Tibar Bay Port

Summary of

Environment and Social Scoping Study

November 2013

Further information about the Port Pre-Qualification process as well as all relevant documents can be found on **http://timorpppinvestor.wordpress.com/**

1. Introduction

This summary presents the findings of the Environment and Social (E&S) Scoping Study undertaken by EcoStrategic Consultants for the International Finance Corporation (IFC), and related work, as part of early project planning for the proposed port at Tibar Bay (the Port), Timor-Leste. E&S scoping is required under national legislation to identify issues associated with Project development and operation to be addressed in the detailed Environmental Impact Assessment (EIA) for the Port. The primary aim is to identify the likely significant risks and impacts of the Project so that assessment studies are focused on these important issues.

Annex A - Site Selection Report summarises the process undertaken to select Tibar Bay as the north coast location for the port and to select the optimum site for the port within the Bay.

2. Scoping Methodology

2.1 Desktop Review

A desktop reivew of available reports was initially undertaken to familiarise the team with the Port development proposal and associated development issues, previous investigations and environmental and social features at potential port sites. Key reports that were reviewed included:

- *Rapid Environmental Assessment - Proposed Tibar Bay Port* (Millette, 2012) - providing an initial identification of environmental and social issues associated with the Port;
- the concept design of the Port developed by Hamburg Port Consulting (HPC, 2013);
- *Hydrographic, Geophysical, Topographic and Geotechnical Surveys, Concept Master Plan, Economic and Financial Analysis, Next Stage Recommendations of Proposed Tibar Bay Port, Timor-Leste. Draft Report at Close of Milestones* (Soros Associates, 2012); and
- *Timor-Leste Strategic Development Plan (SDP) 2011-2030* (GoTL, 2011).

2.2 Field Investigations and Initial Consultation

Field investigations and consultation were conducted between late January 2013 and mid Febraury, involving:

- Initiation briefings at the IFC country office, with key Government of Timor-Leste (GoTL) representatives and two E&S National Counterparts;
- An initial site familiarisation visit of Tibar Bay to assess site conditions and plan field surveys;
- Identification of the main stakeholders;
- Introductory meetings with the District Administrator and Village (Suco) Chief, to brief them on the Project and gain clearance to conduct field surveys in Tibar Bay. Two community members were recruited to accompany the survey teams and facilitate site and community access (one to assist the environmental surveys and one to assist the social surveys);

- Aerial reconnaisance of Tibar Bay and adjacent coastal areas, identifying and photographing coastal features;
- Habitat mapping and ecosystem health surveys of Tibar Bay mangroves, seagrasses, coral reefs and terrestrial habitat;
- Stakeholder analysis;
- Social surveys and stakeholder engagement at Tibar Bay, including: interviewing each household within or immediately adjacent to the Project site; interviewing community representatives; and mapping cultural heritage sites;
- Meetings with key Government agencies and non-government organisations (NGOs);
- Rapid site inspections of Dili Port and Hera to provide qualitative data to support the assessment of site alternatives, including a rapid coral reef survey of Dili Port reef;
- A qualitative survey by vessel of the coastline of Atauro Island (45 km offshore from Dili), a Key Biodiversity Area (KBA) at risk of pollution from passing ships using Tibar Bay Port;
- Briefing and progress meetings with key GoTL agencies and IFC; and
- A initial stakeholder engagement workshop (on 14 February 2013 for half a day) to introduce a wide range of stakeholders to the project and the E&S assessment process, and to obtain their initial views on the Project and associated E&S issues.

Overall, a large amount of high quality data was collected to support completion of the E&S Scoping Study. Positive feedback was received from stakeholder groups ranging from community members to NGOs, senior Government officials and World Bank country representatives on the comprehensiveness and transparency of the process, and level of engagement.

2.3 Issue Identification and Analysis

The Project's direct and indirect area of influence and potential risks and impacts on bio-physical and socio-economic features were identified based on an understanding of the likely location and design of the Port, Port construction and operation activities, and local environmental and social features. Issue analysis considered stakeholder views and identified potential impact avoidance, mitigation and offsetting measures.

2.4 Port Site Selection

As a component of issue scoping, potential Port sites within Tibar Bay were screened based on environmental and social factors. This provided input into HPC's overall Bay site selection process that was based on operational, engineering, environmental, social and cost considerations, resulting in the selection of the preferred Port site (Annex A).

2.5 EIA Terms of Reference

Terms of Reference (ToR) for the EIA was prepared in accordance with national requirements based on the issues and impact avoidance and mitigation options identified in the Scoping Study.

3. Environmental Approval, Standards, Guidelines and Good Practice

3.2 Timor-Leste Legislation and Guidelines

The main environmental legislation in Timor-Leste relating to the proposed Port consists of:

- *Decree-Law 26/2012 - Framework Environmental Law*;
- *Decree-Law 5/2011 - Environmental Licensing System*; and
- UNTAET *Regulation No. 2000/19 - Protected Areas*.

The UNTAET Regulation was prepared during the UN Transitional Administration in East Timor (UNTAET), while the Decree-Laws have been prepared since.

3.2.1 Decree-Law 26/2012 – Framework Environmental Law

The purpose of *Decree-Law 26/2012* is to establish "*the framework for environmental policy and the guiding principles for the conservation and protection of the environment and for the preservation and sustainable use of natural resources in order to promote the quality of life of the country's citizens*". It contains overarching provisions relating to: environmental standards; environmental assessment and licensing; environmental monitoring; relationships with other sectors; protection, conservation and sustainable use of environmental components; and pollution and waste.

The Decree-Law recognizes *Tara Bandu* as an integral custom of Timor-Leste culture and as a traditional mechanism for regulating the relationship between man and his environment. *Tara Bandu* may be applied "*in accordance with the rituals instituted by local common law which are intended to conserve and promote the environment and the sustainable preservation and use of natural resources, as long as it is compatible with the aims and principles established herein*".

3.2.2 Decree-Law 5/2011 - Environmental Licensing System

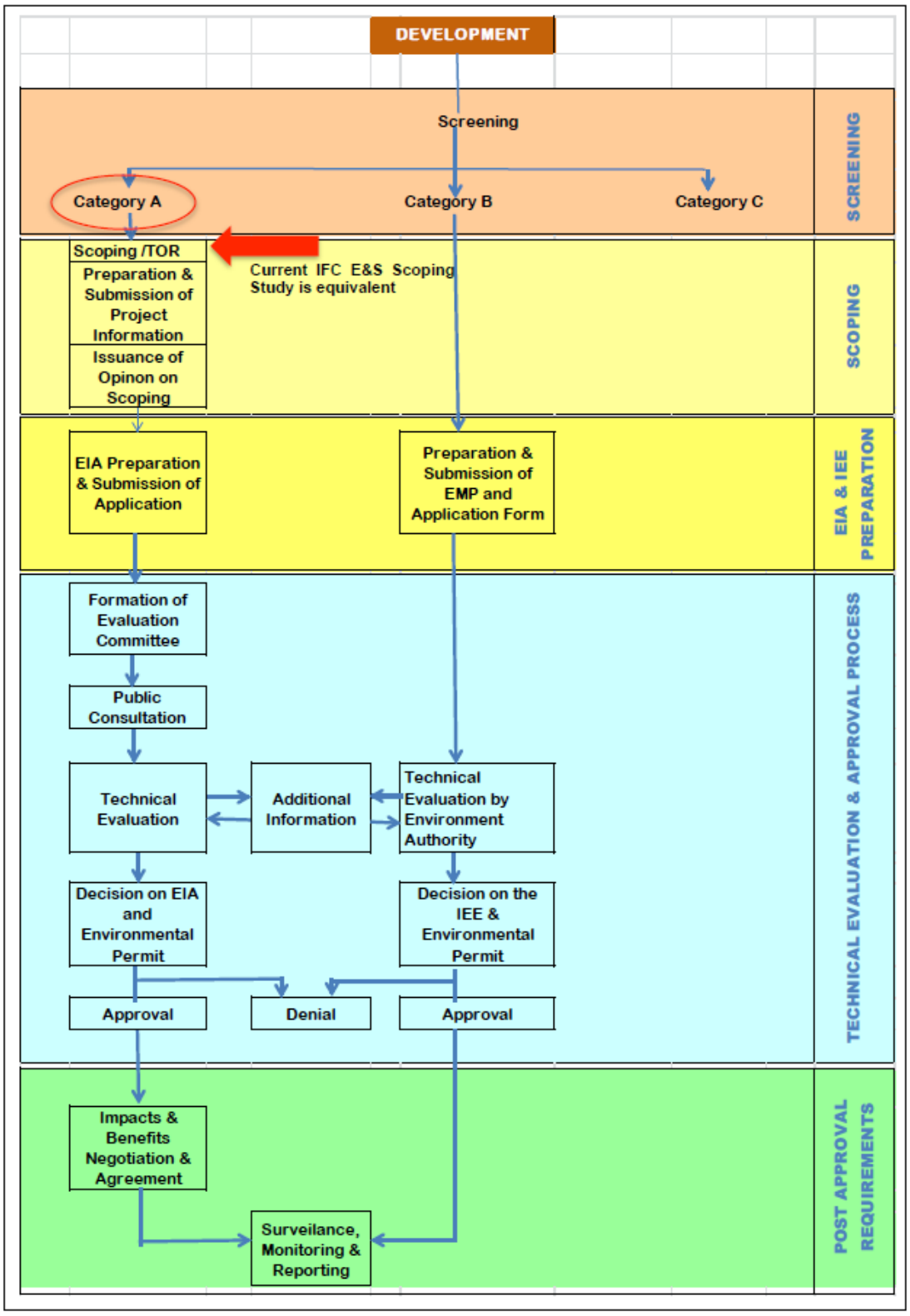
Regulatory approval of development projects occurs under *Decree-Law 5/2011 Environmental Licencing* that defines the environmental licensing system for public and private projects that are likely to produce environmental and social impacts. The licensing system sets out the process, procedures, roles and responsibilities of the Project Proponent. The Project 'Proponent' is defined as "*a person, including a legal person, both public and private, who requires a licence to carry out a project*" in the Decree. The Port Proponent will be the private sector entity awarded the concession by GoTL to design, build and operate the Port (the 'Concessionaire').

The EIA process commences when the Project Proponent prepares a Project Document (PD) and submits this to National Directorate for Environment (NDE). The PD identifies the Proponent, describes the project, outlines the major likely impacts, provides layout drawings and site maps, and provides copies of any permits or government support already obtained.

In accordance with *Decree-Law 5/2011*, Tibar Bay Port is classified as a Category A development as it has "*the potential to cause significant adverse impacts*", and therefore requires

a detailed EIA. For Category A projects the Proponent must prepare a *Scoping Report* and *Draft ToR* for the EIA for review by GoTL. GoTL has a maximum of 15 days to review the ToR and provide comments to the Proponent. The *Scoping Study* was completed in October 2013, and the *Draft ToR* was completed in November 2013. The ToR will be finalized by the Proponent based on GoTL review comments, then resubmitted to GoTL.

Figure 1: Environmental Impact Assessment and Licensing Process under Decree Law 5/2011



Source: ADB, 2011.

The Proponent then prepares the *Draft EIA* in compliance with the approved ToR, incorporating an Environmental Management Plan (EMP), and submits this to NDE for assessment. NDE establishes an Evaluation Committee consisting of representatives of relevant agencies and institutions to review the *Draft EIA*, and the report is made available for public review. The maximum *Draft EIA* review period, including technical review and consultation, is 50 days.

The *Final EIA* is prepared by the Proponent taking into account the comments received from the Evaluation Committee's technical review and public consultation, then submitted to NDE for approval. If the project is approved, an Environmental Permit is issued and may contain conditions of consent, including the requirement to implement the mitigation and monitoring measures set out in the EIA, EMP and other Project management plans.

Decree-Law 5/2011 is likely to be supported by a number of guidelines that are yet to be enacted, covering the following key aspects of the EIA process:

- Terms of Reference;
- Environmental Impact Assessment;
- Environmental Management Plan (EMP);
- Public Consultation Process;
- Impacts and Benefits Agreement;
- Statutes of the Assessment Committee;
- Fees and other costs related to the environmental licensing process;
- Scheme for rehabilitation and decommissioning projects;
- Technical parameters for environmental issues for the various components of the environment.

3.2.3 UNTAET Regulation No. 2000/19 - Protected Areas

UNTAET *Regulation No. 2000/19* protects five types of areas, sites, habitats and species: (i) Protected Wild Areas; (ii) Endangered Species; (iii) Coral Reefs; (iv) Wetlands and Mangroves; and (v) Historic, Cultural and Artistic Sites. The protection of coral reefs, wetlands and mangroves directly applies to the proposed Port in Tibar Bay, while endangered species protection may apply. There are no listed protected wild areas or historic sites likely to be directly affected by the Port.

Endangered species, defined as a species of animal or plant at risk of extinction within Timor-Leste, are listed in the Regulation as (a) Sea tortoises; (b) Sea turtles; (c) Marine mammals, including bottlenose dolphins, whales and dugongs; (d) Wallabies; (e) Crocodiles; (f) all animal and plant species listed in Appendix I or Appendix II of the Convention on the International Trade in Endangered Species; and (g) any other plant or animal species designated as endangered by the Transitional Administrator. The killing, injuring, harming, taking or disturbing of these species is prohibited, as well as the destruction of the habitat of these species.

The killing, damage or destruction of coral reefs is prohibited in Timor-Leste territorial waters. Similarly, it is prohibited to (a) pollute, (b) drain, or (c) destroy naturally existing wetlands and mangrove, while (a) cutting, (b) damaging, or (c) removing mangroves is also prohibited.

The main implication of this Regulation on Port development relates to the prohibited destruction of coral reefs and mangroves as Port construction will require the removal of coral reef and an area of mangroves. These impacts are being minimised through Port site selection and design, but they cannot be avoided within Tibar Bay.

The draft biodiversity law that will replace this UNTAET Regulation in the near future is understood to contain similar blanket protect provisions for the protection of coral reefs and mangroves, although a copy of this was not available for review. Various fisheries management laws may have implications for the Project regarding fisheries habitat and fisheries activities.

3.3 Conventions

Timor-Leste has ratified a number of international environmental conventions, including:

- Convention on Biological Diversity (CBD);
- UN Framework Convention on Climate Change (UNFCC) and the Kyoto Protocol; and
- UN Convention on Combating Desertification (UNCCD).

Under these Conventions GoTL has international environmental obligations when planning, assessing and approving major projects such as Tibar Bay Port. Timor-Leste is also a member of the International Maritime Organization (IMO), which administers the global regulatory regime for shipping. While Timor-Leste is yet to ratify the main IMO maritime safety and marine environment protection conventions, it is understood that this is being advanced through the development of implementing national legislation.

3.4 Standards, Guidelines and Good Industry Practice

Project design and the EIA shall comply with the following standards, guidelines and good international industry practice (GIIP).

3.4.1 World Bank / IFC Guidelines and Performance Standards

Project design and EIA preparation shall take into account World Bank Group (WBG) and IFC guidelines and performance standards, including, but not limited to:

- *IFC Performance Standards on Environmental and Social Sustainability*[1] (IFC, 2012);
- *Environmental Health and Safety (EHS) General Guidelines* (WBG, 2007);
- *EHS Guidelines for Ports, Harbors, and Terminals* (WBG, 2007); and
- *Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets* (IFC, 2007).

[1] IFC Performance Standards and World Bank Group EHS Guidelines - http://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/IFC+Sustainability/Sustainability+Framework/Sustainability+Framework+-+2012/#PerformanceStandards.

The EIA shall be prepared in accordance with all applicable IFC Performance Standards (PS). Specific PSs that are known to apply to this development regardless of the site selected within Tibar Bay are:

- PS1: Assessment and Management of Environmental and Social Risks and Impacts
- PS2: Labor and Working Conditions
- PS3: Resource Efficiency and Pollution Prevention
- PS4: Community Health, Safety, and Security
- PS5: Land Acquisition and Involuntary Resettlement
- PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Depending upon the site selected, PS8: Cultural Heritage may also apply. Where WBG EHS Guidelines and IFC PSs differ from Timor-Leste regulations, the Project shall achieve whichever standard or guideline is more stringent.

3.4.2 Good International Industry Practice

The design, construction and operation of the Port shall comply with good international industry practice (GIIP) through the incorporation of impact avoidance and management measures into each Project phase. The EIA shall identify and specify relevant GIIP to avoid and manage environmental and social risks and impacts associated with Port design, construction and operation. GIIP that requires consideration is provided by the following organisations:

- International Maritime Organisation (IMO) - regime for shipping;
- International Association of Ports and Harbours (IAPH);
- International Chamber of Shipping (ICS);
- World Association for Waterborne Transport Infrastructure (PIANC);
- World Dredging Association (WODA);
- Central Dredging Association (CEDA);
- Western Dredging Association (WEDA);
- Institute of Marine Engineering, Science and Technology (IMarEST);
- United Nations Environment Programme (UNEP);
- Organization for Economic Cooperation and Development (OECD);
- American Association of Port Authorities (AAPA) - Environmental Management Handbook; and
- European Seaports Organization (ESPO) - Green Guide.

While Timor-Leste has yet to ratify the main IMO Conventions or implement them nationally through domestic law, the Port will be planned, built and operated to fully comply with all relevant IMO conventions, standards and guidelines, consistent with GIIP and IFC's PSs and guidelines.

4. Scoping Analysis

4.1 Project Area of Influence

Six Port development and operation impact zones have been identified as follows:

a) **Primary port impact zone**: the immediate footprint of the Project, including onshore infrastructure, land reclamation, dredge areas and dredge material disposal sites, where a substantial loss of existing environmental resources and values will occur. The location and extent of this zone at Tibar Bay will depend on which site within the Bay is selected and the design of the Port.

b) **Secondary port impact zone**: areas adjacent to the primary impact zone (terrestrial and marine) that may receive effluent, emissions, etc from the Port and ships that use it, during both the construction and operational phases. Potential impacts include: sediment plumes from dredging; bilge, ballast and other discharges from ships; runoff from shore-based infrastructure; and air pollution from dust and exhaust emissions (from ships, machinery and vehicles). This zone also includes areas that may be affected by changes in hydrodynamics and coastal processes. The extent of the zone includes the whole of Tibar Bay, adjacent coastline and immediate offshore areas, determined by prevailing oceanographic conditions.

c) **Landward impact zone**: construction of the Port is likely to result in the development of associated shore-based infrastructure and businesses (e.g. wharehousing) in the vicinity of the Port.

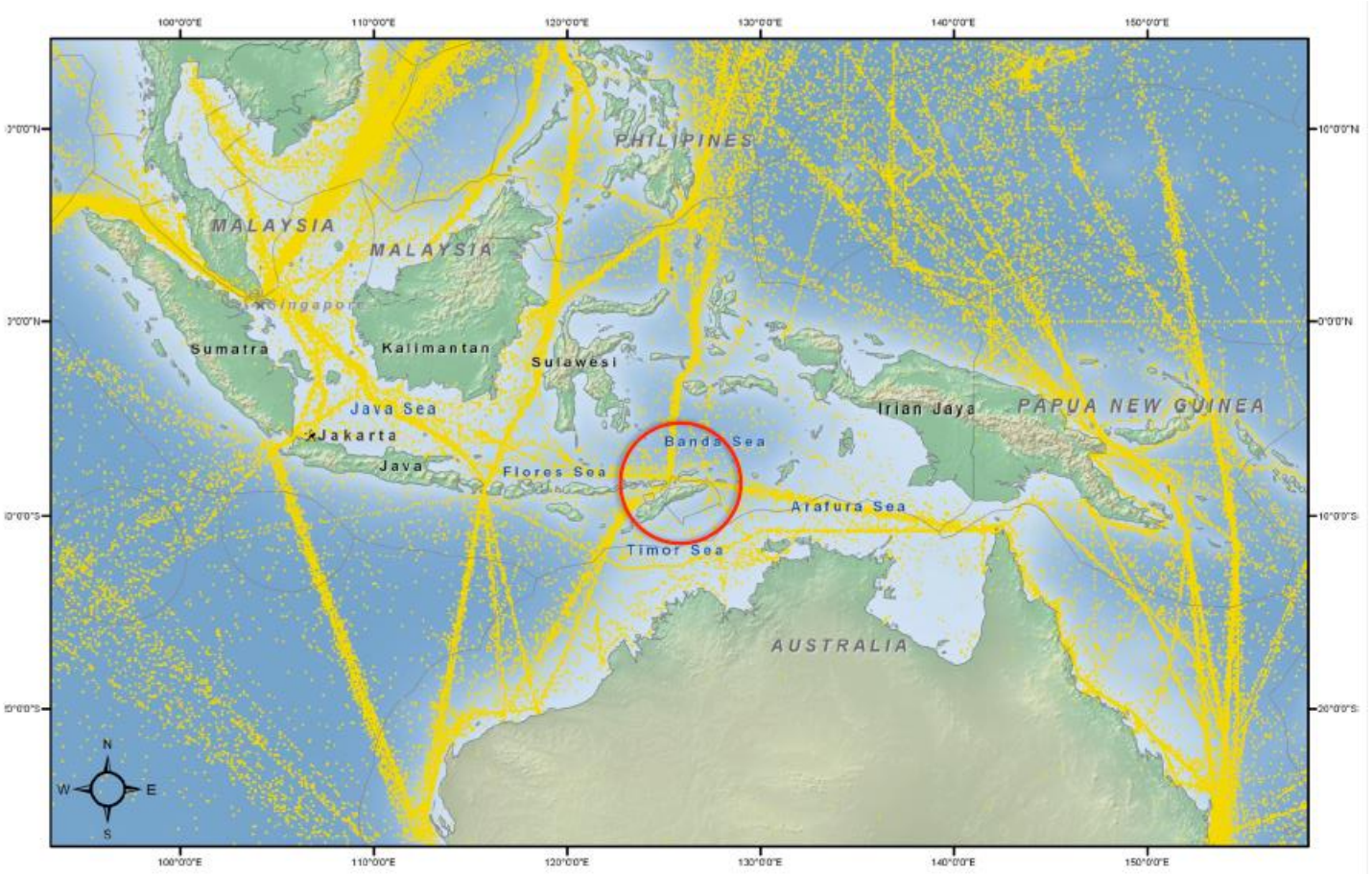
d) **Traffic impact zone**: traffic will be generated by vehicles carrying imported cargo from the Port to Dili, elsewhere in Timor-Leste and potentially westwards to Indonesia (Timor Barat), and the transport of goods to the Port for export.

e) **Shipping impact zone**: ships that use the Port will traverse Timor-Leste territorial waters, navigating past Atauro island and a number of Indonesian islands along the north coast of Timor-Leste and beyond. These shipping movements will present impact risks from ship waste discharges, shipping accidents and oil spills.

f) **Socioeconomic impact zone**: the extent of the socioeconomic impact zone is difficult to define, but will include:

- Tibar Bay, where people may have their current sources of livelihood disrupted or curtailed (e.g. mangrove-dependent livelihoods), or improved (e.g. through employment at the Port or in associated industries); and
- other parts of Timor-Leste where people's lives may improve indirectly from the goods imported via the Port.

Figure 2: Ship Movements Near Timor-Leste



Source: EcoStrategic Consultants - based on AIS ship position data

4.2 Environmental Features

4.2.1 General Environmental Features

Tibar Bay is located 10 km west of Dili and extends approximately 1.6 km east-west and 1 km north-south (160 ha). The Bay is bounded by low hills to the east and west, with Tibar catchment running appproximately 6 km south up to an elevation of around 750 m asl. This medium sized catchment (around 30 km^2) drains into the southern side of the Bay via a few defined watercourses and across a broad sediment delta (deposited behind the main road) in large storm events.

Land use immediately around the Bay consists of grazing (cattle and pigs), mangrove and Mesquite harvesting, fish farming in man-made ponds, salt production, and the growing of maize, cassava or mixed vegetables. Further into the catchment cropping becomes more important, while tree crops and plantations for wood supply are also common.

4.2.2 Biodiversity

Tibar Bay has significant biodiversity resources and values, including:

Mangroves: approximately 20 ha of mature, apex-community mangrove forest exists along the entire southeastern shore of the Bay. The mangroves are dominated (>80%) by large specimens of the apple mangrove *Sonneratia alba*, with heights in excess of 30 m and trunk circumferences of the largest trees exceeding 5 m. Stilt mangrove *Rhyzophera stylosa* is also present in small numbers, mainly on the seaward edge, as well as grey mangrove *Avicinea marina*, mainly on landward areas (which is typical of these species). It appears that an extensive band of *A. marina* has been cleared to landward of the main *S. alba* stand, for fish ponds, salt ponds and firewood, and degradation of the mature S. *alba* stand has commenced, mainly from firewood cutting for salt production.

The mangroves in Tibar Bay are national significance, representing approximately 2% of the total remaining area of mangroves nationally, estimated by Boggs et al 2009 at less than 1,000 ha. The significance of the Bay mangroves should be considered in light of the loss of 80% of mangrove cover nationally since 1940, with 40% of cover lost between 2000-2008. Tibar Bay mangroves also represent part of the western most extent of mangroves on the north coast, and are part of a short 60 km stretch of coast extending from Tibar east to Manatuto where the main remaining patches of mangrove are found in Timor-Leste.

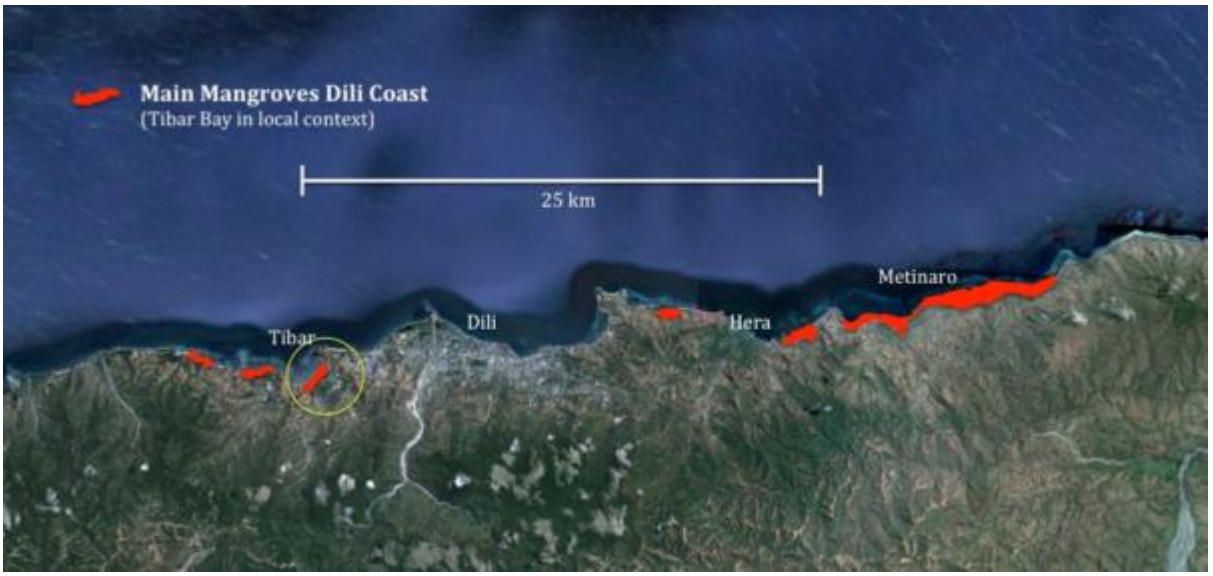
The *National Biodiversity Strategy and Action Plan* (NB-SAP) adopted by the Government of Timor-Leste in 2011, in accordance with the *Convention on Biological Diversity* (CBD), seeks

Figure 3: *A. marina* Cleared Zone Landward of the Remaining Southeastern Mangroves (left), Compared with Intact Mangrove Communities Between Dili and Hera (right) *(images: Raaymakers)*

to reverse the degradation and loss of mangroves,with the protection of significant remaining stands such as those found at Tibar Bay fundamental to achieving this objective.

Mangroves in Tibar Bay are heavily used by the local community and provide a range of ecosystem services. Mangroves are protected under existing national law and will be protected under a new biodiversity law that is yet to be promulgated. Mangroves in the Bay also meet the definition of 'Natural Habitat' under IFC PS6: *Biodiversity Conservation and Sustainable Management of Living Natural Resources*. As such they should not be destroyed or altered for port development unless viable alternatives cannot be found, and subject to due EIA process, stakeholder engagement and implementation of an impact mitigation and offset hierarchy.

Figure 4: Mangrove Areas Along the North Coast Near Dili



Source of image: Google Earth.

Seagrasses: two main seagrass meadows occcur in the Bay: one in the western sub-bay, and the other on the northeast side. Four species of seagrass were identified, with *Enhalus acoroides*, *Sargonium isoetifolium* and *Cymodocea rotundata* being the dominant species. *Halophila ovalis*, the preferred food of Dugong, is also present, although it was only found in small, isolated patches. The seagrasses of Tibar Bay are not considered to be as valuable as the mangroves stands.

Coral reef: extensive areas of coral reef occur at the mouth of and within the Bay, mainly consisting of dead coral rock and rubble on the shallow tops of the reef flats and highly diverse, high live-coral cover on the reef slopes.

Tidal flats: extensive tidal flats exist in the Bay, mainly to seaward of the southeastern mangroves, but also on the western and eastern sides of the Bay. These areas are heavily utilised by the local community for protein supply and they host a variety of shore birds and waders, including two species listed as 'Near Threatened' (with extinction) on the IUCN Red List: the Malaysian Plover (*Charadrius peronnii*) and Black-tailed Godwit (*Limnosa limosa*).

Marine nursery values: Tibar Bay exhibits all the attributes of a productive nursery habitat for fish and other marine life, including hosting the three main tropical marine ecosystems (mangroves, seagrasses and coral reefs), having complex bathymetry that provides diverse benthic habitat, being sheltered, and receiving nutrients from land-based sources. As such, the Baymay provide recruits to adjacent areas along the coast, and loss of these values may have indirect impacts on adjacent areas.

No significant habitat values have been identified in Tibar Bay for important marine species such as Dugong and marine turtles, but a local dive tourism operator (Free Flow Diving) reported frequent sightings of Dugong along the coast immediately east of Tibar Bay. There are also anecdotal reports that the Bay is used by saltwater crocodiles.

Key Biodiversity Areas: two Key Biodiversity Areas (KBA) that may be affected by the passage of ships using the port are: (i) Tasitolu Wetland migratory bird habitat located immediately east of Tibar Bay; and (ii) Atauro Island located approximately 45 km offshore from Tibar Bay, which ships using Tibar Bay will pass. In addition, the deep water straits between Dili and Atauro are heavily used by whales, dolphins, whale sharks and manta rays, forming a major migratory route between the Pacific and Indian Oceans. This presents the risk of ship strike as shipping increases in and out of Tibar Bay.

4.3 Socio-Economic Features

4.3.1 Administration, Population and Settlement Pattern

Tibar is located in Bazartete Subdistrict, Liquica District. The majority of the Bay foreshore lies in Tibar Suco, although most of the western side of the Bay is in Ulmera Suco. The population living in the immediate vicinity of Tibar Bay consists of around 29 households generally residing within 100 m of the shoreline, predominantly on the eastern side of the Bay. A number of addtional households are located between 100-300 m inland, primarily in close proximity to the sealed roads.

4.3.2 Livelihoods and Resource Use

The Tibar Bay community is heavily reliant on the marine resources of the Bay and nearby coast, primarily for their own consumption. There are 25 fisher-families in Tibar, of whom the majority (20) are part of the Tibar Fishermen's Group (TFG). Tibar Bay is unique along this section of coast in that it provides the only protected all-weather anchorage for vessels in relative close proximity to highly valued deep water fishing grounds. The majority of TFG members reside on the eastern side of the Bay where deep water access exists close to shore via a natural channel through the reef. Regardless of the tide, fishermen in this area can access the sea via the channel. There are no other similar locations along the northern coastline of Timor-Leste with these features.

Approximately 25 fish aggregation devices (FADs) to attract pelagic fish, known locally as 'rompongs', are semi-permanently moored in deep water immediately offshore of Tibar Bay. TFG members expressed concern that ships entering and leaving a new port in Tibar Bay would

pose a major hazard to rompong fishing.

4.3.3 Infrastructure and Businesses

National road A03-01 (7.2 km) runs from Dili, along the eastern side of the Bay and terminates at the road intersection on the southeastern side of the Bay. National road A03-02 runs from the intersection along the southeastern and western sides of the Bay before heading west to Liquica (21.4 km). National road A04-01 branches off the intersection to the southeast of the Bay, climbing southwards through Tibar catchment, connecting to Gleno, Ermera and Maliana (31.9 km).

An oil terminal is located on the western side of the Bay, consisting of a 90 m long wharf and landside facilities. A slipway is proposed in Tibar Bay, while a marina development has been considered. Tibar Bay Retreat is located on a small hill on the southwestern corner of the Bay. Fish ponds have been installed near the shoreline on the eastern shoreline. There is a water treatment plant and waste dump in Tibar catchment south of the Bay, as well as several schools, a technical training centre, a health clinic and police post. Timorcorp has a coffee processing plant in Tibar and an abattoir has been built but is yet to commence operation.

4.3.4 Cultural Heritage Sites

Eight cultural heritage sites were identified at Tibar Bay (Table 1 and Figure 5), including freshwater springs that are heavily used by the local community, and special prayer and offering sites, most of which are located in the mangrove area adjacent to the proposed Port site. There is also potentially a ninth site submerged on the southestern side of the Bay that may be a historic stone jetty, but this requires further investigation.

Table 1: Cultural Heritage Sites in Tibar Bay

Site Number	Description	Location
1	Fishermen's prayer site	Asuinur
2	Main freshwater spring	Bitimau
3	Concrete lined well	Near southeastern mangroves
4	Offering preparation site	Bisorek
5	Bamboo fish trap	
6	Concrete lined well	Palm forest
7	Small freshwater spring	Builmau
8	Canoe launch site	
9	Possible historic stone jetty	Immediately north of southeast mangroves

Figure 5: Sensitive Social Receptors within Tibar Bay

4.3.5 Port Employment

All stevedoring, bulk handling and transport of general cargo and containers through Dili Port is handled by private companies, with APORTIL managing the overarching security and administrative functions. Transferring container shipping from Dili Port to Tibar Bay is unlikely to have would have a significant negative impact on the staff numbers employed by APORTIL. Some private sector staff losses may occur in relation to container handling at Dili Port, however it is expected that most positions will be either transferred to the new port at Tibar or be reassigned to general cargo handling at Dili Port.

4.4 Climate Change and Greenhouse Gas Emissions

Timor-Leste is considered to be highly vulnerable to the effects of climate change because: it is a Small Island Developing State (SIDS) with coastal land vulnerable to sea level rise; the climate is characterized by highly variable rainfall and extremes between droughts and floods; most rural households rely upon subsistence food production therefore they are susceptible to changes in the climate; and natural resources are already under stress from unsustainable use, therefore they have low resilience to further impacts from climate change.

The country is not well equipped to adapt to the effects of climate change given the high levels of poverty, poor infrastructure and an absence of social security protection. As the main impacts of global climate change are predicted to be sea level rise and an increasing frequency and intensity of extreme weather events, ports, located on the land-sea interface, are particularly vulnerable to climate change.

4.4.1 Climate Change Adaptation

The main risks to the Port from climate change include:

- **Sea level rise** - with implications for the design height of infrastructure;
- **Increasing air and sea surface temperatures** – affecting rates of deterioration, corrosion and erosion;
- **Increasing ocean acidity** – affecting rates of deterioration, corrosion and erosion; and
- **Changes in the frequency and intensity of extreme weather events** - predicted to decrease in Timor-Leste.

These potential impacts primarily relate to Port structures and therefore mainly require engineering solutions. This includes ensuring that the design height of all structures is sufficient to cope with predicted sea level rise, and that construction materials are sufficiently resistant to the estimated increasing rates of deterioration, corrosion and erosion.

Operational solutions will also be required, including infrastructure inspection and maintenance regimes that take account of climate change. Kong et al (2013) developed a "material model" that assesses the effects of different climate variables on concrete, timber and steel used in port construction, calculating a maintenance trigger line that could be factored into planned infrastructure inspection and maintenance regimes for the Port.

In addition, 'soft' engineering solutions for climate change adaptation can be cost-effective and have fewer ancillary impacts. Soft engineering solutions include set-backs from the shoreline (siting some port infrastructure back from the coast, and leaving the coastline largely unaltered where possible e.g. using piled wharves connected to onshore facilities via trestle jetties) and retaining and/or creating natural coastal protection using mangroves, coral reefs and seagrass beds.

4.4.2 Greenhouse Gas Emissions

The main sources of GHG emissions from Port construction and operation are:

- **black carbon** - emitted from vessels, vehicles and machinery, and from the burning of fossil fuels to generate electricity used for port construction and operation;
- **green carbon** – loss of green carbon sequestration and storage from the permanent loss of terrestrial vegetation removed to construct the Port; and
- **blue carbon** – loss of blue carbon sequestration and storage from the permanent loss of mangroves, salt flats and/or seagrasses removed to construct the Port.

The carbon storage role of marine sediments is relevant to the proposed Port as development in a mangrove zone and other marine areas requires site preparation to make the foundations geotechnically competent to support port infrastructure. Site preparation will involve excavating/ dredging overlying material to remove it, exposing sediment to oxidation if it is used in land reclamation or disposed of on land, and resulting in carbon release.

It is likely that the largest source of Port emissions will result from electricity use to operate the Port. Electricity is likely to be sourced from the main power station at Hera which runs on heavy fuel oil (HFO). Port development will facilitate an increase in shipping and an associated increase in GHG emissions. GHG emissions from ships are regulated globally under Annex VI of the MARPOL Convention, which requires a mandatory Energy Efficiency Design Index (EEDI) for new ships and a mandatory Ship Energy Efficiency Management Plan (SEEMP) for all ships. The simplest and most effective way to address GHG emissions from ships using Tibar Port is to require them to comply with MARPOL Annex VI.

4.5 Environmental and Social Risks and Impacts

Environmental and social risk and impact issues associated with the proposed Port will be dependant upon the site utilized within Tibar Bay and the design of the Port. The Port layout concept is being developed to include all components and stages of Port development to ensure that it is planned based on the full Project footprint. This includes: berthing for tugs, line boats and a pilot boat; dredging of berth pockets; a container wash-down area and quarantine facility (likely to be required, especially if trading with Australia and New Zealand); linking the container yard with onshore facilities; and possible future Port expansion.

A summary of the range of issues and impacts identified during issue scoping is presented in Table 2.

Table 2: Potential Environmental and Social Impacts

	Potential Impacts	Feature Affected or Cause
Environmental	Biodiversity destruction/degradation	Coral, mangroves, seagrass beds, tidal flats, deeper water, indirect impact on key biodiversity areas, ship strike of larger marine creatures
	Changes to Bay and coastal hydrodynamics	Broad channel opened to the sea Wharf Land reclamation
	Bay foreshore erosion	Broad channel opened to the sea Wave refraction off the wharf Ship movement within the Bay
	Seawater quality deterioration	Dredging Spills – ships and cargo Releases from ships Seabed disturbance from ship movement within the Bay
	Sea/land degradation	Dredge material disposal Land reclamation Land-based cut and fill Induced landside development
	Drainage and sedimentation	Altered catchment drainage into the Bay
	Solid waste	Construction waste Ship waste Port waste

	Wastewater	Ship wastewater Port sewage Port stormwater runoff
	Noise	Construction activities Port operation Road traffic
Socio-economic	Resettlement	Households (between 2-20+)
	Loss or reduction in livelihoods	Effects on fishing, aquaculture, salt production, tidal flat resource collection, etc
	Business relocation	Oil terminal Ship maintenance facility
	Employment	APORTIL staff reduced New Port positions
	Loss of cultural heritage sites	Canoe launching site Freshwater springs Possible rock jetty*
	Damage to or loss of domestic water supply	Natural springs
	Restrictions to local access	Port structures blocking Bay access
	Safety	Construction Ship approach and docking Port operation
	Traffic	To/from the Port
	Reduced visual amenity	Tourist lodge, local houses, etc

* - feature unlikely to be affected by the use of site Option 2B.

The main Port constuction activities that have the potential to create significant impacts are:

- **Dredging and dredge material disposal** – habitat removal/degradation, sea water quality decline;
- **Land reclamation** – habitat removal, sea water quality decline, business relocation;
- **Wharf construction** – habitat removal, sea water quality decline; and
- **Landside development** – habitat removal, resettlement, loss of livelihoods, business relocation, loss of cultural heritag sites.

The Port features and activities that may cause significant impacts during the operation phase are:

- **Altered Bay bathymetry** (from land reclaimation and dredging), **breakwater and wharf** – changes to Bay and coastal hydrodynamics and processes, Bay foreshore erosion;
- **Ship movements into and out of the Port** – sea water quailty decline, safety, effects on marine-based livelihoods; and
- **Port operation activities** – sea water quailty decline, safety, effects on marine-based livelihoods.

The cumulative impacts of the proposed Port and other developments within Tibar Bay and nearby require assessment.

4.6 Key Studies

Field surveys and/or modeling required to define baseline conditions at Project sites and the surrounding features likely to be affected by the Project include:

Marine

- Hydrodynamics and coastal processes – Bay and coastline (based on oceanographic data and modeling);
- Marine sediment quality and PASS – on proposed excavation/dredging sites. Describe the parameters set out in the Australian National Assessment guidelines for Dredging (NAGD, 2009) and guidelines under the London Protocol (e.g. IMO 2009 and IMO 2005). The geological survey is testing 15 samples tested for PASS, which may be sufficient;
- Marine habitat and biodiversity – within and immediately adjacent to the Bay, including mangroves, seagrasses, coral reefs and fisheries, building upon previous studies. The presence of marine turtle, dugong and crocodile will be ascertained, as well as any other IUCN Red List species or *UNTAET Regulation No. 2000/19 Protected Areas* listed species. A survey of marine mega-fauna (cetaceans, whale sharks and manta rays) will also be undertaken between Tibar and Atauro;
- Benthic communities - Project footprint;
- Fish aggregation devices (FADs) (rompongs) – offshore;
- Seawater quality;
- Underwater noise survey;
- Dredge material dump site studies (in accordance with London Protocol and Aus NAGD 2009);
- Survey and mapping of FADs (rompongs).

Terrestrial

- Habitat/vegetation survey - project footprint and adjoining areas;
- Wildlife survey - project footprint and adjoining areas, Tasitolu wetland;
- Land use survey – directly affected land and adjacent areas;
- Sedimentation study – assessment of Tibar catchment sediment loads entering the Bay;
- Water quality sampling – surface and groundwater.

Social

- Socioeconomic survey, census and asset register of directly affected households – Port footprint, adjacent areas and households reliant on Bay natural resources for their livelihoods – to identify the persons who will be displaced by the project, determine who will be eligible for compensation and assistance;
- Socioeconomic survey of indirectly affected households living in proximity to the Bay;
- Cultural heritage and archaeology survey – Port footprint (including potential historical "rock jetty" if this site may be affected);
- Any field surveys required for the economic valuation of ecosystem services.

4.7 Impact Avoidance, Mitigation and Offsetting

Management measures to avoid and mitigate the environmental and social risks and impacts of the Port will be designed in accordance with national requirements, IFC PSs, World Bank EHS Guidelines and good international industry practice, based on the following mitigation 'hierarchy':

- Prevent/avoid impacts; then
- mitigate/reduce impacts; then
- offset residual impacts.

Some of the more important impact avoidance and mitigation measures that are likely to be implemented to manage major issues are summarised below.

Avoidance

Tibar Bay Port site selection and design alternatives are the two key aspects that are being fully investigated to avoid significant Port impacts where possible from the outset, and minimise or lessen other significant risks and impacts where avoidance is not possible.

An overall Tibar Bay Development Masterplan is proposed to plan activities within the Bay and Tibar catchment in an integrated manner, recognising that induced landside development will result from the Port.

Mitigation

Port construction techniques that minimise construction impacts will be investigated to select appropriate methods (e.g. vibro-placement of stone columns or piling to provide deep foundations, rather than excavating and replacing existing sediments). A full range of construction environmental management measures will be designed for strict implementation, including a dredging management plan.

Resettlement of directly affected households will aim to ensure that these households are no worse off following resettlement, including compensation at full replacement cost for land and other assets lost. Alternative sustainable livelihoods for affected households will be investigated and supported as required to replace any loss of access to coastal natural resources caused by the Port, while additional meausres will be proposed to mitigate other negative impacts of displacement.

A Marine Spill Contingency Plan will be prepared to manage any spills that may occur during Port construction or operation. Shipping management measures that are likely to be implemented include speed restrictions, maintaining watch for marine mammals, and other measures such as those outlined in IMO *Guidance Document for Minimizing the Risk of Ship Strikes with Cetaceans* (2009).

Measures that will be considered to minimise the Port's GHG emissions include:

- Designing the Port to avoid/minimize the loss of blue carbon sinks (mangroves, seagrasses and salt flats);
- Incorporating best practice energy efficiency into the design of Port lighting, buildings and facilities;
- Using renewable energy to supply at least part of the Port's electricity needs (e.g. solar photovoltaic panels and solar water heaters mounted on Port buildings); and
- Requiring all ships using the Port to comply with MARPOL Annex VI.

Offsets

A Biodiversity Action plan will be prepared containing management actions to maintain/ improve ecosystem health, and establish biodiversity offsets as required. Potential offsets include: *Avicinea marina* mangrove rehabilitation along the shoutheastern shoreline of the Bay; supporting the protection and management of unimpacted mangrove/seagrass/coral reef communities in areas east of Dili; establishment of community-based Marine Protected Areas (MPAs) in the Bay, on the coast immediately west of Tibar Bay, at other significant coastal sites such as Hera, Metinaro and Manatuto. These offsets will be linked to alternative livelihood iniatives where necessary to replace natural resource over-exploitation (e.g. solar-based salt production methods).

4.8 Stakeholder Views

Stakeholder consultation and engagement initiated as part of the E&S Scoping Study obtained the views of the 29 households in the Project area, representatives of key government agencies and NGOs. Most parties stated that they understand the need for a new port for Dili and support this development subject to a number of concerns and issues being addressed. The main issues raised were:

- Detailed assessment of Port siting alternatives, including other locations along the north coast and alternative sites and layout options within Tibar Bay. Two parties stated that Tibar Bay should be reserved for tourism development given the attractive setting and proximity to Dili, and that the oil terminal and proposed Port should be moved to an alternative location such as Hera (see Annex 1).

- Developing the Port in a manner that allows existing livelihoods (primarily fishing) and other current Bay uses to continue. The local community appears to have a lack of understanding about the scale of the proposed development and the potential impact on current uses of the Bay, including that fishing, salt production, tidal flat resource collection and mangrove harvesting may not be able to co-exist with the Port and therefore will be displaced.

- All legislative and regulatory requirements and processes should be fully complied with,

including full transparency and accountability during Project assessment and approval. The community should be consulted and given every opportunity to have input into this process.

- The maximum opportunity for employment should be provided to the local community for both Port construction and operation, including the provision of appropriate training in advance.

- If the relocation/re-settlement of households is required, the replacement facilities/ conditions must be better than current conditions at Tibar Bay.

- If cultural heritage/sacred sites and other social values are destroyed or impacted, then proper cultural process has to occur prior to these impacts, with alternative sites and facilities provided by the Port developer.

All parties appreciated being consultated and requested that this continue during Port planning.

Annex 1: Site Selection Report

1. Need for the Port

The *Timor-Leste Strategic Development Plan 2011-2030* (GoTL, 2011), developed through a lengthy and intensive national consultation process, identifies the need for a new port on the north coast of Timor-Leste in proximity to the majority of the national population living within and around the capital Dili. The port is needed to replace Dili Port, Timor-Leste's only international seaport, that has become an economic bottleneck. Limitations of Dili Port capacity and function include:

- a building and cargo shed layout more suited to a coastal port mainly handling general cargo (the port's previous function) rather than international container shipping;
- harbour limitations, especially draught restrictions, that restrict port access to small ships, thereby preventing access by competing shipping lines operating larger vessels and the productivity gains that would result;
- no available land to extend the port;
- road congestion within Dili and a poor entry road intersection into the port; and
- no landing facilities or export capacity for the fishing industry. (GoTL, 2011)

Dili Port is too shallow for ships above 500 twenty foot equivalent (TEU) capacity and the Port is expected to reach capacity by 2018, resulting in further congestion, delays and higher costs. The limited capacity of the Port, with a wharf length of 380 m, already results in a berthing backlog of between three and eight ships (GoTL, 2011). The port is located in the centre of town with no realistic expansion options. Unless a new port is installed the only option will be to truck goods in from Indonesia at great expense.

All consumer and capital goods are imported into Timor-Leste, with the country's population expected to more than double to 2.3 million by 2040. This, coupled with economic growth, is expected to increase container traffic from around 45,000 TEU in 2013 to 350,000 TEU by 2040. Additionally, 0.5 million tons of non-containerized dry cargo is expected by 2040. A new port, designed to handle containers and general cargo, will increase transport efficiency, allowing larger vessels up to 3,500 TEU to be accommodated and thus capitalizing on sea transport economies of scale.

Timor-Leste has port facilities at Hera, Tibar, Oe-Cusse Ambeno, Kairabela, Atauro and Com, but each of these ports is in a poor state of repair and has limited function and capacity. There are no ports or small ship facilities on the south coast and hence all agriculture and industry in this region is reliant on road transport from the north. The transport of goods through other existing ports has many disadvantages. Moving cargo through the Indonesian port of Kupang, approximately 410 km by road from Dili, is not ideal given the long haulage distance and difficult road conditions, while this port is similar to Dili Port in that it has no known expansion plans.

The planned port at Suai on the south coast of Timor-Leste, 179 km by road from Dili, may handle some containers in the long term and is well placed to service the south coast (where about 20% of the

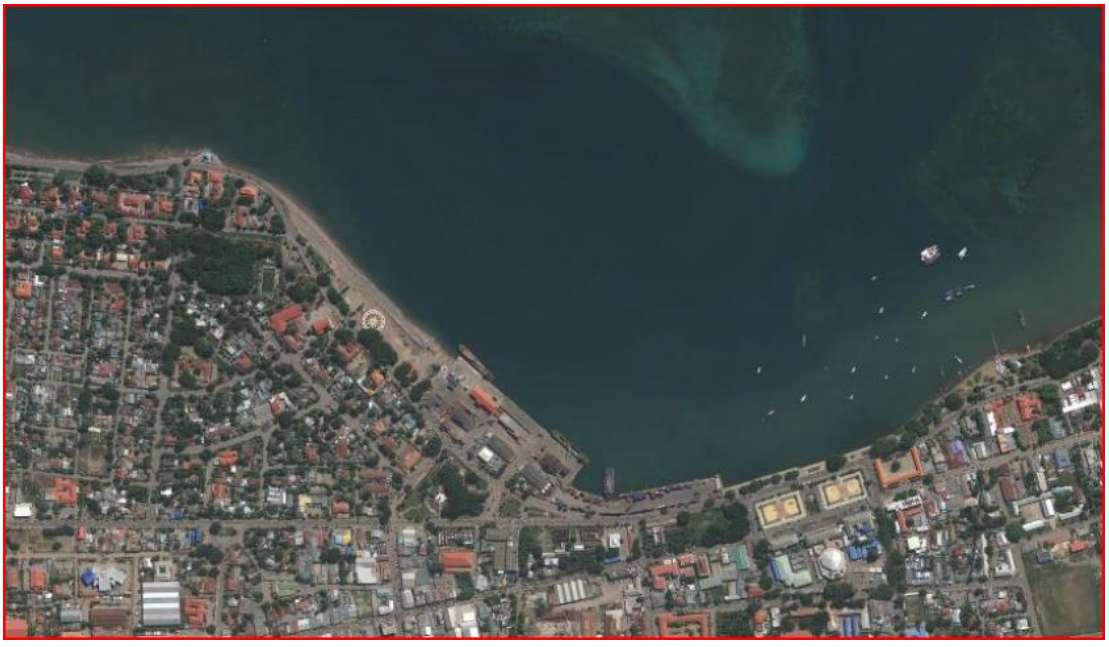
population resides), but the capacity of this port is expected to be limited, while the road travel time to Dili is considerable at over six hours and roads unsuited to heavy vehicle traffic. All container shipping lines, mainline and regional services alike, presently sail north of Timor Island, therefore a north coast location is far better suited to servicing this trade.

Selection of the port location on the north coast was undertaken by GoTL, while IFC-supported project planning prepared by HPC and EcoStrategic considered some additional location alternatives to ensure that no options had been overlooked. After GoTL had selected Tibar Bay as the location, selection of the preferred port site within Tibar Bay was undertaken as a component of (i) HPC's conceptual design of the Port, and (ii) EcoStrategic's environmental and social scoping work.

2. Dili Port Upgrading

The upgrading of Dili Port (Figure 1) was considered to meet port needs into the foreseeable future, based on either expanding the onshore facilities, creating offshore facilities or a combination of these two options. Onshore expansion would involve the acquisition and development of land opposite the existing port to substantially increase the landside area. Offshore expansion would involve reclaiming new land by building an artificial island on top of Dili Port Reef, connected via a causeway to the existing onshore port facilities and creating a breakwater for the port.

Figure 1: Dili Port



While the Dili Port area is free of many natural features (i.e. mangroves, tidal flats, seagrasses), onshore expansion would require the acquisition of a large area of urban land immediately southwest of the existing port, as well as substantial business displacement and some resettlement. The cost of land

acquisition would be considerable, while a large increase in port activity will only add to traffic congestion in Dili.

Given land availability issues in Dili, offshore expansion of the port provides a conceptual alternative to landside expansion. Offshore land reclamation would result in the total loss of the small Dili Port Reef located 550 m from the main wharf, whilst substantially altering and detracting from the appearance of the city shoreline.

Expansion of the port in either form would require dredging to create additional depth to cater for larger vessels (3,500-7,000 TEU capacity container ships), therefore the existing berths would have to be reconstructed to cope with the increased draught. Dredging could result in turbidity and sedimentation impacts on the reef.

A survey of this reef found that despite its close proximity to a functioning commercial port, it appears to very healthy with high coral species diversity and up to 100% live coral cover in many areas, although very few fish larger than 10 cm were observed.

The transport of containers and cargo to and from the expanded port would be undertaken by truck via the already highly congested and narrow city roads. Increased land transport would add to existing traffic congestion in the city, constraining the movement of containers and general cargo to and from the port. In addition, port expansion on the Dili shoreline would detract from this significant natural feature in the heart of the capital, whereas eventually moving container and cargo traffic out of the city will allow this section of the city's shoreline to become a landmark feature.

The Government intends to convert Dili Port into a tourism feature more in keeping with its vision for the development of Dili and the broadening of Timor-Leste's economic base. While planning is at an early stage, it is expected that the port will accommodate ferry services, marina development and related tourism facilities.

3. North Coast Locations

The selection of a suitable location for the port along the north coast was undertaken by GoTL based on the following general considerations:

- **proximity to Dili** – within relatively close proximity to Dili to minimize land transport (i.e. within 50 km);
- **sheltered conditions** – little current, wave action, low potential tsunami impact
- **free of landside congestion** – allowing ample development potential due to absence of settlements and businesses, and ease of heavy traffic movement to and from the port;
- **minimal environmental and social impact** – avoidance of/minimal impact on significant ecosystem features, settlements, livelihoods and cultural features
- **minimal development cost** – primarily for the main features (wharf, foundation conditions, dredging volume, breakwater, landside areas); and

- **port capacity to handle traffic for the next 30 years plus the potential to expand beyond 2044**.

The range of location alternatives considered by the IFC team in providing advice to GoTL were:

- open (unsheltered) coastline;
- man-made sheltered areas: Dato and Lake Maubara - to be created by excavating out low lying coastal land or lakes (Figure 2); and
- natural sheltered bays: Hera and Tibar Bay - no other natural sheltered marine areas within 50 km of Dili (Figure 3).

Figure 2: Potential Port Locations West of Dili

Figure 3: Potential Port Locations East of Dili

3.1 Open Coastline

Much of the unsheltered coastline within 50 km of Dili drops away steeply into the sea, having narrow coastal shelves with little protection from currents and waves and difficulty in finding suitable anchor grounds. These geological characteristics make port construction difficult water depth increases dramatically very close to the coastline. This makes the construction of a breakwater problematic and costly.

Many areas along this coastline support coral reef immediately offshore, with shoreline mangroves also found along stretches of the coast, particularly to the east of Dili. Additionally, relatively flat landside areas are limited at many sites. For these reasons open coastal locations were considered to be unsuitable for a new port to handle the capacity of containers and general cargo required.

3.2 Man-made Sheltered Areas

The IFC team briefly reviewed several landside locations where potential man-made ports could be excavated to ensure that all feasible location options were considered. The excavation of Lake Maubara, a saltwater lake located 36 km west of Dili and separated from the sea by approximately 200 m of land, was considered to construct a port. Use of this site for a port would destroy this significant ecological feature that is home to a large flock of pelicans and other coastal birds. Additionally, the cost of the port is likely to be higher than seaward locations as the full depth of the approach channel, turning area berths would have to be excavated. The greater road distance to Dili would also add significantly to transport costs.

Dato, consisting of seaside river delta land 29 km west of Dili, could form a port with the excavation of riverine material on low-lying coastal land. Despite this potential, the site has a number of major limitations that include more than 300 households living on the potential port site, 200 fishermen using the adjacent coast, and the loss of a large area of land production resources at the site. This section of coast has a water depth of up to 200 m at less than 50 m distance from the beach, making it difficult to find suitable anchor grounds, while the sea has a very strong current parallel to the beach.

The area is subject to drainage and sedimentation issues as the two rivers either side of the site carry large volumes of sediment, therefore a port would be subject to high rates of sedimentation. The cost of port construction is likely to be high due to the full excavation of the approach channel, turning area and berths. The condition of the road to Dili is poor and it passes through five villages, therefore added traffic will create a safety hazard while transport costs would also be higher, similar to Lake Maubara.

Accordingly, both Lake Maubara and Dato were not considered to be feasible locations for the port.

3.3 Natural Sheltered Bays

The only naturally sheltered marine areas within proximity to Dili are Hera and Tibar Bay. Hera, 12 km east of Dili, is home to the port Hera Navy Base (Figure 4). Accordingly, this location was ruled out by GoTL for a container and bulk cargo port for national security reasons. A limitation of this site is the difficult land transport connection to Dili via a narrow road that includes sections with steep gradients.

Figure 4: Port Hera Navy Base

Tibar Bay, 10 km west of Dili, is a relatively undeveloped natural Bay, currently supporting a small fishing community, 29 nearby coastal households and several businesses on the shoreline. The Bay is well sheltered, having a coral reef mainly consisting of dead coral across almost the entire mouth of the Bay. An operational limitation of this site is the lack of suitable anchor grounds immediately offshore of the Bay, but areas offshore of Dili can be used for this purpose. This site was primarily chosen by GoTL as the preferred location for the port due to the degree of shelter, lack of existing marine and landside development and close proximity to Dili.

4. Tibar Bay Site Options

The optimization of port site selection within Tibar Bay was based on consideration of and a trade-off between five factors:

- operation;
- engineering;
- cost;
- environmental; and
- social.

The requirement for the Port to have good navigational access and adequate landside area to operate effectively could not be compromised, but optimization of other port operation considerations could be foregone if other factors such as environmental considerations warranted this.

4.1 Operation, Engineering and Cost Factors

The IFC team assessed the operational, engineering and cost considerations of seven alternative port sites within Tibar Bay (Figure 5), rating each criterion based on how conducive it was to port development, operation and future expansion (Table 1). A general rating was assigned to each factor, identifying where limitations or difficult conditions exist.

Figure 5: Port Site Options in Tibar Bay

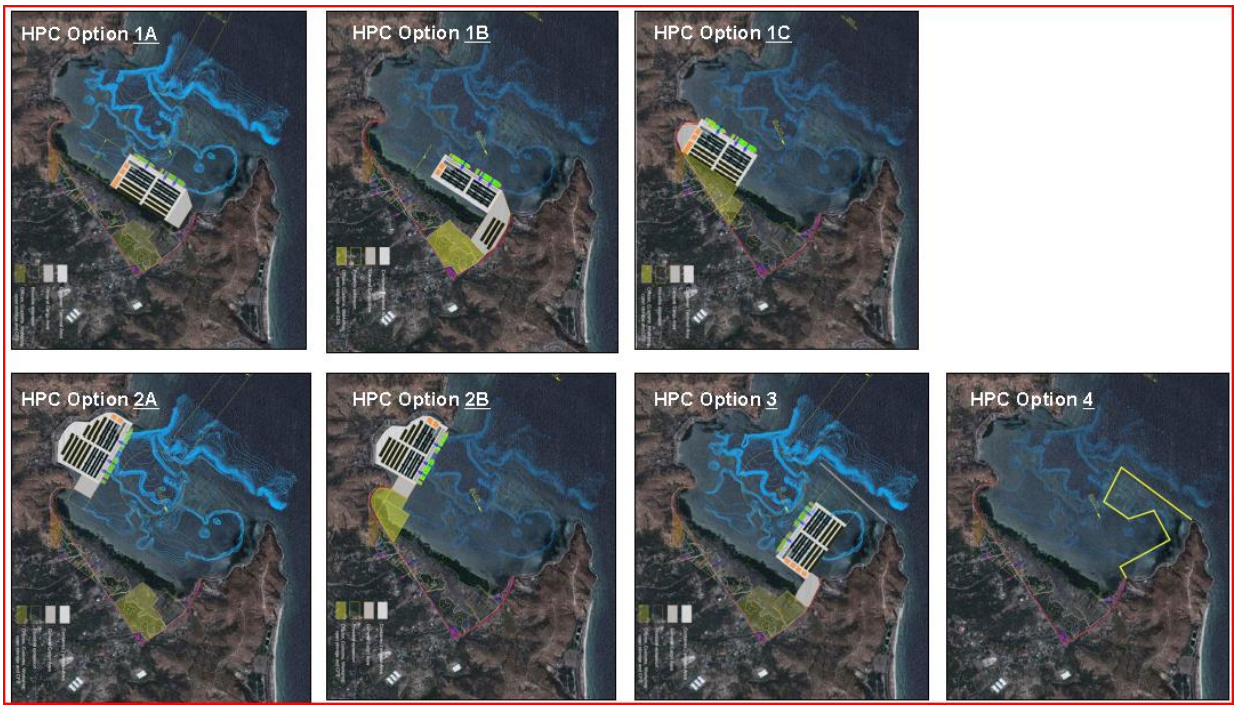


Table 1: Operational, Engineering and Cost Evaluation of Alternative Port Sites

Factor	Criterion	Site Options						
		1A	1B	1C	2A	2B	3	4
Port Operation	Navigational access	Good	Good	Good	Good	Good	Good	Difficult
	Wave protection	Very good	Very good	Good	Good	Good	Very good	Very good
	Land area availability	Good	Moderate	Good	Difficult	Moderate	Moderate	Limited
	Berth extension	Possible	Possible	Possible	Limited	Limited	Not possible	Not possible
	Yard extension	Possible	Possible	Possible	Difficult	Difficult	Limited	Difficult
Engineering/ Construction	Dredging volume	Medium	Medium	Low	Low	Low	Medium	Very high
	Dredge material dumping	Low	Low	Low	Low	Low	Medium	Very high
Cost	Quay wall construction	Medium	Medium	Medium	High	High	High	High
	Land operating cost	Low	High	Low	High	Medium	Medium	Highest

Colour ratings:

Green – no significant impediment or limitation.

Yellow – some limitation.

Red – a significant limitation.

The most obvious finding from the ratings was that Option 4 has considerable limitations for almost all operational, engineering and cost criterion that was considered. Option 1C was the most favourable with no operational, engineering, or cost limitations. Options 1A and 1B were almost as favourable, having few limitations. Options 2B, 3 and 2A have additional limitations relating to land area availability and the potential to eventually extend the berth and yard areas.

4.2 Environmental and Social Factors

Environmental and social factors were evaluated for four generic port site options in Tibar Bay, covering each side of the Bay. These sites cover HPC's seven sites as follows:

HPC	EcoStrategic
1A, 1B, 3	East
1C	Southwest
2A, 2B	West
4	Northeast

Notable environmental and social features that the port has the potential to adversely impact upon were identified. A weighting between 1-3 was then assigned to each feature based on the environmental and social significance of that feature as described in Tables 2 and 3.

Table 2: Environmental Factor Weightings

Environmental Feature	Weighting	Weighting Rationale
Mangroves	3	The most significant ecological resource in the Bay, having national importance given the loss of 80% of mangroves country-wide since 1940. *S. alba*-dominant mangrove is unique on the north coast, being the only example of a mature, apex community of this species. Provides fisheries value, wildlife habitat and coastal protection. Highest blue carbon value. Heavily utilized by the local community.
Seagrass	2	Links mangroves to offshore reefs. Provides fish nursery values and coastal protection. Not as rare as mangroves as there are extensive areas of seagrass along the north coast.
Tidal flats	2	Provides habitat for two IUCN Red List bird species and other bird species. High blue carbon value. Heavily utilized by the local community.
Coral reef	1	High species diversity and live coral cover on slopes, but low/no live coral cover on reef flats. Provides coastal protection. Not as rare as mangroves as there are extensive areas of reef along the north coast.
Terrestrial habitat	1	Heavily used as a resource by the local community, but there appears to be no species of ecological significant (e.g. Mesquite is an introduced species). Resources can be replaced or offset.
Bay/coast hydrodynamics	2	Changes will impact on all other aspects of the Bay, including indirect impacts on mangroves, seagrass and tidal flats.

Source: adapted from EcoStrategic, 2013.

Table 3: Social Factor Weightings

Social Feature	Weighting	Weighting Rationale
Resettlement	2	Directly affects people's lives but it can be effectively managed to ensure that resettled households are no worse off.
Fisheries	3	The Bay is the only sheltered harbour for fishing vessels with direct access to deep water fishing grounds along the north coast near Dili.
Salt production	1	Alternative livelihoods can be established for the affected households, which is also essential for mangrove preservation.
Fish ponds	1	Alternative livelihoods can be established for the affected households.
Other resources	2	Immediate coastal community of 29 households is highly dependent on these resources, but loss will permanently alter their livelihoods.
Bay access	2	Will directly affect people's lives but can be managed.
Cultural heritage	3	Loss is irreversible and commonly irreplaceable, usually permanently altering cultural aspects of local community life.

Source: adapted from EcoStrategic, 2013.

A score of between 0-4 was then subjectively assigned to each feature based on the relative severity of the likely impact of the Port (area of impact; type of impact - destruction, degradation or change) on that feature, then weighted scores were calculated (Tables 4 and 5).

Table 4: Environmental Evaluation of Alternative Port Sites

Primary Environmental Issue	Feature	Weight-ing	East		Southwest		West		Northeast	
			Score	Weight. Score	Score	Weight. Score	Score	Weight. Score	Score	Weight. Score
Habitat loss	Mangroves	3	4	**12**	3	**9**	2	**6**	0	**0**
	Seagrass	2	1	**2**	1	**2**	4	**8**	3	**6**
	Tidal flats	2	4	**8**	4	**8**	3	**6**	2	**4**
	Coral	1	1	**1**	1	**1**	2	**2**	3	**3**
	Terrestrial	1	4	**4**	3	**3**	1	**1**	0	**0**
Bay/Sea Hydrodynamics	Hydrodynamics	2	3	**6**	3	**6**	1	**2**	4	**8**
Total Weighted Score		**-**	**-**	**33**	**-**	**29**	**-**	**25**	**-**	**21**

Source: adapted from EcoStrategic, 2013.

Table 5: Social Evaluation of Alternative Port Sites

Primary Social Issue	Feature	Weight-ing	East		Southwest		West		Northeast	
			Score	Weight. Score	Score	Weight. Score	Score	Weight. Score	Score	Weight. Score
Resettlement	Resettlement	2	4	**8**	2	**4**	2	**4**	0	**0**
Loss of livelihoods	Fisheries	3	4	**12**	3	**9**	3	**9**	2	**6**
	Salt production	1	4	**4**	4	**4**	0	**0**	0	**0**
	Fish ponds	1	4	**4**	0	**0**	0	**0**	0	**0**
	Other resources	2	4	**8**	3	**6**	1	**2**	0	**0**
Reduced Bay access	Access	2	4	**8**	3	**6**	2	**4**	1	**2**
Loss of cultural heritage	Sites	3	4	**12**	3	**9**	2	**6**	0	**0**
Total Weighted Score		**-**	**-**	**56**	**-**	**38**	**-**	**25**	**-**	**8**

Source: adapted from EcoStrategic, 2013.

The combined total weighted environmental and social scores for the four alternative sites, in order of site preference, were: Northeast - 29; West – 50; Southwest – 67; and East – 89.

4.3 Preferred Port Site

The ratings for Tibar Bay port sites for the two sets of factors assessed (i. Operation, Engineering and Cost; and ii. Environmental and Social) were combined to select the preferred port site. Site 4/Northeast, despite being the best site in terms of having the lowest potential adverse environmental and social impacts, was rejected primarily due to difficult navigation access even before a number of other operation and engineering limitations were considered.

Site 2B/West, rated as having the second lowest adverse environmental and social impacts, was selected as the preferred port site as there were no operation, engineering or cost factors that prohibited or overly restricted development at this site, with each limitation being manageable. The most significant environmental impact associated with Option 2B/West will be the loss of a large area of seagrass bed (15-18 ha), but this impact is seen as preferable to the loss of a large area of mangroves (up to 20 ha at other sites) as seagrass has a lower conservation value.

The main adverse impacts that are likely to result from the use of port site 2B/West and the severity of these impacts are:

- loss of 15-18 ha of seagrass - major;
- loss of 1-3 ha of mangrove – minor to moderate;
- loss of some tidal flats – moderate;
- loss of up to 1 ha of live coral – minor to moderate;
- altered Bay hydrodynamics – minor;
- resettlement of around 3-4 households - minor;
- impact on fisheries – minor to moderate;
- loss of other livelihood resources - minor;
- blocking local access to much of the western shoreline of the Bay; and
- loss of a traditional canoe launching area.

GoTL, 2011. *Timor-Leste Strategic Development Plan 2011-2030*. Government of Timor-Leste.