><b><u>Legislations</u></b></p> <ul style="list-style-type: none"> <li>• Decree-Law No.26/2012 on Environmental Basic Law (EBL)</li> <li>• Decree-Law No.5/2011 on Environmental Licensing Law (ELL)</li> </ul> <p><b><u>Regulations and Guidelines</u></b></p> <ul style="list-style-type: none"> <li>• Guidelines on Ministerial Diploma on Regulation on Detailed Requirements for Screening, Scoping and the Terms of Reference, Environmental Impact Statements and Environmental Management Plans for Environmental Assessment</li> <li>• Guidelines on Ministerial Diploma for Regulations on Status and Rules of Procedures for Evaluation Committee for Managing the Environmental Assessment Procedure for Category A Projects</li> <li>• Guidelines on the Ministerial Diploma for Regulations on Impacts and Benefits</li> <li>• Ministerial Diploma for Regulation on the Public Consultations Procedures and Requirements during the Environmental Assessment Project</li> </ul>
Biodiversity and Protected Areas	<p><b><u>Legislations and Regulations</u></b></p> <ul style="list-style-type: none"> <li>• UNTAET Regulation No.2000/19 on Protected Places</li> <li>• UNTAET Regulation No.2000/17 on the Prohibition of Logging Operation and Export of Wood from East Timor</li> <li>• Draft Decree-Law on Biodiversity</li> <li>• Draft Decree-Law on Forest Management, Draft 6</li> </ul>
Fisheries and Aquaculture Legislation	<p><b><u>Legislation</u></b></p> <ul style="list-style-type: none"> <li>• Decree-Law No.6/2001 on General Bases of the Legal Regime for Management and Regulation of Fisheries and Aquaculture</li> </ul>
Environmental Management	<p><b><u>Standards and Guidelines</u></b></p> <ul style="list-style-type: none"> <li>• International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability</li> <li>• World Bank Environmental, Health, and Safety General Guidelines (EHS Guidelines)</li> <li>• IFC Workers' Accommodation: Process and Standards</li> <li>• World Health Organisation (WHO) Guidelines for Community Noise</li> <li>• WHO Air Quality Guidelines</li> </ul>
Environmental Quality	<p><b><u>Standards and Guidelines</u></b></p> <ul style="list-style-type: none"> <li>• <b>Marine Water Quality:</b> Malaysian Marine Water Quality Criteria and Standard (MWQCS)</li> <li>• <b>Lake Water Quality:</b> Malaysian National Water Quality Standards (NWQS)</li> <li>• <b>Groundwater Quality:</b> Decree-Law No.5/2009 Licensing Regulations, Sale and Quality of Drinking Water and Malaysian Drinking Water Quality Standard</li> <li>• <b>Effluent:</b> Malaysian Sewerage Industry Guidelines</li> <li>• <b>Air Quality:</b> WHO Air Quality Guidelines</li> <li>• <b>Noise Level:</b> WHO Guideline Values for Community Noise in Specific Environments</li> </ul>

**1.6 DESCRIPTION OF THE ENVIRONMENT**

Components	Description								
<b>(A) Physical Environment</b>									
Climate and Implications of Climate Change	<ul style="list-style-type: none"> <li>• Average Annual Climatic Statistics (2011 – 2015): <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Rainfall</td> <td>Highest rainfall: 1,045.1 mm (2013) Lowest rainfall: 646.6 mm (2015)</td> </tr> <tr> <td>Temperature</td> <td>3-hr mean temperature: 28.9 to 29.2°C</td> </tr> <tr> <td>Relative Humidity</td> <td>3-hr mean relative humidity: 62% to 77%</td> </tr> <tr> <td>Surface Winds</td> <td>Mostly from northeast (23.4%) 2.1% under calm condition</td> </tr> </table> </li> <li>• Natural climatic hazards experienced are: Infrequent tropical cyclones; seismicity; and frequent prolonged droughts.</li> <li>• Climate change: Over a period of 20 years (1986 – 2005), Timor-Leste experienced the following changes: <ul style="list-style-type: none"> <li>(i) Average surface temperature change of between 0.5 to 1.0°C.</li> <li>(ii) 10% reduction in average precipitation.</li> <li>(iii) Sea level increased ~0.4 to 0.5 m.</li> </ul> </li> </ul>	Rainfall	Highest rainfall: 1,045.1 mm (2013) Lowest rainfall: 646.6 mm (2015)	Temperature	3-hr mean temperature: 28.9 to 29.2°C	Relative Humidity	3-hr mean relative humidity: 62% to 77%	Surface Winds	Mostly from northeast (23.4%) 2.1% under calm condition
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Relative Humidity	3-hr mean relative humidity: 62% to 77%								
Surface Winds	Mostly from northeast (23.4%) 2.1% under calm condition								
Topography and Slope	<ul style="list-style-type: none"> <li>• The general terrain is undulating to flat towards the coast.</li> <li>• Background hills with highest elevation of 395 m above MSL.</li> <li>• Most slopes (86.36%) are &lt;35°.</li> </ul>								
Geomorphology and Geology	<ul style="list-style-type: none"> <li>• Four main geological units are found: Contemporary Beach, Coastal Deposits, Alluvial Fan Sediments and the Alieu Formation.</li> <li>• Alluvial Fan Sediments overlies a thick sequence of Coastal Deposits, whilst the hilly terrain consists of meta-sedimentary bedrock of the Alieu Formation.</li> <li>• Groundwater in the Coastal Deposits and the Alieu bedrock is difficult to abstract, except at the Alluvial Fan Deposits where the aquifers are shallower and could yield more water, but the area could be subject to saltwater intrusion.</li> </ul>								
Soil	<ul style="list-style-type: none"> <li>• Soils were derived from coastal marine materials and weathered base rocks.</li> <li>• Generally, the soils have very little organic materials and infertile.</li> </ul>								
Water Quality	<ul style="list-style-type: none"> <li>• Two sets of lake and seawater samples were collected: (i) 28 September and 20 October 2016; and (ii) 13 January 2017. Due to inconsistencies, the results from the first set were discarded.</li> <li>• Presently, there are no marine water quality standards in Timor-Leste. The lake and seawater results were compared to the limits of Class 2 (for marine life, fisheries, coral reefs, recreational and mariculture), and Class E (for mangroves, estuarine and river mouth water), under the Malaysian Marine Water Quality Criteria and Standards (MWQCS), respectively.</li> <li>• <b>Lake Water:</b> <ul style="list-style-type: none"> <li>(i) Water quality standards used: Class E of MWQCS (estuarine and inland).</li> <li>(ii) TSS: All complied with Class E limits of MWQCS.</li> <li>(iii) Heavy metals: All complied with Class E limits of MWQCS, except for Lead (Pb) at LW2 (Tasi Tolu Lake B); Copper (Cu) at all points, and Zinc (Zn) at LW3 (Tasi Tolu Lake A).</li> <li>(iv) Nitrate (NO<sub>2</sub><sup>-</sup>) and Nitrite (NO<sub>3</sub><sup>-</sup>): All samples exceeded MWQCS Class E limits.</li> <li>(v) Tasi Tolu area: Brackish aquifers where the water contains high salinity and total dissolved solid (TDS).</li> </ul> </li> </ul>								

Components	Description															
Water Quality (Cont')	<ul style="list-style-type: none"> <li>• <b>Seawater:</b> <ul style="list-style-type: none"> <li>(i) Water quality standards used: Class 2 of MWQCS (recreation).</li> <li>(ii) Oil and Grease (O&amp;G): Level high at SW4 with 3.7 mg/L exceeding the Class 2 limits of MWQCS.</li> <li>(iii) Heavy metals: All complied, except Pb at SW3 and SW4; Cu at all points; and Zn at SW2.</li> </ul> </li> <li>• NO<sub>2</sub><sup>-</sup> and NO<sub>3</sub><sup>-</sup>: All samples exceeded MWQCS Class 2 limits.</li> </ul>															
Air Quality	<ul style="list-style-type: none"> <li>• Baseline air quality measurements were carried out on 18 – 21 October 2016.</li> <li>• Results: All complied with WHO Air Quality Guidelines and Malaysia Ambient Air Quality Standards (MAAQS) except: <ul style="list-style-type: none"> <li>(i) PM<sub>2.5</sub> at A1 exceeded WHO standards (25 µg/m<sup>3</sup>).</li> <li>(ii) PM<sub>2.5</sub> at A2 exceeded both WHO standard (25 µg/m<sup>3</sup>) and MAAQS standard (75 µg/m<sup>3</sup>).</li> <li>(iii) PM<sub>10</sub> at A3 exceeded WHO standards (50 µg/m<sup>3</sup>).</li> </ul> </li> </ul>															
Hydrology and Drainage	<ul style="list-style-type: none"> <li>• The Project site is located within the Tasi Tolu basin.</li> <li>• It captures waters from the range of hills during the wet season via the small ephemeral streams and drain into the three lakes.</li> <li>• There is no direct outlet to the sea except at the man-made culvert near the Dili Rock, to discharge previous treated sewage to the sea.</li> <li>• The Project site is not flood-prone but is vulnerable to occasional storm surge and half yearly droughts.</li> </ul>															
Noise Level	<ul style="list-style-type: none"> <li>• The baseline noise levels at N1, N3 and N4 all exceeded the permissible limits of 55 dB(A) of both WHO and the Department of Environment (DOE) Malaysia.</li> </ul>															
<b>(B) Ecological Environment</b>																
Wetlands and the Three Lakes	<ul style="list-style-type: none"> <li>• The three Tasi Tolu Lakes within the Project site are saline, semi-eutrophicated and devoid of much of its lake organisms.</li> <li>• The lake baseline planktons survey showed he following: <ul style="list-style-type: none"> <li>(i) <u>Phytoplankton and Zooplankton:</u> <table border="1" data-bbox="488 1245 1370 1395"> <thead> <tr> <th></th> <th>No. of Genera</th> <th>No. of Phylum</th> <th>Cell Density</th> <th>Diversity (H')</th> </tr> </thead> <tbody> <tr> <td>Phytoplankton</td> <td>13</td> <td>4</td> <td>Lake B &gt; C &gt; A</td> <td>Lake A &gt; C &gt; B</td> </tr> <tr> <td>Zooplankton</td> <td>2</td> <td>1</td> <td>Lake C &gt; B &gt; A</td> <td>Lake C &gt; A &gt; B</td> </tr> </tbody> </table> </li> <li>(ii) <u>Fish:</u> Tasi Tolu Lakes have very low fish diversity and only one fish species (Tilapia or <i>Oreochromis</i> sp.) was observed during site investigations.</li> <li>(iii) <u>Overall:</u> Low level of primary food causing low fish population.</li> </ul> </li> </ul>		No. of Genera	No. of Phylum	Cell Density	Diversity (H')	Phytoplankton	13	4	Lake B > C > A	Lake A > C > B	Zooplankton	2	1	Lake C > B > A	Lake C > A > B
	No. of Genera	No. of Phylum	Cell Density	Diversity (H')												
Phytoplankton	13	4	Lake B > C > A	Lake A > C > B												
Zooplankton	2	1	Lake C > B > A	Lake C > A > B												
Mangroves	<ul style="list-style-type: none"> <li>• Mangroves along the shores of the Tasi Tolu Lakes have largely been depleted. Largest patch was observed north of Lake C.</li> <li>• Two dominant species of mangroves were the Grey Mangrove (<i>Avicennia marina</i>) and the White-flowered Black Mangrove (<i>Lumnitzera racemosa</i>).</li> </ul>															

Components	Description
Corals	<ul style="list-style-type: none"> <li>• Coral surveys (on 19 – 22 October 2016) at four locations comprising two transects each, using Line Intercept Transect (LIT) and Visual Quadrat methods.</li> <li>• Result of LIT showed:               <ul style="list-style-type: none"> <li>(i) The deeper sea transects had lower coral coverage than shallower ones.</li> <li>(ii) Transects east of Dili Rock have poorer coral coverage than in the west.</li> <li>(iii) T7, the shallower transect in front of Plot 3 and 2<sup>nd</sup> hotel (Plot 10), had most live hard and soft corals (39.65% and 42.40% respectively).</li> <li>(iv) T1, the shallower transect at the proposed jetty (Plot 1) had most coral rubbles and less live corals.</li> <li>(v) T2, the deeper transect had mostly sand (58%) and rubble (40%), only 2% is algae.</li> </ul> </li> <li>• Result of Visual Quadrat:               <ul style="list-style-type: none"> <li>(i) This concurred with the results of T7 with highest diversity of 10 coral genus.</li> <li>(ii) Quadrats from T1, T2 and T4 had the lowest coral diversity.</li> </ul> </li> <li>• <b>Overall:</b> The reefs west of Dili Rock are healthy and diverse. East of Dili Rock where the future jetty will be sited has lower coverage and more coral rubbles.</li> </ul>
Fisheries	<ul style="list-style-type: none"> <li>• The dominant fishes at the northern coast of Timor-Leste are mostly pelagic; whereas the southern coast has more diverse fishery resources of greater commercial value according to the fishermen.</li> </ul>
Protected Areas and National Parks	<ul style="list-style-type: none"> <li>• Tasi Tolu Lake areas have been gazetted as an Important Bird Area (IBA) by BirdLife International as it satisfies two criteria: (i) inhabited by Globally Threatened (A1) and Restricted-range (A2) species; and because (ii) the rare Timor Sparrow (<i>Lonchura fuscata</i>) and the Slaty Cuckoo Dove (<i>Turacoena modesta</i>) were found in the area.</li> </ul>
Marine Ecology	<ul style="list-style-type: none"> <li>• <b>Invertebrates:</b> 11 genera of invertebrates along the eight survey transects, from six families: Annelidian, Cnidarian, Crustacean, Molluscs, Echinoderm and Chordata, were mostly of LC status by IUCN.</li> <li>• <b>Phytoplankton:</b> Three locations (B1 – B3) have in total, 16 genera from three phyla. B3 west of Plot 3, has the highest cell density and diversity. B1 at the breakwater of Presidente Nicolau Lobato International Airport, had the lowest density and diversity.</li> <li>• <b>Zooplankton:</b> Zooplankton from the same location as phytoplankton, comprises 14 genera from six groups: Arthropoda, Mollusca, Cnidaria, Chordata, Chaetognatha and Annelida. The density and diversity of zooplankton is highest at B1.</li> <li>• <b>Marine Mammals:</b> A total 15 species of marine megafauna was sited at the coastal region of Timor-Leste (from sight and literature review), which included whales, dolphins and dugongs. Among the 15 species, three of them are listed as Endangered under the IUCN; two are Vulnerable - dugongs and sperm whale; and the rest are listed as Least Concern and Data Deficient.</li> <li>• <b>Overall:</b> The sea is rich in marine life although the primary producers vary from place to place.</li> </ul>



Components	Description
Terrestrial Ecology	<ul style="list-style-type: none"> <li>• There are three distinct ecological habitat types in Project site: (i) E1 – Tasi Tolu Lakes; (ii) E2 – Tasi Tolu coastline; and (iii) E3 – the hills around Tasi Tolu.</li> <li>• <b>Flora:</b> Four floristic types:               <ul style="list-style-type: none"> <li>(i) Degraded scrubland around Tasi Tolu Lakes.</li> <li>(ii) Remnant mangroves at the shores of Tasi Tolu Lakes.</li> <li>(iii) Coastal vegetation along the shores and coasts.</li> <li>(iv) Open woodlands on the hills.</li> </ul> </li> <li>• A total of 46 plant species were observed in all three habitats, comprising common and hardy invasive species of little to no conservational importance.</li> <li>• No rare or endangered plant species were encountered during the survey.</li> <li>• The habitats have been altered from its natural state, as invasive plants had already spread widely in the native landscape.</li> <li>• <b>Avifauna:</b> A total of 30 species of avifauna were observed. Several birds of conservational importance, Timor Sparrow, Sunda Teal (<i>Anas gibberifrons</i>), Red-necked Stint (<i>Calidris ruficollis</i>) and Black-tailed Godwit (<i>Limosa limos</i>), are listed as Near Threatened status by IUCN. Literature review indicated 79 species recorded in and around the Project site, which makes the area an IBA.</li> <li>• <b>Herpetofauna:</b> The diversity of amphibians was low and only recorded at E1, but the abundance was relatively high. The reptile diversity was also poor in the and only five species of reptiles were observed. All species found were hardy colonisers of low conservational value. They were tolerant to disturbance and often found near human habituations. However, two taxons recorded in the survey were not properly described (<i>Feyervarja</i> sp. and <i>Cyrtodactylus</i> sp.) and it is possible that these species may be endemic to the island of Timor.</li> <li>• <b>Mammal:</b> Most mammals observed were domesticated ones such as pig, buffalo, banteng, dog, etc. kept either as pets or livestock. The banteng (<i>Bos javanicus</i>) however is listed as Endangered status by IUCN.</li> </ul>
Coastal Beaches and Resources	<ul style="list-style-type: none"> <li>• The coast of Tasi Tolu Beach can be separated into three zones:               <ul style="list-style-type: none"> <li>(i) <u>West of Dili Rock</u>: Divided into a 2 – 3 m vegetation zone (shrubs, beach grass, and medium sized trees); and a 3 – 5 m short sandy intertital beach zone with rocky outcrops.</li> <li>(ii) <u>Dili Rock</u>: This rocky outcrop terminates directly into the sea and is a favourite diving spot. The Dili Rock comprises a large tower boulder with small boulders interspersed with the sandy beach.</li> <li>(iii) <u>East of Dili Rock</u>: This comprises a long stretch of unbroken sandy beach with a vegetation zone (mainly shrubs and bushes), sandy beach with grass patches and an intertidal zone with pebbles, gravels, shells, and dead corals.</li> </ul> </li> </ul>
<b>(C) Economic Environment</b>	
Employment Sectors	<ul style="list-style-type: none"> <li>• Based on the Timor-Leste Labour Force Survey 2013, the total active working-age population was only 27.3%; the rest were inactive (69.4%) and persons who did not have permanent jobs, looking for job or waiting for reply to a job application (3.3%).</li> <li>• Among those employed, most of them were in the services sector (45.1%), following by agriculture sector (40.5%) and industry sector (12.7%).</li> <li>• From the socio-economic survey within the 3-km Zone of Impacts (ZOI), 73.4% of the respondents (total = 203) were actively employed; most of them were in the government services (30.5%), followed by agriculture (12.8%)</li> </ul>

Components	Description
Infrastructure Facilities	<ul style="list-style-type: none"> <li>• <b>Electricity:</b> Electricity supply within the Project site will be sourced from the national grid supplied by <i>Electricidade de Timor-Leste</i> (EDTL). The Project will require ~650 kVa during construction and ~21,344 KW for the operational phase.</li> <li>• <b>Water supply:</b> Water supply is managed by National Directorate for Water and Sanitation Service (NDWSS). The Project will require ~0.6 MLD during construction and 6.403 MLD during the operational phase.</li> <li>• <b>Telecommunication:</b> Telecommunication is currently serviced by three mobile network operators: Timor Telecom, Telemor and Telkomsel. There is access to mobile internet and landline internet services.</li> <li>• <b>Roads:</b> The Project site can be accessed via Rua Terra Santa connecting Presidente Nicolau Lobato International Airport and Dili in the east and Tibar, west of the Project site. The main form of public transport within Dili areas is by microlets, buses and taxis.</li> <li>• <b>Sewerage:</b> The nearest STP to the Project site is Tibar STP. Presently, the settlement in the Project site uses the pour flush system.</li> <li>• <b>Solid Waste Management:</b> Solid waste collection service in Dili is served by the Municipalities of Dili, under the Ministry of State Administration. Waste is collected by private contractors and disposed off at the Tibar Landfill, which is the nearest landfill from the Project site.</li> </ul>
Landuse	<p><b>Within the Project Site</b></p> <ul style="list-style-type: none"> <li>• The only settlement within the Project site is Kg 12 De Outubro with ~3,803 persons, who will be resettled by the Government in 2017.</li> <li>• Other landuses presently occupying the Project site include: remnant houses of the Timor-Leste Defence Force (F-FDTL) and Military Police Internally Displaced Person (IDP) camp; an off-dock yard; a depot for abandoned cars; former race track; a line of used clothing stalls; make-shift market; and the bus terminal area.</li> </ul> <p><b>Within 3-km ZOI</b></p> <ul style="list-style-type: none"> <li>• <b>Northeast Quadrant (NEQ):</b> It is the most built-up and densely settled quadrant. It comprises 25 settlements with a residential population of 43,565 persons or 6,707 households. This NEQ has factories, workshops, sand mining, commercial and retail outlets, etc.</li> <li>• <b>Southeast Quadrant (SEQ):</b> SEQ is described as the rural hinterland at the fringes of the Dili urban region, where there are only four settlements with the population of 3,708 persons, mostly at the northern section of the quadrant.</li> <li>• <b>Southwest Quadrant (SWQ):</b> There are two settlements with total 249 households and a population of 1,340 persons. Apart from residential landuse, it has fish farms and patches of mangroves along the shores of Tibar bay. The higher slopes of SWQ comprise degraded forests.</li> <li>• <b>Northwest Quadrant (NWQ):</b> NWQ only has a small portion of land under salt pans and patches of mangroves. The largest settlement is Kg Fatunia, which straddles both NWQ and SWQ.</li> </ul>
Use of Forest and Other Natural Resources	<ul style="list-style-type: none"> <li>• Some communities in Timor-Leste are dependent on forest resources for their livelihood: (i) Fuel for cooking and lighting; (ii) For building materials; and (iii) As a source of incomes from sales of firewood, fruits, medicinal plants, etc.</li> <li>• Within 3-km ZOI, same families harvest timber, bamboo, palms, etc. to supplement their incomes.</li> <li>• Timor-Leste has rich deposits of oil and natural gas, contributing 80.9% of the total export (2014). No oil and gas have been recorded within the Project site.</li> <li>• There were no records of mineral resources mined at the Project area although Timor-Leste has metallic minerals such as gold, copper, manganese, etc.</li> <li>• The common non-metallic minerals are sand, shale, slate and gravel etc. No mining activities were observed within the Project.</li> </ul>

Components	Description
Fishery Resources	<ul style="list-style-type: none"> <li>• Fishery activities in Timor-Leste are mainly coastal fishing, characterised by artisanal and small-scale fishing operations.</li> <li>• There were 633 and 319 fishermen recorded in the Municipalities of Dili (including Atauro) and Liquica respectively within 2013 – 2015.</li> <li>• There were no fisheries activities along the coastal area fronting the Project site; only recreational fishing.</li> <li>• Some families living within the Project site rely on limited fisheries resources of the Tasi Tolu Lakes to supplement their income, but the catch has dwindled considerably.</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• <b>Crop-growing Activity:</b> Common crops grown in Timor-Leste are staple foods, root crops and cash crop. Most of the crops harvested are kept for domestic consumption except for cash crop (coffee); 83% of harvested coffee is exported. There is no agriculture activity within the Project site. However, some households grow vegetables/fruit trees in their yards for consumption or sometimes for sale.</li> <li>• <b>Non-crop Agriculture Activity:</b> The common livestock are pigs and chicken, generating ~40% of the incomes for the households.</li> </ul>
Tourism and Recreation	<ul style="list-style-type: none"> <li>• The tourist arrivals in Timor-Leste have steadily increased from 2010 to 2015. Compared to 2006 data, there was a 67.6% increase in tourist arrivals in 2015, which is a positive sign for the tourism sector.</li> <li>• The tourism sites in and around the Project area are the Tasi Tolu Lakes, St Paul's Holy House, Pope Monument and Dili Rock.</li> <li>• There are some medium-sized hotels catering to the tourists but none are of international class. These include Hotel Timor, Timor Plaza, Novo Turismo and Hotel The Ramelau. Hotel 1 will be the largest when completed.</li> </ul>
Other Industries	<ul style="list-style-type: none"> <li>• Traditional arts, craft and handiworks have contributed to the national economy. The common traditional handicraft is Tais, weaved by Timorese women to supplement their income. In recent years, the traditional Tais products have been modernised (scarves, bags, etc.) to cater to the tourist market.</li> <li>• Rock quarrying and coffee drying factories are found within 3-km ZOI but none at the Project site.</li> </ul>
<b>(D) Social Environment</b>	
Population and Communities	<ul style="list-style-type: none"> <li>• The 2015 Timor-Leste Census showed: <ul style="list-style-type: none"> <li>(i) Total population: 1,167,242.</li> <li>(ii) Population growth: ~2.69%, from 2010 to 2015.</li> <li>(iii) Gender composition and ratio: 588,561 males and 578,681 females, with a gender ratio of 102:100 respectively.</li> <li>(iv) Household size: average ~6 persons.</li> <li>(v) Population density: 78 persons/km<sup>2</sup>.</li> <li>(vi) Rural-Urban distribution: 328,281 urban and 838,961 are rural.</li> </ul> </li> </ul>
Health Profiles	<ul style="list-style-type: none"> <li>• Through self-reporting, the communities within the 3-km ZOI, considered their health as good.</li> <li>• They or their family members only occasionally suffered from common illnesses, such as flu, sinusitis, respiratory infection, dengue, malaria, diarrhoea, etc.</li> </ul>
Institutions, Schools and Health Facilities	<ul style="list-style-type: none"> <li>• The 2015 data from the Education Management Information System (EMIS), showed there were 1,523 schools in Timor-Leste for basic education.</li> <li>• Up to 2011, there were four accredited universities and seven accredited institutes in Timor-Leste to provide higher education.</li> <li>• There were six public hospitals in Timor-Leste; the nearest one is Dili National Hospital, located ~9 km from the eastern boundary of the Project site.</li> <li>• A number of clinics were recorded in the Municipality of Dili, mostly NGOs-supported and private clinics.</li> </ul>

Components	Description
Community and Family Structures	<ul style="list-style-type: none"> <li>• <b>Community Structure:</b> In general, the local communities paid good respects to their leaders, who are also chiefs in the settlements and often act as their mediators. Community structure is hierarchical and tight.</li> <li>• <b>Family Structure:</b> Most households in Timor-Leste are headed by the males of the family.</li> </ul>
Land Ownership	<ul style="list-style-type: none"> <li>• Presently, the Project land is under state property with a lease of 99 years for commercial development to the PP.</li> </ul>
Any Types of Common or Individual Rights on Natural Resources	<ul style="list-style-type: none"> <li>• <b>Mining Code:</b> The Mining Code (approved in August 2016) encompasses all mining activities, both inland and offshore. Any mining activities in the country would require a mining license issued by the government authority responsible for mineral resources.</li> <li>• <b>UNTAET Regulation No.2000/17:</b> UNTAET Regulation No.2000/17 on the Prohibition of Logging Operations and the Export of Wood from East Timor prohibits any logging operation in Timor-Leste, except for (i) pharmaceutical and cosmetic industry; (ii) producing wood for traditional farming and other domestic, traditional or cultural uses; (iii) construction of traditional houses and religious buildings; and (iv) handicrafts exported individually as personal household effects.</li> </ul>
Traffic	<ul style="list-style-type: none"> <li>• The main arterial road access to the Project site is Rua Terra Santa, which is bi-directional. The road conditions are poor with large potholes in some places, and lack of traffic guard rails at the seaward edge.</li> <li>• The Signalised and Unsignalised Intersection Design and Research Aid (SIDRA) simulation showed the through traffic from Dili town and other residential areas to the Project site had a LOS of 'A' during the morning, afternoon and evening peak hours, indicating smooth traffic flow without much time delay.</li> </ul>
<b>(E) Cultural Environment</b>	
Cultural Heritage	<ul style="list-style-type: none"> <li>• Timor-Leste has a strong and unique culture reflecting their history.</li> <li>• <b>Language:</b> Tetum-Prasa with strong influence from the Portuguese language is widely used in Timor-Leste. The other official language is Portuguese. There are 31 indigenous dialects spoken in different Municipalities throughout the country.</li> <li>• <b>Religion and Beliefs:</b> 96.9% of the people are Roman Catholic. There are still people deep in their belief in animism, but no animistic sites were found at the Project site.</li> </ul>
Archaeological Sites	<ul style="list-style-type: none"> <li>• There is no record of any archaeological sites within the Project site.</li> </ul>
Historic Sites	<ul style="list-style-type: none"> <li>• The nearest historic sites are St Paul's Holy House and the Pope Monument. Both of these historic are also considered religious sites, built to commemorate the contributions of Pope John Paul II to Timor-Leste's Independence.</li> </ul>
Sacred Sites	<ul style="list-style-type: none"> <li>• The Tasi Tolu Lakes are believed to be sacred sites by the people of Timor-Leste as a reminder of their sad history during the Indonesian occupation, 1975 – 1999.</li> <li>• St Paul's Holy House adjacent to Project site is also known as a sacred site by some the local community.</li> <li>• No cemetery is found within the Project site.</li> </ul>
Unique Landscape	<ul style="list-style-type: none"> <li>• Tasi Tolu, where the Project site is located, has a unique landscape. It is scenic with a range of hills as a background and a broad flat coastal plain that merges to the sea.</li> </ul>

## 1.7 CLIMATE CHANGE

- The Project is unlikely to cause any climatic change during the construction, operation and decommissioning phases. The Project of 563.04 ha (5.63 km<sup>2</sup>) within a country of 15,000 km<sup>2</sup> is too small to affect the global, indeed, even the regional synoptic climatic conditions.
- On the other hand, regional and global climate change will cause an impact on the Project and the country such as sea level rise, extreme rainfall and oceanic acidity; all of which will cause hardships to the communities in Timor-Leste. These include increasingly low productivity of marine resources and therefore less food and income for the families and economy. Consistent monitoring of the climatic conditions of the seas surrounding Timor-Leste will be necessary to prepare for any eventuality.

## 1.8 ALTERNATIVES

- The choice of the Project site is *sine qua non*, as the location has already been approved by the Government of Timor-Leste to the PP. This effectively foregoes any other alternative sites for development. There is thus no need to review alternative locations for the Project in this EIS.
- The focus of alternatives in the EIS was on landuse compatibility; development components; technology and construction methods; and environmental significance (see **Chapter 8**).

### 1.8.1 Project Design Concept

- The Project is an integrated mixed development comprising hotels, golf-course, commercial centres, hospital, school, residential building and nature area. The design follows the eco-friendly, green conservational concept but with a focus on developmental potentials for tourism and services as the country lacks tourism products such as good accommodation and facilities for conventions, meetings and exhibitions (see **Chapter 4**).

### 1.8.2 New Technology and Method

- Due to climatic constraints, the PP has adopted specific environmental options to enhance the Project. These include
  - (i) Water Resource Options: To overcome water deficit due to prolonged drought, various options have been considered and proposed such as:
    - (a) Existing water supply from the network.
    - (b) Utilise groundwater.
    - (c) Utilise existing surface water.
    - (d) Recycling and treatment of sewage.
    - (e) Desalination plant.
    - (f) Alternative water supply, i.e. rainwater harvesting.

- 
- (ii) Lake Rehabilitation: The conversion of Lake A to freshwater is a necessary option to meet water demands for the Project. Lakes B and C, will remain saline, but improvements have been proposed for the Government to make them viable and productive again to form the best physical touristic features in and around the public parks.
- (iii) Coastal Management: To least disrupt marine life and their communities, soil erosion will be controlled at source, containing all the silt and sediments within the Project site.
- (a) Floating Jetty: The jetty will be slated in areas with least corals and least disruption to sea and land traffic and the communities. Technology wise, a floating jetty will not cause a heavy toll on the corals and marine life as compared to a permanent jetty.
- (b) Intake and Outlet of the Desalination Plant: There are two options: first option is to place it east of the Dili Rock where there are more coral rubbles and less healthy corals; while the second option is to lay them near to the jetty. Both options are now under detailed investigations at the time of this EIS.
- (c) Drainage Outlet of Lakes B and C: To create a healthy lake environment and improve its capability to sustain a higher diversity and density of aquatic and avian life, a series of engineered lake system is proposed to provide better water exchange and recharge in Lakes B and C. The system includes a pump house to supply saline water from the coast into Lake C to recharge the waters. The water will flow into Lake B through a channel and finally, discharge to the coastal sea through an overflow culvert. The outlet of the culvert is sited adjacent to the floating jetty to minimise further disruptions to marine life.
- (iv) Re-forestation of the Hill Areas: The reforestation of the hills will improve the aesthetics, capture rain and atmospheric moisture as well as lessen erosion and provide a more conducive habitat for fauna.
- (v) Zero Discharge of Sewage: All sewage will be treated for reused to irrigate the golf course or the effluent will undergo further polishing that can be used in the aircond cooling towers, etc. The sludge will be used as materials for soil enrichment.

### 1.8.3 'No Project' Option

- The 'No Project' Option is *status quo* option where no development will take place. Since the 'With Project' Option will provide more benefits than in its present condition, the 'No Project' Option is not recommended.

## 1.9 IMPACT ASSESSMENT AND MITIGATION MEASURES

### 1.9.1 Scope of the Assessment

- The environmental impact assessment features the significant positive and negative impacts that are direct, indirect or cumulative within the short-, medium- and long-term during the pre-construction, construction, operational and deactivation/decommissioning phases.
- The impacts are described to the level where the consulting engineers can take over to prepare the mitigation measures to abate the adverse impacts.

### 1.9.2 Methodology and Approach

- A Rapid Impact Assessment Matrix (RIAM) was used to assess the cause-effect relationships between various Project activities on the physical, ecological, economic, social and cultural environmental components.
- The environmental components with significant/adverse impact were further assessed individually, for which mitigation measures were recommended to abate the negative impacts.

### 1.9.3 Impacts and Significance of the Identified Impacts

- The positive and negative impacts to its environs are summarised in **Table 1.9.1**.
- Respectively, the potential significant impacts from Project activities during the construction, operational and deactivation/decommissioning phases are shown in **Tables 1.9.2 – 1.9.4**. The details can be referred to **Chapter 9: Impact Assessment and Mitigation Measures**.

**Table 1.9.1: Summary of Positive and Negative Impacts from the Project**

Impacts		Description
<b>Pre-construction Phase</b>		
Significant Impacts		<ul style="list-style-type: none"> <li>• No significant negative impacts ascertained.</li> <li>• <b>Result:</b> No mitigations needed.</li> </ul>
<b>Construction Phase</b>		
Significant Negative Impacts	Major	<ul style="list-style-type: none"> <li>• Soil erosion and sedimentation.</li> <li>• Marine and lake water quality deterioration.</li> <li>• Air pollution.</li> <li>• <b>Result:</b> Mitigations required.</li> <li>• <b>Time Period:</b> Short to mid-term.</li> </ul>
	Minor	<ul style="list-style-type: none"> <li>• Alteration of hydrological system.</li> <li>• Displacement of fauna through loss of habitat.</li> <li>• Increased noise.</li> <li>• Landuse change.</li> <li>• Traffic congestion.</li> <li>• Social conflicts.</li> <li>• <b>Result:</b> Intermittent mitigations required.</li> <li>• <b>Time Period:</b> Short to mid-term.</li> </ul>

Impacts		Description
Significant Positive Impacts		<ul style="list-style-type: none"> <li>• More jobs and business opportunities.</li> <li>• Multiplier effects on the local economy.</li> <li>• <b>Result:</b> Need only enhancements.</li> <li>• <b>Time Period:</b> Short to long-term.</li> </ul>
<b>Operational Phase</b>		
Significant Negative Impacts	Major	<ul style="list-style-type: none"> <li>• Water pollution by sewage effluents.</li> <li>• Increased traffic volume.</li> <li>• <b>Result:</b> Mitigation measures required.</li> <li>• <b>Time Period:</b> Short to mid-term.</li> </ul>
	Minor	<ul style="list-style-type: none"> <li>• Air pollution.</li> <li>• Increased noise level.</li> <li>• Increased peak flow discharges.</li> <li>• <b>Result:</b> Intermittent mitigation measures required.</li> <li>• <b>Time Period:</b> Short to mid-term.</li> </ul>
Significant Positive Impacts		<ul style="list-style-type: none"> <li>• Aesthetic improvements to Tasi Tolu area.</li> <li>• Enhanced terrestrial and lake ecology.</li> <li>• Generation of jobs and business.</li> <li>• Land value appreciation.</li> <li>• Increase in housing, commercial and institutional development.</li> <li>• Improvements in standard of living.</li> <li>• Increased Gross Domestic Product (GDP) of the country.</li> <li>• Increased tourist arrival.</li> <li>• <b>Result:</b> Need only enhancements.</li> <li>• <b>Time Period:</b> Short to long-term.</li> </ul>
<b>Deactivation/Decommissioning Phase</b>		
Significant Negative Impacts		<ul style="list-style-type: none"> <li>• Reduced aesthetics of site.</li> <li>• Loss of jobs and business.</li> <li>• Land value depreciation.</li> <li>• <b>Result:</b> Mitigation measures required for closure.</li> <li>• <b>Time Period:</b> Short to mid-term.</li> </ul>
Significant Positive Impacts		<ul style="list-style-type: none"> <li>• Reduced traffic volumes.</li> <li>• <b>Result:</b> Need to enhance the area before closure.</li> <li>• <b>Time Period:</b> Short to mid-term.</li> </ul>



**Table 1.9.2: Summary of Potential Significant Environmental Impacts and Mitigation Measures during Construction Phase**

Project Activity	Potential Significant Environmental Impact	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters	Monitoring Frequency/ Responsibility
<ul style="list-style-type: none"> <li>Mobilisation of labour recruitment and machinery</li> <li>Setting up base camp and site office</li> <li>Demolition of remnant squatter houses</li> <li>Construction of the jetty</li> <li>Land clearing and platforming</li> <li>Biomass removal</li> <li>Earthwork and platform formation</li> <li>Earthworks, sculpturing and shaping the golf course</li> <li>General piling, structural and landscaping works</li> <li>Conversion of Lake A (into freshwater) works</li> </ul>	<p><b>Soil Erosion</b></p> <ul style="list-style-type: none"> <li>Soil erosion has been identified as important during earthworks and construction, which may affect water quality in the lakes and sea.</li> </ul>	<p><b>Soil Erosion and Sedimentation</b></p> <ul style="list-style-type: none"> <li>Minimise earthworks during the rainy season.</li> <li>Implement BMPs in the Erosion and Sediment Control Plan (ESCP) that provide controls over runoff, sediments and drainage emanating from the active work sites.</li> <li>A long bund to trap silt and sediments from escaping to Rua Terra Santa, beach and sea.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> </ul>	<ul style="list-style-type: none"> <li>Condition of stockpile area.</li> <li>BMPs implemented.</li> </ul>	<ul style="list-style-type: none"> <li>Daily inspection by Environmental Officer (EO) of Contractor.</li> <li>Quarterly inspection by Environmental Monitoring Consultant (EnvMC).</li> </ul>
	<p><b>Water Quality</b></p> <ul style="list-style-type: none"> <li>Silt and sediment have been identified as the main pollutants.</li> <li>Accidental leaks and spills from new and used oil, fuel and chemical storage sites affect the aquatic resources and groundwater.</li> <li>Inadequate waste management could also cause water pollution.</li> </ul>	<p><b>Water Pollution</b></p> <ul style="list-style-type: none"> <li>Implement all mitigation measures to control silt at the main active areas of work:                             <ol style="list-style-type: none"> <li>Earthwork and platforming areas.</li> <li>Stockpile areas.</li> <li>Jetty areas.</li> <li>Chemical and fuel storage areas.</li> <li>Base camp areas.</li> <li>Sanitary and base camp kitchen areas.</li> <li>Golf course areas.</li> <li>The three Tasi Tolu areas.</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> </ul>	<ul style="list-style-type: none"> <li>List of parameters are provided in <b>Table 12.4.1, Chapter 12: Summary of Environmental Management Plan</b>, in this EIS.</li> </ul>	<ul style="list-style-type: none"> <li>Quarterly monitoring by EnvMC.</li> </ul>
	<p><b>Air Quality</b></p> <ul style="list-style-type: none"> <li>Temporary and localised dust and air pollution from construction activities, transportation, material handling and stockpile materials.</li> </ul>	<p><b>Air Pollution</b></p> <ul style="list-style-type: none"> <li>As the Project area is dry for at least half the year, wet suppression is the best method. These include: water bowing on untarred roads; having wash troughs at the egress and ingress junctions; and sand stockpile areas.</li> <li>For other stockpile areas, to cover the materials on-site with tarpaulin/plastic sheet.</li> <li>Practise good standard operating procedures (SOP) such as:                             <ol style="list-style-type: none"> <li>Turning off idle machinery or vehicles to reduce gaseous emissions.</li> <li>Cover vehicles transporting earth materials by tarpaulin.</li> <li>Transport earth materials during non-peak hours.</li> <li>Spoils spilled on public roads to be immediately cleared.</li> <li>Impose speed limit.</li> <li>Provide personal protective equipment (PPE) to the workers.</li> <li>Burning of wastes is strictly prohibited.</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> </ul>	<ul style="list-style-type: none"> <li>List of parameters are provided in <b>Table 12.4.1, Chapter 12.</b></li> </ul>	<ul style="list-style-type: none"> <li>Quarterly monitoring by EnvMC.</li> </ul>
	<p><b>Hydrology and Drainage</b></p> <ul style="list-style-type: none"> <li>Localised ponding may occur because of earthworks and rehabilitation of the lakes.</li> </ul>	<p><b>Hydrology</b></p> <ul style="list-style-type: none"> <li>Provide temporary drainage systems to divert high flows to detention ponds or the lakes when they are yet to be rehabilitated.</li> <li>Silt traps and earth drains to be constructed before earthwork commencement.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> </ul>	-	-
	<p><b>Marine Ecology</b></p> <ul style="list-style-type: none"> <li>Land clearing, earthworks and construction of the floating jetty will cause re-suspension of silt in the seabed and erosion from the beaches that can affect the corals.</li> <li>Spilled/leaked oil and chemicals could contaminate the seawater.</li> <li>Leaking sewage and sullage may cause algal blooms.</li> </ul>	<p><b>Marine Ecology</b></p> <ul style="list-style-type: none"> <li>Implement all mitigation measures proposed for soil erosion, water quality and waste generation.</li> <li>Spill kits to be kept on floating jetty.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> </ul>	<ul style="list-style-type: none"> <li>Phytoplankton</li> <li>Zooplankton</li> <li>Coral reef</li> </ul>	<ul style="list-style-type: none"> <li>Half yearly by EnvMC.</li> </ul>

Project Activity	Potential Significant Environmental Impact	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters	Monitoring Frequency/ Responsibility
<ul style="list-style-type: none"> <li>Mobilisation of labour recruitment and machinery</li> <li>Setting up base camp and site office</li> <li>Demolition of remnant squatter houses</li> <li>Construction of the jetty</li> <li>Land clearing and platforming</li> <li>Biomass removal</li> <li>Earthwork and platform formation</li> <li>Earthworks, sculpturing and shaping the golf course</li> <li>General piling, structural and landscaping works</li> <li>Conversion of Lake A (into freshwater) works</li> </ul> (cont')	<b>Terrestrial Ecology</b> <ul style="list-style-type: none"> <li>Although the terrestrial habitat is not rich with low numbers of wildlife, nevertheless, removal of scrub vegetation will cause some disruptions to the wildlife that is still there.</li> </ul>	<b>Terrestrial Ecology</b> <ul style="list-style-type: none"> <li>Any major wildlife displaced or encountered shall be recorded and immediately contact the relevant authority to relocate them to safe areas.</li> <li>Signages and posters placed at the worker camps to inform workers not to harass the animals.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> </ul>	-	-
	<b>Lake Ecology</b> <ul style="list-style-type: none"> <li>Excavated materials from Lake A may contain heavy metals.</li> <li>Lake restoration and rehabilitation will improve the aesthetic value of the Project area.</li> </ul>	<b>Lake Ecology</b> <ul style="list-style-type: none"> <li>Implement all mitigation measures proposed for soil erosion and water quality.</li> <li>Re-stocking the lakes with appropriate organisms and fish to restore the ecological balance.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> <li>PP</li> </ul>	<ul style="list-style-type: none"> <li>Parameters according to water quality monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Half yearly by EnvMC.</li> </ul>
	<b>Noise Levels</b> <ul style="list-style-type: none"> <li>Minor noise impact to the nearest tourism sites (i.e. St Paul's Holy House and the Pope Monument) is expected due to use of machinery and traffic.</li> </ul>	<b>Noise Level</b> <ul style="list-style-type: none"> <li>Noise is a pulse and goes off immediately once it is sounded. However, as many machinery will be used at different times, the din may affect visitors to the tourism and religious sites. The mitigation measures include:                             <ol style="list-style-type: none"> <li>Erect hoardings and noise reducing barriers along the perimeter boundary of the Project site.</li> <li>Retain vegetative buffers around the Project site as natural noise attenuators.</li> <li>Confine construction work to day time.</li> <li>Maintain all vehicles and machinery at optimum operating conditions.</li> <li>Provide workers with PPE, i.e. ear muffers and abide by WHO's publication on Occupational Exposure to Noise: Evaluation, Prevention and Control.</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> </ul>	<ul style="list-style-type: none"> <li>List of parameters are provided in <b>Table 12.4.1, Chapter 12.</b></li> </ul>	<ul style="list-style-type: none"> <li>Quarterly monitoring by EnvMC.</li> </ul>
	<b>Traffic</b> <ul style="list-style-type: none"> <li>Occasional traffic congestion.</li> <li>Higher risk of traffic accidents.</li> </ul>	<b>Traffic</b> <ul style="list-style-type: none"> <li>Plan, schedule and control trips of road loaders, tractors, etc. to avoid peak road hours.</li> <li>Positioning flagmen at suitable locations to indicate traffic diversion, if any.</li> <li>Minimum of two flagmen at suitable locations or temporary traffic lights to be installed to control traffic movement.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> <li>National Directorate of Roads, Bridges and Flood Control</li> </ul>	-	-

Project Activity	Potential Significant Environmental Impact	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters	Monitoring Frequency/Responsibility
<ul style="list-style-type: none"> <li>• Mobilisation of labour recruitment and machinery</li> <li>• Setting up base camp and site office</li> <li>• Demolition of remnant squatter houses</li> <li>• Construction of the jetty</li> <li>• Land clearing and platforming</li> <li>• Biomass removal</li> <li>• Earthwork and platform formation</li> <li>• Earthworks, sculpturing and shaping the golf course</li> <li>• General piling, structural and landscaping works</li> <li>• Conversion of Lake A (into freshwater) works</li> </ul> <p>(cont')</p>	<p><b>Waste Generation</b></p> <p><b>Biomass</b></p> <ul style="list-style-type: none"> <li>• Left to decompose naturally but not in contact with water, which will cause leaching of organic compounds.</li> </ul> <p><b>Spoils</b></p> <ul style="list-style-type: none"> <li>• Exposed spoils may result in windblown dust.</li> <li>• Spoil materials may contain heavy metals and nutrients. They have to be tested before used as refined fills.</li> </ul> <p><b>Construction and Demolition (C&amp;D) Wastes</b></p> <ul style="list-style-type: none"> <li>• Rusted steel and decomposed wood may contaminate runoff.</li> <li>• They are also hazards in working areas, and have to be disposed off properly.</li> </ul> <p><b>Scheduled/Hazardous Wastes</b></p> <ul style="list-style-type: none"> <li>• Water pollution may occur if discharged directly into water bodies.</li> <li>• Workers may be exposed via direct contact due to improper handling or storage.</li> </ul> <p><b>Municipal Solid Wastes</b></p> <ul style="list-style-type: none"> <li>• Improper management of wastes may lead to water pollution, odour and public health impacts.</li> <li>• Uncollected solid waste may attract pest/scavengers.</li> <li>• Open burning may trigger air pollution and health problems.</li> </ul> <p><b>Sewage</b></p> <ul style="list-style-type: none"> <li>• Untreated sewage may contaminate runoff and water bodies.</li> <li>• Faecal coliform contained in sewage may spread water-borne diseases to humans.</li> </ul>	<p><b>Waste Generation</b></p> <p><b>Biomass</b></p> <ul style="list-style-type: none"> <li>• Generally sold if there is commercial value.</li> <li>• Unsold biomass to be stored on-site at designated stockpile areas to decompose naturally.</li> <li>• Burning of biomass is prohibited.</li> </ul> <p><b>Spoils</b></p> <ul style="list-style-type: none"> <li>• Excess spoils can be used for landscaping and reforestation works.</li> </ul> <p><b>Construction and Demolition (C&amp;D) Wastes</b></p> <ul style="list-style-type: none"> <li>• All C&amp;D wastes to be segregated and stored at designated temporary storage area(s) on-site.</li> </ul> <p><b>Scheduled/Hazardous Wastes</b></p> <ul style="list-style-type: none"> <li>• Disposal of scheduled/hazardous wastes into water bodies is strictly prohibited.</li> <li>• Scheduled/hazardous wastes to be stored in containers which are compatible, durable and able to prevent spillage and leakage.</li> <li>• Bunded storage area containing scheduled/hazardous wastes to be designed, constructed and maintained adequately to prevent spillage or leakage and to be sheltered or roofed or covered with suitable material.</li> <li>• The hazardous wastes to be disposed off at a secured landfill or facility approved by the local government.</li> <li>• PPE to be provided for the personnel handling the hazardous wastes.</li> <li>• Emergency spill kits to be provided on-site to facilitate clean-up. Contaminated materials to be treated as hazardous wastes.</li> </ul> <p><b>Municipal Solid Waste</b></p> <ul style="list-style-type: none"> <li>• Adequate bins to be provided at strategic locations in Project site.</li> <li>• Waste to be disposed off at the Tibar Landfill.</li> </ul> <p><b>Sewage</b></p> <ul style="list-style-type: none"> <li>• Provision of temporary sanitary facilities at strategic locations within working area(s).</li> <li>• Regular desludging and maintenance of sanitary facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> </ul>	<p><b>General Waste</b></p> <ul style="list-style-type: none"> <li>• General cleanliness of site</li> <li>• Number of bins provided</li> </ul> <p><b>Sanitary Facilities</b></p> <ul style="list-style-type: none"> <li>• Sufficient toilet facilities</li> <li>• Treatment system installed</li> </ul> <p><b>Scheduled Waste</b></p> <ul style="list-style-type: none"> <li>• Waste disposal at designed scheduled waste disposal area</li> <li>• Visual inspection of storage condition</li> <li>• Signs of oil spill</li> </ul> <p><b>Housekeeping</b></p> <ul style="list-style-type: none"> <li>• Proper domestic waste disposal method</li> <li>• Presence of vectors</li> </ul>	<ul style="list-style-type: none"> <li>• Daily inspection by EO of Contractor.</li> <li>• Quarterly inspection by EnvMC.</li> </ul>

**Table 1.9.3: Summary of Potential Significant Environmental Impacts and Mitigation Measures during Operational Phase**

Project Activity	Potential Significant Environmental Impact	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters	Monitoring Frequency/Responsibility
<ul style="list-style-type: none"> <li>Project operations</li> <li>Maintenance of the golf course and landscape features</li> <li>Maintenance of Lake A</li> <li>Maintenance of infrastructure, utilities and facilities</li> </ul>	<p><b>Water Pollution</b></p> <p><b>Integrated Mixed Development</b></p> <ul style="list-style-type: none"> <li>Wastewater from operational activities will be the main source of water pollution.</li> <li>Brine from desalination plant may impact the sea organisms.</li> </ul> <p><b>Golf Course Development</b></p> <ul style="list-style-type: none"> <li>Fertiliser and pesticide runoff in large amounts could leach and cause eutrophication of the lakes.</li> </ul> <p><b>Hospital Development</b></p> <ul style="list-style-type: none"> <li>Hospital wastewater discharge without treatment will be a main concern as it contains antibiotic-resistant bacteria (ARB).</li> <li>Discharging harmful chemicals (i.e. x-ray contrast agents, disinfectants, etc.) will impact the aquatic ecosystem adversely.</li> </ul>	<p><b>Water Pollution</b></p> <p><b>Integrated Mixed Development</b></p> <ul style="list-style-type: none"> <li>Regular inspection and maintenance of all piping and wastewater treatment systems.</li> <li>Monitoring sewage treatment plants' (STPs) effluent quality and performance.</li> </ul> <p><b>Golf Course Development</b></p> <ul style="list-style-type: none"> <li>Implement pest management.</li> <li>Proper selection and use of chemicals with low leaching potential index and without organochlorines.</li> <li>Select suitable turf grass to minimise application of fertilisers, pesticides and water.</li> <li>Use of weed-free planting.</li> <li>Conduct groundwater and surface water quality monitoring.</li> </ul> <p><b>Hospital Development</b></p> <ul style="list-style-type: none"> <li>Conduct regular maintenance and inspection of hospital wastewater storage and pipping system.</li> <li>Provision of a hospital wastewater treatment plant, if necessary.</li> <li>Provision of on-site incinerator for clinical wastes.</li> </ul>	<ul style="list-style-type: none"> <li>PP</li> </ul>	<p><b>Ambient Water Quality</b></p> <ul style="list-style-type: none"> <li>List of parameters are provided in <b>Table 12.4.2, Chapter 12.</b></li> </ul> <p><b>Groundwater Quality</b></p> <ul style="list-style-type: none"> <li>List of parameters are provided in <b>Table 12.4.2, Chapter 12.</b></li> </ul>	<p><b>Ambient Water Quality</b></p> <ul style="list-style-type: none"> <li>Quarterly monitoring by EnvMC for one year only for indemnity period.</li> </ul> <p><b>Groundwater Quality</b></p> <ul style="list-style-type: none"> <li>Half yearly monitoring by EnvMC for one year only for indemnity period.</li> </ul>
	<p><b>Air Pollution</b></p> <p><b>Integrated Mixed Development</b></p> <ul style="list-style-type: none"> <li>Increased number of vehicles will produce more gaseous emissions.</li> <li>STP failure may cause odours.</li> </ul> <p><b>Hospital Development</b></p> <ul style="list-style-type: none"> <li>Proper disposal of clinical wastes needed.</li> </ul>	<p><b>Air Pollution</b></p> <p><b>Integrated Mixed Development</b></p> <ul style="list-style-type: none"> <li>Maintain green buffer areas between the residential areas as natural air filters.</li> <li>Implement traffic control.</li> <li>Ensure frequent monitoring of STPs to prevent odours.</li> <li>Ensure good solid waste management and housekeeping practices at all times.</li> </ul> <p><b>Hospital Development</b></p> <ul style="list-style-type: none"> <li>Proper management of clinical waste.</li> </ul>	<ul style="list-style-type: none"> <li>PP</li> <li>Ministry of Health</li> </ul>	-	-
	<p><b>Noise Level</b></p> <ul style="list-style-type: none"> <li>Increased noise from traffic and tourist activities.</li> </ul>	<p><b>Noise Level</b></p> <ul style="list-style-type: none"> <li>Impose speed limits to all vehicles to/from the Project site.</li> </ul>	<ul style="list-style-type: none"> <li>PP</li> </ul>	-	-
	<p><b>Marine Ecology</b></p> <p><b>Integrated Mixed Development</b></p> <ul style="list-style-type: none"> <li>Sewage contamination may have detrimental effects on the coral reefs.</li> <li>Microalgal blooms in the sea may affect marine and human lives.</li> <li>Hypersaline water may affect corals and disrupt the osmotic balance of marine flora and fauna, if the discharge pipeline is too short for proper mixing with seawater.</li> </ul> <p><b>Golf Course Development</b></p> <ul style="list-style-type: none"> <li>Usage of fertilisers and pesticides may pollute groundwater and lake water.</li> </ul> <p><b>Hospital Development</b></p> <ul style="list-style-type: none"> <li>Toxic chemicals and clinical wastes may poison marine flora and fauna if leaked to the sea.</li> </ul>	<p><b>Marine Ecology</b></p> <p><b>Integrated Mixed Development</b></p> <ul style="list-style-type: none"> <li>Regularly maintain and inspect the STPs to prevent leakages and functional failures.</li> <li>Brine to be discharged at a location far from coral reefs.</li> <li>Regular marine ecology monitoring.</li> </ul> <p><b>Golf Course Development</b></p> <ul style="list-style-type: none"> <li>Implement integrated pest management measures, similar to the construction phase.</li> <li>Minimise usage of fertilisers, pesticides and water.</li> </ul> <p><b>Hospital Development</b></p> <ul style="list-style-type: none"> <li>Toxic chemicals to be treated in a designated wastewater treatment plant.</li> <li>Clinical solid wastes to have pre-treatment.</li> </ul>	<ul style="list-style-type: none"> <li>PP</li> </ul>	<p><b>Ecology</b></p> <ul style="list-style-type: none"> <li>Phytoplankton</li> <li>Zooplankton</li> <li>Coral reef</li> </ul>	<ul style="list-style-type: none"> <li>Half yearly by EnvMC for one year only for indemnity period.</li> </ul>

Project Activity	Potential Significant Environmental Impact	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters	Monitoring Frequency/Responsibility
<ul style="list-style-type: none"> <li>Project operations</li> <li>Maintenance of the golf course and landscape features</li> <li>Maintenance of Lake A</li> <li>Maintenance of infrastructure, utilities and facilities</li> </ul> (cont')	<p><b>Terrestrial Ecology</b> <b>Integrated Mixed Development</b></p> <ul style="list-style-type: none"> <li>Human-wildlife conflicts.</li> <li>Lights at night throughout the development may disturb nocturnal wildlife.</li> </ul> <p><b>Golf Course Development</b></p> <ul style="list-style-type: none"> <li>Chemical pollution from fertilisers and pesticides usage may contaminate groundwater and lake water.</li> </ul>	<p><b>Terrestrial Ecology</b> <b>Integrated Mixed Development</b></p> <ul style="list-style-type: none"> <li>Signboards to be placed to warn and/or inform visitors on the existence of wildlife.</li> <li>Hunting, poaching and disturbing local wildlife are prohibited.</li> <li>Reforestation of hillslopes.</li> </ul> <p><b>Golf Course Development</b></p> <ul style="list-style-type: none"> <li>Oversee turf maintenance and management such as a mowing, soil aeration, topdressing with sand and dethatching of the turf root zone.</li> </ul>	<ul style="list-style-type: none"> <li>PP</li> </ul>	-	-
	<p><b>Lake Ecology</b></p> <ul style="list-style-type: none"> <li>Water pollutants from partially treated effluent, pesticides and fertilisers may be harmful to aquatic organisms in the lakes causing eutrophication.</li> </ul>	<p><b>Lake Ecology</b></p> <ul style="list-style-type: none"> <li>Maintain the efficient functions of the mechanical aeration system to aid water circulation and oxygenation.</li> <li>Implement mitigation measure and BMPs for water quality.</li> </ul>	<ul style="list-style-type: none"> <li>PP</li> <li>Golf Course Superintendent</li> </ul>	<ul style="list-style-type: none"> <li>Parameters according to water quality monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Half yearly by EnvMC for one year only for indemnity period.</li> </ul>
	<p><b>Tourism</b></p> <ul style="list-style-type: none"> <li>Disruption to the birds and other avians by golf course activities and visitors to the lakes.</li> <li>Possible eutrophication of Lakes B and C from the golf course fertiliser runoff.</li> <li>Disruption to small fishing vessels by tourist boats and services.</li> <li>Coral bleaching may occur if there are excessive leached pesticides and toxic chemicals.</li> </ul>	<p><b>Tourism</b></p> <ul style="list-style-type: none"> <li>Sea and vessel traffic to be managed by Local Authorities with the assistance of PP.</li> <li>Berthing and anchoring of vessels to be demarcated clearly away from rich coral areas.</li> <li>Adequate provision of tourist facilities (e.g. toilets, bathing areas and waste bins).</li> <li>Post signages and enforce strictly the prohibition to collect corals and marine life.</li> <li>Maintain the reforested hillslopes to provide more habitats for resting and breeding for terrestrial fauna.</li> <li>Proper irrigation management to maintain the golf course.</li> </ul>	<ul style="list-style-type: none"> <li>PP and</li> <li>National Directorate of Tourism Enterprise, Activities</li> </ul>	-	-
	<p><b>Waste Generation</b> <b>Municipal Solid Waste</b></p> <ul style="list-style-type: none"> <li>Poor management produces leachate, odour and generation of disease vectors.</li> <li>Garbage can attract pests and scavengers.</li> </ul> <p><b>Scheduled/Hazardous Waste</b></p> <ul style="list-style-type: none"> <li>Impact on water quality, aquatic life and occupational health.</li> </ul> <p><b>Green Waste</b></p> <ul style="list-style-type: none"> <li>Leachates from decomposing green wastes may affect aquatic life if leached into the lakes.</li> </ul> <p><b>Sewage</b></p> <ul style="list-style-type: none"> <li>Mainly generated from integrated mixed development.</li> <li>Poses problems to water quality and public health if the STPs fail.</li> </ul> <p><b>Clinical Waste</b></p> <ul style="list-style-type: none"> <li>May cause pathogenic/infectious diseases.</li> <li>Safety concerns due to sharps (from medical instruments).</li> <li>Improper chemical waste management may result in hazards to workers, public and patients.</li> </ul>	<p><b>Waste Generation</b> <b>Integrated Mixed Development</b></p> <ul style="list-style-type: none"> <li>Disposal of scheduled/hazardous wastes into drainage and sewerage systems is prohibited.</li> <li>Hazardous wastes generated to be stored properly with clear labelling for final disposal at a secured landfill or any facility approved by the local authority.</li> </ul> <p><b>Golf Course Development</b></p> <ul style="list-style-type: none"> <li>Green waste to be collected, composted and used as soil conditioners for golf course maintenance.</li> </ul> <p><b>Hospital Development</b></p> <ul style="list-style-type: none"> <li>Hazardous wastes to be stored in clearly marked waste bins with plastic liners.</li> <li>Sharps to be disposed off in puncture-proof containers, whilst chemical liquid wastes can be placed in amber disposal containers compatible with their hazardous characteristics.</li> <li>All containers containing hazardous wastes to be labelled appropriately with symbol of waste type and weight.</li> <li>PPE such as gloves, masks and appropriate footwear to be provided for personnel handling clinical wastes.</li> <li>General waste from hospital can be incinerated and disposed off at Tibar Landfill through usual waste collection.</li> </ul>	<ul style="list-style-type: none"> <li>PP</li> <li>STP Operator</li> <li>Golf Course Superintendent</li> </ul>	<p><b>Sewage Effluent Quality</b></p> <ul style="list-style-type: none"> <li>List of parameters are provided in <b>Table 12.4.2, Chapter 12.</b></li> </ul>	<ul style="list-style-type: none"> <li>Quarterly by EnvMC for one year only.</li> </ul>

**Table 1.9.4: Summary of Potential Significant Environmental Impacts and Mitigation Measures during Deactivation/Decommissioning Phase**

Project Activity	Potential Significant Environmental Impact	Mitigation Measures	Mitigation Responsibility	Monitoring Parameter	Monitoring Frequency/ Responsibility
<ul style="list-style-type: none"> <li>• Site rehabilitation</li> <li>• Demobilisation of construction equipment and machineries</li> </ul>	<p><b><u>Tourism</u></b></p> <ul style="list-style-type: none"> <li>• Loss of vital opportunity to develop an international mixed resort Project in Timor-Leste.</li> <li>• Loss of income and business opportunities.</li> <li>• Loss of improved visual aesthetics at the tourism sites.</li> <li>• Loss of important tourism product in the country.</li> </ul>	<p><b><u>Tourism</u></b></p> <ul style="list-style-type: none"> <li>• For the bare area, to undertake seeding programmes where agreed upon with the relevant Government agencies.</li> <li>• Use of hoardings and fences to ward off unauthorised persons at the site.</li> <li>• Contain all liquid and solid wastes for treatment and safe disposal in accordance with the Timor-Leste legal standards and other appropriate standards and guidelines applicable at the time.</li> </ul>	<ul style="list-style-type: none"> <li>• PP</li> <li>• Contractor</li> <li>• National Directorate of Tourism Enterprise Activities</li> </ul>	-	-

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#### 1.9.4 Mitigation Measures

- The mitigation measures for the potential negative impacts identified during construction, operational and deactivation/decommissioning phases, are described in **Tables 1.9.2 – 1.9.4** respectively.

#### 1.9.5 Incorporation of Mitigation Measure into Project Design

- During the construction phases (see **Chapter 9** for details), the incorporated measures are:
  - (i) Erosion and sediment control.
  - (ii) Water pollution control.
  - (iii) Dust dispersion control.
  - (iv) Drainage control.
  - (v) Noise pollution control.
  - (vi) Ecology management.
  - (vii) Traffic management.
  - (viii) Waste management.
  - (ix) Greenery features.
- During the operational phase, the main incorporated measures are:
  - (i) Waste management:
    - (a) Municipal solid waste.
    - (b) Scheduled/hazardous waste.
    - (c) Clinical waste.
    - (d) Sewage.
  - (ii) Water resource.

#### 1.9.6 Residual Impacts

- The residual impacts that persist even after all mitigation measures have been implemented, may arise from:
  - (i) Soil erosion from residual bare areas.
  - (ii) Water quality at Tasi Tolu Lakes affected by garbage, leached fertilisers and pesticides.
  - (iii) Water quality of coastal waters – same as (ii) above.
  - (iv) Air quality: Only if outdoor burning is practised.
  - (v) Marine ecology: Only if there is high capacity usage of the beach and sea that will destroy the corals and disturb the marine life.
  - (vi) Terrestrial ecology: Only if reforestation is not successful.
  - (vii) Tourism: Only if there is high density and usage in the area.
  - (viii) Waste: All types of wastes that are indiscriminately thrown.

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## 1.10 SOCIAL IMPACT ASSESSMENT

### 1.10.1 Introduction

- The Social Impact Assessment (SIA) of the Project is not a social research study *per se*. Hence, the scope of the SIA cannot follow exactly what has been prescribed in the *Ministerial Diploma Regulation on the Detailed Requirements for the Terms of Reference, Environmental Impact Statements and Environmental Management Plans for Environmental Assessment*, as the Government has already indicated that it will deliver the site free of all encumbrances for commencement of the Project.
- The Government will resettle the people now living at the Project site, and hence will be outside the scope of this EIS. The SIA will instead focus on the impacts to the local communities living within 3-km ZOI.
- A total of 11 settlements within the 3-km radius ZOI, with a total of 203 respondents representing 2.69% of the households (7,541) in 29 settlements located within the ZOI, were surveyed.
- Based on the survey results, the respondents perceived the development to have both positive and negative impacts on the socio-economy with most, being positive. The respondents felt that jobs and business would be created to help reduce the unemployment situation in the country and hence a majority of them, have no objections to the Project development.

### 1.10.2 Analysis of Key Social Impacts

- **Pre-construction Phase:** Discussions with the residents in Kg 12 De Outubro, indicated that they knew that they will be relocated by the Government before construction starts. However, they requested some form of compensation from the Government to help them in their relocation.
- **Construction Phase:** The residents within the 3-km ZOI are quite attuned to the fact that more jobs will be created. Based on the PP's projections, about 1,500 jobs will be created during the construction phase with the same numbers during the operational phase. With these jobs, unemployment will be reduced and there will be more money circulating in the economy, which will be a boon to business and the local communities. On the negative side, the influx of migrant workers will add pressures on the already limited public utilities and amenities; exceeding their current carrying capacities and causing unintended social tensions with the local communities. One of the pressures will be public health and safety arising from poor sanitation and congested living. Differences in way of life and cultures may also cause social conflicts with the local communities.
- **Operational Phase:** The operations of the Project will mainly provide positive impacts such as stimulating the growth in tourism-related businesses among aspiring local entrepreneurs. Many jobs will also be created, which will help obviate the high unemployment rate in the country. On the negative side, the tranquillity and way of life of the local communities may be affected with an influx of tourists, visitors and hotel employees from other areas or from other countries. Again, differences in social outlooks may cause tensions with the new comers and visitors.



- **Deactivation/decommissioning Phase:** It is highly unlikely that this phase will occur. If it did happen, it will cause a large number of people losing their jobs due to closure. The loss of jobs may affect not only the employees but also their families, their socio-economic obligations and indeed the whole economy in Timor-Leste.

### 1.10.3 Mitigation Measures and Strategies to Achieve Good Developmental Outcomes

- The mitigation measures proposed to ameliorate the social impacts include:
  - (i) It is proposed that the PP, contractors and sub-contractors give first preference to the local communities living within the 3-km ZOI. A “labour desk” to be set up to facilitate employing local labour during construction.
  - (ii) Continuous engagement between the PP and stakeholders shall be carried out throughout the construction phase. A Community Relations Committee (CRC) can be established as a communication channel between the PP and local community.
  - (iii) The CRC can incorporate awareness campaigns and precautionary measures related to safety and health of the local residents and the construction workers.
  - (iv) Provision of continuous training for semi-skilled locals to make them skilful in their jobs. The CRC can help find workers for the hotels and tourism-related business.

### 1.10.4 Management and Monitoring of Social Impacts

- Monitoring social impacts through the CRC is advocated. The CRC can be used as a platform for communities to voice and resolve any social concerns linked to the Project.

## 1.11 ECONOMIC ASSESSMENT

- The economic assessment is based on a relative cost and benefit; that is, gains and losses, and is not a financial cost and benefit study *per se*. The main quantifiable and non-quantifiable benefits that will potentially accrue to the Government and the local communities are in **Chapter 11**. These are summarised in the Table below:

Descriptions	Benefits/Gains	Costs/Losses
Economic development	/	
Employment generation	/	
Enhanced tourism activities	/	
Skills training and development	/	
Reforestation of degraded forest	/	/
Lake rehabilitation	/	/
Deterioration of environmental quality		/
Accidents, safety and health		/

## 1.12 ENVIRONMENTAL MANAGEMENT PLAN

- The main objective of the EMP is to provide a set of guidelines and procedures to protect the environment and its surrounding areas during the construction, operational and deactivation phases. The EMP comprises:
  - (i) Mitigation measures proposed to avoid, reduce or minimise the identified negative impacts.
  - (ii) Costs of the mitigation measures.
  - (iii) Monitoring requirements.
  - (iv) Institutional roles and responsibilities for implementing the EMP and monitoring activities.
  - (v) Identification of training and capacity building.
- Significant environmental impacts during the construction, operational and deactivation phases are summarised in **Tables 1.9.2 – 1.9.4**. The details of the EMP are in a separate volume as submitted together with this EIS.

### 1.12.1 Costs of Mitigation Measures

- The PP will provide sufficient allocations to undertake all environmental protection measures and monitoring works. The actual cost could not be ascertained at this stage and will be provided by the PP and contractor(s).

### 1.12.2 Monitoring Programmes

- Environmental monitoring and surveillance works shall start concurrently with construction works. The monitoring works shall include:
  - (i) Establishment of an in-house monitoring programme and standard environmental operating procedures (SOP).
  - (ii) Field inspection with contractor(s).
  - (iii) Confirmation of field sampling locations.
  - (iv) Field sample/data collection and analysis.
  - (v) Data documentation.
  - (vi) Feedback of result.
- The monitoring works shall be carried out throughout the construction phase and one year for the operational indemnity phase.
- The proposed monitoring programme is shown in **Tables 1.9.2 – 1.9.4** with the details in **Chapter 12: Summary of Environmental Management Plan** (see **Tables 12.4.1 – 12.4.3**).

### 1.12.3 Institutional Roles and Responsibilities to Implement the EMP

- Environmental management is a dynamic process, which evolves with time. All persons involved in any of the phases of development of the Project, shall ensure that adjustments be made to accommodate amendments for environmental protection works, plans, or programmes as, and whenever necessary. An Environmental Management Team (EMT) shall be formed with members from:

Phase	Key EMT Members
Pre-construction Phase	(i) National Directorate of Pollution Control and Environmental Impact (NDPCEI) (ii) Pelican Paradise Holdings (Timor-Leste) or PP (iii) Asia Pacific Environmental Consultant Sdn Bhd (ASPEC)
Construction Phase	(i) National Directorate of Pollution Control and Environmental Impact (NDPCEI) (ii) National Directorate of Land, Property and Cadastral Services (iii) National Directorate of Roads, Bridges and Flood Control (iv) National Directorate of Water and Sanitation (v) National Directorate of Aquaculture and Fisheries (vi) National Directorate of Sanitation Control and Environmental Health (vii) Department of Policy and Strategic Planning (viii) Suco Comoro and Tibar (iv) Pelican Paradise Holdings (Timor-Leste) or PP (ix) Main Contractor (MC) (x) Environmental Monitoring Consultant (EnvMC) (xi) Environmental Auditor (EnvA)
Operational Phase	(i) National Directorate of Pollution Control and Environmental Impact (NDPCEI) (ii) National Directorate of Water and Sanitation (iii) National Directorate of Forestry and Watershed Management (iv) Pelican Paradise Holdings (Timor-Leste) or PP (v) Environmental Monitoring Consultant (EnvMC) (vi) Environmental Auditor (EnvA)
Deactivation/Decommissioning Phase	(i) National Directorate of Pollution Control and Environmental Impact (NDPCEI) (ii) Pelican Paradise Holdings (Timor-Leste) of PP (iii) Decommissioning Contactor (DC) (iv) Environmental Monitoring Consultant (EnvMC) (v) Environmental Auditor (EnvA)

### 1.12.4 Training and Capacity Building

- Environmental training for staff is aimed at creating competency and skill in environmental management throughout Project implementation. Environmental training programmes shall be customised to cater to different levels of employees to achieve environmental compliance with the regulations to prevent any environmental degradation by their actions within the Project.

- The training programmes shall be subjected to amendments when new procedures and directives from the NDPCEI or from any other relevant agencies are issued from time to time. The basic training programmes can be referred to in **Table 12.6.1** in **Chapter 12** of this EIS.

#### 1.12.5 Environmental Audits

- Environmental audits are carried out half yearly during the constructional and operational phases. It will also be carried out once only during the deactivation period before final closure. The details of the environmental audit are found in **Chapter 12, Section 12.7: Auditing Requirement**, of this EIS.

### 1.13 PUBLIC CONSULTATION

- The main objectives of public consultation are to inform the stakeholders regarding the Project and to seek their perceptions/comments on the Project.
- For the formal consultations, a total of 16 group discussions had been conducted from September to October 2016 and one public workshop on 12 January 2017.
- Questionnaire surveys and informal consultations were carried out on 12 – 13 October 2016 in 11 randomly selected settlements located within the 3-km ZOI.

#### 1.13.1 Summary of Main Comments

- The main concerns of the stakeholders are summarised as follows:
  - (i) Accessibility to St Paul's Holy House, which is usually used for celebration events.
  - (ii) Impact(s) on air, noise and marine water quality during the construction phase of Project.
  - (iii) Socio-economic issues, e.g. impact on livelihood, job opportunities, etc.
- During the public workshop, the concerns from the stakeholders were:
  - (i) Concerns over negative impacts on their socio-economic development.
  - (ii) Needed to clarify on the water sufficiency situation for the proposed golf course and public park.
  - (iii) Concerns over electricity demands of the Project.
  - (iv) Suggested all participants involved in the public workshop to form a committee to supervise the Project development.
- The questionnaire survey showed that most of the respondents supported the development because of the expected income benefits and employment.
- All comments/view/issues received from public consultation activities were taken into account in the EIS and EMP Study.

### 1.13.2 Public Acceptance or Opinions on the Project

- The findings showed that the majority of the stakeholders were in favour of the Project development as it could boost and attract investments as well as create job opportunities. They recommended that the Project give priority of employment to the local workers, and recommended that training be given to strengthen their working skills.

### 1.13.3 Recommendations for Future Consultations

- All stakeholders involved in the public consultation suggested that they be invited in future consultations.

## 1.14 DIFFICULTIES ENCOUNTERED

- Difficulties encountered in conducting the EIS are:
  - (i) Information and Datasets: Insufficient updated information to assess the environment in the surrounding areas.
  - (ii) Information from Government Agencies: Some relevant information were unavailable from government agencies, although there were indications that these datasets were collected but could be in raw form. The Consultants had to depend on literature reviews from limited past research and site investigations.
  - (iii) Information on the Environment: There is insufficient research information in Timor-Leste to complement and validate the results of simulations and calculations based on the site investigation information.

## 1.15 CONCLUSIONS AND RECOMMENDATIONS

- There will be positive and negative impacts arising from the development of the Project during the construction and operational phases of the Project, more during construction than operations.
- **Chapter 9** has provided all the impacts, both positive and negative as well as the mitigation measures to abate the negative ones. These include:
  - (a) Erosion and sediment control.
  - (b) Water pollution control
  - (c) Dust dispersion control.
  - (d) Noise level control.
  - (e) Traffic control.
  - (f) Marine ecology management.
  - (g) Terrestrial ecology management.
  - (h) Lake ecology management.
  - (i) Waste management.
  - (j) Socio-economic management.

- The following general management practices are also recommended:
  - (i) The proposed environmental mitigation measures and environmental management requirement in EIS, EMP and the conditions of the Environmental License, to be clearly stated and incorporated in the contracts between the PP and contractor(s).
  - (ii) The proposed EMT in the EMP should be set up as soon as possible to serve as means for continuing public consultation and disclosure. There is already a recommendation by some Government agencies to form a committee to monitor the activities during the construction phase.
  - (iii) The PP may establish a complaint grievances mechanism (CGM) related to environmental and social issues arising during the construction, operational and deactivation/decommissioning phases.

#### **1.16 NON-TECHNICAL SUMMARY**

- A non-technical summary is attached in **Chapter 16** that summarises the main findings of the EIS presented in **Chapters 2 – 15** in simple language to enable non-technical readers to have a clear understanding of the environmental aspects of this Project.