ENVIRONMENTAL Management Plan (EMP)

Fujian Provincial Department of Ocean and Fisheries
Xiapu State Owned Assets Investment & Operation Co., Ltd.
Fujian Provincial Academy of Environmental Science

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1. Introduction

This Environmental Management Plan (EMP) is prepared for Fujian Fishing Port Construction Project (Project). The project is undertaken by the Xiapu State Owned Assets Investment & Operation Co., Ltd.

Project environmental impacts were identified in the Fujian Fishing Port Construction Project Environmental Impact Assessment (Project EIA). The EIA report was completed by Fujian Provincial Environmental Science Institute and cooperating organizations Hehai University, Ningbo Marine Environmental Monitoring Central Station and East Fujian Marine Environmental Monitoring Central Station under the State Oceanic Administration, Fisheries Research Institute of Fujian. The EIA includes general introduction, regulatory and legal framework, regional and social environment baseline, ecological and environmental quality baseline and assessment, project impacts assessment, cumulative environment assessment, information disclosure and public consultation, risk assessment and environmental management. The Project is classified as Category A based on the current EIA laws and regulations in China and World Bank’s OP/BP4.01 EA, requiring a full EA study. The EMP references the EIA findings in defining management requirements.

Based on the findings and recommendations of the Project EIA, this EMP provides a comprehensive environmental management plan including key sub-management plans tailored to project implementation. The EMP follows requirements of national laws, regulation and technical guidelines, as well as World Bank safeguards policies, including the World Bank Group Environment, Health and Safety Guidelines (EHS Guidelines). It adopts available and economically sound strategies to achieve project impact mitigation targets. The major construction activities in the context of the EMP include mountain blasting for rocks, excavation of breakwater foundation trench and port basin, packing sedimentation by throwing stone and blasting and dredged material disposal at confined facilities.

The EMP is developed to be a stand-alone document to allow readers an understanding of the EMP program rationale with EIA document references included as appropriate.

1.1 Location of Fishing Ports

The proposed fishing ports are located in the east sea area of Xiapu County, Ningde City, Fujian Province, as shown in the Figure 1.
1.2 Project Description

The objectives of the project are to help Fujian reduce the fishermen’s loss caused by the extreme climate, which include four components: 1. Expansion and Upgrading of Fishing Port Facilities; 2. Upgrading of Early Warning and Response Systems; 3. Establishment of a Training Center; 4. Project Management and Implementation Support.

The World Bank will finance the fishing ports facilities, which is designated as the “China: Fujian Fishing Port Construction Project”. The construction of project ports facilities includes one Central port, one Class-1 port and four Class-2 ports, respectively serving for the Sansha town, Fenghuo village, Luxia village, Wen’ao village, Dajing village and Beishuang village under Xiapu County.

Construction activities for each port are given in Table 1. The location of proposed fishing ports are given in Figure 2.
Table 1 List of Major Project Activities

<table>
<thead>
<tr>
<th>Fishing Ports</th>
<th>Sansha</th>
<th>Luxia</th>
<th>Fenghuo</th>
<th>Beishuang</th>
<th>Dajing</th>
<th>Wen'ao</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade</td>
<td>Central Port</td>
<td>Class-1 Port</td>
<td>Class-2 Port</td>
<td>Class-2 Port</td>
<td>Class-2 Port</td>
<td>Class-2 Port</td>
</tr>
<tr>
<td>Breakwaters</td>
<td>South: 750m; West: 545m</td>
<td>Outer: 600m; Inner-A: 380m, Inner-B: 680m, Inner-C: 600m</td>
<td>200m</td>
<td>/</td>
<td>/</td>
<td>East: 75m; South: 370m</td>
</tr>
<tr>
<td>Docks</td>
<td>1×300m</td>
<td>2×74m</td>
<td>1×35m</td>
<td>/</td>
<td>1×65m</td>
<td>/</td>
</tr>
<tr>
<td>Trestle bridges</td>
<td>80m</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Seawall</td>
<td>/</td>
<td>Seawall #1: 1,186 m; seawall #2: 2,413 m</td>
<td>/</td>
<td>85m</td>
<td>1,065m</td>
<td>/</td>
</tr>
<tr>
<td>Land reclamation</td>
<td>33.8 ha*</td>
<td>7,459.3ha</td>
<td>/</td>
<td>8,200 m²</td>
<td>3,715 m²</td>
<td>/</td>
</tr>
<tr>
<td>Buildings</td>
<td>Administration and fishermen shelter building: 2,500m²</td>
<td>Administration and fishermen shelter building: 2,500m²</td>
<td>Administration building, 500m²</td>
<td>Administration building, 500m²</td>
<td>Administration building, 500m²</td>
<td>Administration building, 500m²</td>
</tr>
<tr>
<td>Access roads</td>
<td>Use existing access roads</td>
<td>7m-wide, 2,413m-long new access road to dock, to be built along inner side of seawall #2</td>
<td>2, 260m-long, 3m-wide new access road</td>
<td>Use existing access road</td>
<td>285m-long, 4m-wide new access road to dock; pavement of 1,300m existing road</td>
<td>Use existing access roads</td>
</tr>
</tbody>
</table>

*The World Bank financed activity in Shansha is the expansion of domestically funded Phase I of Sanshan Central Fishing Port which includes a plan of land reclamation of 33.8ha. The World Bank funded expansion activity will generate dredged materials from breakwater construction, which will be reused as backfilling material for the land reclamation.*
Figure 2 Geographical Location of Proposed Fishing Ports
1.3 EMP Focus

The EMP focuses on executing the mitigation measures for the identified environmental impacts and monitoring the effectiveness of the measures over the life cycle of the Project. Based on the EIA and SEA, the EMP is developed in accordance with Chinese environmental laws and guidelines, World Bank's safeguard policies, and best practices from similar projects. The EMP objective is to ensure consistency between EIA and EMP to achieve appropriate standard of environmental protection. The EMP effectively manages the regulatory requirements and directs the project owner in the management contractors and sub-contractors.

1.4 The EMP Structure and Objectives

The key components of the EMP include procedures for overall environmental management during Project construction and operation. EMP covers the following elements

- Environmental management roles and responsibilities
- Mitigation measures
- Supervision and Monitoring Plan
- Contractor Environmental Specifications
- Dredged Material Management Plan
- Marine Ecology and Habitat Offset Plan
- Communication and Stakeholder Engagement Plan
- Environmental Training Plan, and
- EMP Budget

EMP provides sufficient information for the project proponent, contractors, sub-contractors to implement the EMP and set priorities to:

- Meet the environmental requirements set by the P. R. China, Fujian province and World Bank;
- Fulfill all environmental and socio-economic conditions associated with project approvals, permits and policies set out by the state, provincial and municipal levels;
- Develop, promote and foster a shared sense of responsibility for environmental and social performance during the implementation of the project;
- Promote environmental awareness and understanding among regulatory bodies and Xiapu State-owned Assets Investment & Operation Co., Ltd. including its retained contractors through training and identification of roles and responsibilities towards environmental and social management;
- Monitor environmental and social performance throughout the project and implement an adaptive management approach to continuous improvement and minimum cumulative impact in project-located sea area;
- Work with local communities and project affected stakeholders to ensure that they benefit as a result of project development;
• Ensure the fisheries management and compensation program is implemented and compensatory man-made reef habitat is established; and
• Maintain an ongoing commitment to informing, engaging and involving local stakeholders throughout all phases of the project through monitoring processes.

1.5 Environmental Laws, Policies and Regulations

Rules and legislative requirements as enacted by various levels of government in China and the World Bank are summarized below. Chapter 1, General Introduction, of the EIA provides complete relevant legislation, regulations and technical guidelines and standards and plans. The EMP adheres to these legislative objectives and enforcement policies and procedures.

Compliance with key Chinese national laws and regulations are summarized in Table 2.

<table>
<thead>
<tr>
<th>No.</th>
<th>China Laws and Regulations</th>
<th>Project Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Environmental Protection Law of P.R.C.</td>
<td>The EIA has assessed the possible marine pollution and taken corresponding mitigation measures.</td>
</tr>
<tr>
<td>2</td>
<td>Marine Environmental Protection Law of P.R.C.</td>
<td>①The EIA involves dredging, blasting, dredged materials dumping (rear Phase-1 of Sansha Fishing Port ), land reclamation, waste and sewage control, oil spills risk, ecological protection and compensation etc.; ②The dredged materials will be dumped in the rear Phase-1 of Sansha Fishing Port; ③Oil spill risk emergency response plan prepared; ④Ecological compensation plan prepared.</td>
</tr>
<tr>
<td>3</td>
<td>Sea Utilization Administrative Regulation of P.R.C.</td>
<td>The occupied sea area has been approved by the marine authorities.</td>
</tr>
<tr>
<td>4</td>
<td>EIA Law of P.R.C.</td>
<td>①The EIA prepared by the qualified agencies has been approved by the marine and environmental protection administration; ②Public disclosure in surrounding towns, villages, East Fujian Daily and on websites of Xiapu County government and institution for preparing EIA, two-round public consultation implemented.</td>
</tr>
<tr>
<td>5</td>
<td>Fishery Law of P.R.C.</td>
<td>EMP incorporates measures to minimize impacts on fishery resources resulted from underwater blasting and construction. Affected aquaculture will be relocated before construction.</td>
</tr>
<tr>
<td>6</td>
<td>Soil and Water Conservation Law of P.R.C.</td>
<td>The plan of soil and water conservation prepared and submitted to the water authorities.</td>
</tr>
<tr>
<td>7</td>
<td>Maritime Transport Safety Law</td>
<td>Measures and requirements of safe construction have been incorporated in the EIA.</td>
</tr>
<tr>
<td>8</td>
<td>Cultural Relics Law</td>
<td>No cultural relics involved within the assessment scope.</td>
</tr>
<tr>
<td>9</td>
<td>Administrative Regulations for Marine Natural Reserve</td>
<td>The project doesn't include marine natural reserve.</td>
</tr>
</tbody>
</table>
### Table 2 Compliance with China Domestic Laws and Regulations

<table>
<thead>
<tr>
<th>No.</th>
<th>China Laws and Regulations</th>
<th>Project Compliance</th>
</tr>
</thead>
</table>
| 10  | Administrative Regulations for Marine Special Reserve                                     | ① The proposed Wen’ao Fishing Port is located in the marine special reserve, whose construction has been approved by the Ocean and Fishery Bureau of Ningde City.  
     |                                            | ② The status survey and impact assessment of Pollicipes mitella’s ecological environment implemented;  
     |                                            | ③ The ecological compensation plan of man-made fish reef prepared;  
     |                                            | ④ The ecological compensation incorporated in the cost estimate.                                                                                                                                                    |
| 11  | Navigation Safety Regulations for Above- and Under Water Activities                      | Construction shall start after approved by relevant authorities.                                                                                                                                                     |
| 12  | Administrative Regulations for Marine Pollution Prevention from Marine Engineering        | ① The natural spawning ground, breeding ground and feeding ground not involving economic creatures can be occupied.  
     |                                            | ② EMP incorporates mitigation measures for blasting.                                                                                                                                                                  |
| 13  | Administrative Regulations for Marine Pollution Prevention from Ship Wastes               | Ship wastewater and solid wastes must be received and treated by port facilities.                                                                                                                                       |
| 14  | Technical Regulations for Impact Assessment of Construction Projects on Marine Living Resources | The EIA has assessed the impacts on marine living resources from habitat occupation, dredging and blasting as well as the economic value of potential loss caused by project construction;  
     |                                            | An ecological compensation plan of habitat protection prepared.                                                                                                                                                      |
| 15  | Announcement on Strengthening the EIA Management of International Financial Institution Financed Projects | The EIA and EMP have been prepared following the World Bank’s Safeguards Policies.                                                                                                                                   |

Of the ten safeguards policies, the following are triggered: 1) OP4.01 Environmental Assessment; and 2) OP4.04 Natural Habitats; 3) OP/BP4.12 Involuntary Resettlement; 4) OP/BP4.11 Physical Cultural Resources. The World Bank Group Environmental, Health and Safety Guidelines (WBG EHS Guidelines) also apply to the Project. The compliance with these policies is summarized in the table 3.
### Table 3 Compliance with World Bank Safeguards Policies

<table>
<thead>
<tr>
<th>No.</th>
<th>Safeguard Policies</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OP/BP4.01 Environmental Assessment</td>
<td>Category A project; Full EIA and EMP have been prepared; Consultation conducted as part of EIA process.</td>
</tr>
<tr>
<td>2</td>
<td>OP/BP4.04 Natural Habitats</td>
<td>Ecological survey conducted as part of EIA; Mitigation measures developed to mitigate impacts; Ecological compensation and habitat offset program developed in EMP.</td>
</tr>
<tr>
<td>3</td>
<td>OP/BP4.12 Involuntary Resettlement</td>
<td>A Resettlement Action Plan has been prepared.</td>
</tr>
<tr>
<td>4</td>
<td>OP/BP4.11 Physical Cultural Resources</td>
<td>Physical resources such as tomb and shrine are found in the construction and affected area of Dajing Fishing Port.</td>
</tr>
<tr>
<td>5</td>
<td>OP/BP4.36 Forest</td>
<td>Not triggered, the project will not finance activities that would involve significant conversion or degradation of critical forest areas or related critical natural habitats as defined under the policy.</td>
</tr>
<tr>
<td>6</td>
<td>OP/BP4.09 Pest Management</td>
<td>Not triggered, the project will not procure any pesticides nor will an increased use of pesticides result from the project. No action is required under the policy.</td>
</tr>
<tr>
<td>7</td>
<td>OP/BP4.37 Dam Safety</td>
<td>Not triggered, the project area does not include any dams.</td>
</tr>
<tr>
<td>8</td>
<td>OP/BP4.10 Indigenous Peoples</td>
<td>Not triggered, there are no indigenous peoples live in project-located area, no impact on the indigenous peoples.</td>
</tr>
<tr>
<td>9</td>
<td>OP/BP7.50 Projects on International Waterways</td>
<td>Not triggered, the project doesn’t include any international waterways.</td>
</tr>
<tr>
<td>10</td>
<td>OP/BP7.60 Projects in Disputed Areas</td>
<td>Not triggered, the project area does not include any disputed areas.</td>
</tr>
</tbody>
</table>

The World Bank Group Environmental, Health and Safety Guidelines for Ports, Harbors, and Terminals also apply to the Project. The environmental mitigation measures completely meet the requirements of WBG EHS Guidelines (especially those related to construction management) because the general requirements are also included in the laws, regulations, guidelines and construction standards. At the request of the World Bank, the measures in the EMP also completely meet the Management Practices for Dredged Materials prepared for fishing ports (see the table 4).
Table 4 Compliance with the WBG EHS Guidelines

<table>
<thead>
<tr>
<th>EHS Guidelines</th>
<th>EIA /EMP Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidelines on Dredged Materials Management, including requirements on dredge planning, dredging, and disposal of dredged materials.</td>
<td>The project doesn't need to dredge any navigation channel. Excavation is needed for Sansha breakwater due to very thick silts. Limited dredging of port basin for Sansha, Lvxia and Dajing is needed as well. There is no need for maintenance dredging. The dredging techniques, quality of dredged materials, disposal approach comply with the EHS guidelines.</td>
</tr>
<tr>
<td>Guidelines on air emissions from vessels.</td>
<td>Emissions from fish boats are limited compared to large cargo vessels. The ambient air quality is very good. The project will not result in increased air emissions.</td>
</tr>
<tr>
<td>Guidelines on wastewaters from port, drainage and vessels</td>
<td>Collection and treatment of boat wastewater, port wastewater and runoff have been considered in the EIA and EMP. Compliance with the guidelines and international convention of MARPOL.</td>
</tr>
<tr>
<td>Guidelines on wastes from vessels and ports</td>
<td>Collection and disposal of wastes have been considered in the EIA and EMP. Compliance with the guidelines and international convention of MARPOL.</td>
</tr>
<tr>
<td>Guidelines on protection of biodiversity</td>
<td>Survey and assessment of marine ecology conducted. Impacts on natural habitats are very limited. Offset plan is included in the EMP.</td>
</tr>
<tr>
<td>Occupational Health and Safety</td>
<td>These measures equal to national requirements and included in EMP.</td>
</tr>
</tbody>
</table>
2. Regional Environmental Baselines

2.1 Environmental Quality

During EA preparation, sampling and tests of ecological environment, water, sediments and biological quality in Funing Bay were conducted to characterize the physical, chemical and biological conditions of the project area. Results show the water and sediments are clean and uncontaminated meeting the relevant Chinese quality standards. These results are consistent with other environmental quality monitoring previously conducted. Air and noise levels are suggestive that the environmental quality in this area is generally good.

2.2 Main Environment-sensitive Receptors

The list of environmental and social sensitive receptors that are potentially impacted by the project is listed in Table 5.

<table>
<thead>
<tr>
<th>Name</th>
<th>Environmental and Social Sensitive Area</th>
<th>Status</th>
<th>Position Relation to Project Construction Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sansha Fishing Port</td>
<td>Sea Area: Sansha sea area</td>
<td>Marine ecological environment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Land Area: People in Sansha Town</td>
<td>Population: 42,000 persons</td>
<td>The nearest Si’ao village with transportation vehicles passing by</td>
</tr>
<tr>
<td></td>
<td>Land Area: Sansha Quarry</td>
<td>Land area vegetation system</td>
<td>455m to the nearest Si’ao village</td>
</tr>
<tr>
<td>Luxia Fishing Port</td>
<td>Sea Area: Kelp culture</td>
<td>15.5 hectare of kelp culture ground in the port</td>
<td>Within construction region</td>
</tr>
<tr>
<td></td>
<td>South shore pond culture</td>
<td>Shrimp and crab culture, pond area 0.3 hectare</td>
<td>Near seawall</td>
</tr>
<tr>
<td></td>
<td>Shrimp pond water intake</td>
<td>Located in the middle of Luxia Sand Beach and provide service to the 14 hectares of backside shrimp pond area</td>
<td>580m to nearest Breakwater C</td>
</tr>
<tr>
<td></td>
<td>North shore pond culture</td>
<td>Crab culture, pond area 0.28 hectare</td>
<td>290m to Breakwater A</td>
</tr>
<tr>
<td></td>
<td>North shore pond culture</td>
<td>Crab culture, pond area 0.2 hectare</td>
<td>390m to outer breakwater, 280m to Breakwater A</td>
</tr>
<tr>
<td></td>
<td>Land Area: Luxia Sand Beach</td>
<td>About 1 km long, 110 m wide</td>
<td>Near seawall</td>
</tr>
<tr>
<td></td>
<td>Luxia village</td>
<td>Totally 4,700 persons in the village, located in the north side of Luxia Fishing Port</td>
<td>Seawall, reclamation near Luxia village</td>
</tr>
<tr>
<td></td>
<td>Land area vegetation</td>
<td>Southern region land area vegetation system</td>
<td>in south area of construction region</td>
</tr>
<tr>
<td>Fenghuo Fishing Port</td>
<td>Sea Area: Nori culture</td>
<td>Aquaculture area 0.3 hectare</td>
<td>150m to breakwater</td>
</tr>
<tr>
<td></td>
<td>Cage culture</td>
<td>15 cages for small yellow croaker culture</td>
<td>500m to breakwater</td>
</tr>
<tr>
<td></td>
<td>Land Area: Fenghuo quarry</td>
<td>Vegetation system in Fenghuo Island quarry</td>
<td>No people around</td>
</tr>
<tr>
<td>Name</td>
<td>Environmental and Social Sensitive Area</td>
<td>Status</td>
<td>Position Relation to Project Construction Region</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Beishuang Fishing Port</td>
<td><strong>Sea Area</strong> Pond culture</td>
<td>Culture species are shrimp and crab; pond area is 0.08 hectare</td>
<td>Near construction region</td>
</tr>
<tr>
<td></td>
<td><strong>Land Area</strong> Beishuang village</td>
<td>Totally 2,500 persons in Beishuang village; per capita agricultural area is only 0.04mu</td>
<td>The nearest house in Beishuang village with transportation vehicles passing by</td>
</tr>
<tr>
<td></td>
<td><strong>Land Area</strong> Beishuang Quarry</td>
<td>Vegetation system in Beishuang Quarry</td>
<td>166m to Beishuang village</td>
</tr>
<tr>
<td>Dajing Fishing Port</td>
<td><strong>Sea Area</strong> Dajing sand beach</td>
<td>About 2.3 km long, 120m wide</td>
<td>Construction region locates in the south end of Dajing sand beach</td>
</tr>
<tr>
<td></td>
<td><strong>Land Area</strong> Liu's Tomb</td>
<td>Liu's Tomb in Dajing Village which was built starting from 1940, which is located in the east side of 45m to the seawall end with the shortest distance of 33m, In every Tomb-sweeping Day, the descendants come to sweep tomb and worship</td>
<td>shortest distance of 33m to seawall</td>
</tr>
<tr>
<td></td>
<td><strong>Land Area</strong> Temple</td>
<td>White Dragon Temple, built in 1950 as the place for villagers in the Gangli village to worship, located in the top of small hill in the north shore of outlet</td>
<td>12m Located on the top of hill, 12m over the breakwater</td>
</tr>
<tr>
<td></td>
<td><strong>Land Area</strong> Gangli Natural village</td>
<td>300 persons</td>
<td>Near seawall</td>
</tr>
<tr>
<td>Wen’ao Fishing Port</td>
<td><strong>Sea Area</strong> Pollicipes mitella species, Fuying Island Marine Reserve</td>
<td>Distributed in the cliffs of Fuying Island</td>
<td>Cliff cracks where <em>Pollicipes mitella</em> live occupied by the end of breakwater</td>
</tr>
<tr>
<td></td>
<td><strong>Land Area</strong> Wen’ao village</td>
<td>700 persons, north to Wen’ao fishing port</td>
<td>158m to Wen’ao village</td>
</tr>
<tr>
<td></td>
<td><strong>Land Area</strong> Wen’ao Quarry</td>
<td>Land Vegetation system</td>
<td>240m to Wen’ao village</td>
</tr>
</tbody>
</table>
3. Environmental Management Roles and Responsibilities

3.1 Agencies and Institutions Involved in the Environmental Management

The implementation of this EMP requires the involvement of several agencies and institutions, each fulfilling a different but vital role to ensure effective environmental management for the Project.

Essentially there are two groups of institutions involved in the process of environmental management: those responsible for organizing or implementing the EMP, and those that enforce the standards, laws and regulations relevant to the project, supervise the EMP and the overall environmental performance during the construction and operation of the Project. The EMP institutional structure for Project construction is shown in Figure 6.

![Figure 6 Management Structure during Construction](image)

The main environmental responsibilities of the respective institutions are summarized in Table 6.
<table>
<thead>
<tr>
<th>No</th>
<th>Agency/Unit</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fujian Department of Ocean and Fisheries (FDOF)</td>
<td>The FDOF will take the overall responsibility for the management and coordination of project implementation. Its readily-established Project Management Office (FPMO) handles the day-to-day management and coordination of project implementation. It will oversee the implementation of the Project and fulfill the requirements of World Bank.</td>
</tr>
<tr>
<td>2</td>
<td>Ningde City Environmental Protection Bureau</td>
<td>The Ningde City Environmental Protection Bureau reviewed and approved the Project EA. It will be responsible for the enforcement of the laws, regulations, technical guidelines, and environmental quality standards for the Project construction and operation.</td>
</tr>
<tr>
<td>3</td>
<td>Fujian Provincial and local Ocean and Fisheries Department (FOFD)</td>
<td>The FOFD is in charge of marine and fishery development and conservation in Fujian Province. Its responsibilities includes: (i) in collaboration with other agencies to develop and supervise the implementation of marine functional zoning plans, marine development and utilization plans and marine and fishery mater plans. Coordinating other agencies’ marine utilization and development activities. (ii) undertake the ecological conservation for marine environmental and fishery water bodies. In collaboration with other agencies, organizing and develop marine environmental conservation plan, proposing and implementing pollutants discharge and total amount control institutions. Managing the environmental protection against marine engineering and marine waste dumping. Supervising land source pollution discharge into ocean, biodiversity and marine ecological conservation; and (iii) organizing key fishery related EIA and ecological compensation activities.</td>
</tr>
<tr>
<td>4</td>
<td>Project Owner: Xiapu State Owned Assets Investment &amp; Operation Co., Ltd.</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd., which is under the jurisdiction of Xiapu County People's Government, will implement the fishing ports construction, including the procurement, construction management, safeguards implementation and compliance, as well as the monitoring, reporting tasks under the Project.</td>
</tr>
<tr>
<td>5</td>
<td>Environmental Supervision Engineers (ESE)</td>
<td>The ESE are responsible for inspecting, supervising, and auditing all construction works and other activities undertaken by the Contractor(s), and for ensuring compliance with the environmental protection requirements and contractual requirements.</td>
</tr>
<tr>
<td>6</td>
<td>Contractor(s)</td>
<td>Contractor(s) is hired by the Project Owner to undertake the detailed design and the construction activities for the Project.</td>
</tr>
<tr>
<td>7</td>
<td>Independent Environmental Management Consultant (IEMC)</td>
<td>The IEMC is hired by the Project Owner and is independent of the ESE and Contractor. The objectives of the IEC assignment is to assess the implementation and performance of the Project EMP during construction, provide management recommendation to the Project owner, and eventually ensure Project compliance with the EMP.</td>
</tr>
<tr>
<td>8</td>
<td>Environmental Monitoring Station</td>
<td>The EMS refers to specialized monitoring institutes who will conduct environmental quality monitoring according to the environmental monitoring plan included in the EIA reports. The Project Owner will contract EMS to implement the monitoring plan.</td>
</tr>
<tr>
<td>9</td>
<td>Xiapu Ocean &amp; Fishery Bureau</td>
<td>XOFB is responsible for implementation of the habitat offset program.</td>
</tr>
</tbody>
</table>
3.2 Environmental Management Responsibilities during Construction

● Xiapu State Owned Assets Investment & Operation Co., Ltd.

Xiapu State Owned Assets Investment & Operation Co., Ltd. will be the project owner and implementation agency for the Project. It is responsible for FDOF and World Bank for overseeing the Project implementation. Therefore it is responsible to ensure that the project environmental management complies with EMP and relevant legislations. The environmental management responsibilities of Xiapu State Owned Assets Investment & Operation Co., Ltd. include, but not limited to, the following aspects.

1) Ultimately supervise the implementation of mitigation measures and other environmental protection measures during project construction, including incorporation of the measures into bidding documents and contracts, organizing training for the contractors, enforce other environmental management programs and conduct periodically inspection of the construction sites.

2) Engage and supervise environmental monitoring consultant (for example, IEMC and EQMC) to carry out environmental monitoring in accordance with the project environmental monitoring plan.

3) Engage and supervise the IEMC to provide technical support including management advice, training, periodical field inspection, and preparation of reports.

Xiapu State Owned Assets Investment & Operation Co., Ltd. will appoint 1-2 dedicated environmental staff who will be responsible for overall coordination of the EMP implementation. The dedicated environmental staff must have adequate knowledge on environmental management as well as environmental legislation to understand and implement the EMP. Their duties include the following:

1) Ensure the project environmental management is in compliance with EMP and relevant legislation. Take appropriate actions if non-compliance is identified.

2) Maintain open and smooth communication between Xiapu State Owned Assets Investment & Operation Co., Ltd., supervision engineers and contractors with regard to environmental issues.

3) Review and approve site-specific Environmental Protection Implementation Plan for key project activities with potential environmental signification impacts that are prepared by Contractors.

4) Organize regular site inspections of all construction areas with compliance with the EMP.
5) Review and filing reports from Contractors and Environmental Supervision Engineers with regard to environmental management.
6) Monthly reporting to Xiapu State Owned Assets Investment & Operation Co., Ltd. on environmental issues at construction sites.

● **Contractors**

The Contractor and its employees shall firstly at all times try to avoid the negative impacts that may result from the project construction activities and secondly adhere to mitigation measures specified in the EMP and contracts to minimize harm and nuisances on the environment and local communities.

Remedial actions which cannot be effectively carried out during construction stage should be carried out on completion of the works and before issuance of the acceptance of completion of works.

The Contractor shall establish a robust environmental management system that addresses institutional, site-specific measures, monitoring, training and reporting requirements.

Detailed Environmental Specifications for Contractors are included in Chapter 6.

● **Environmental Supervision Engineer (ESE)**

ESE is an integral part of Supervision Engineer’s function. Each Supervision Engineer company will assign at least one ESE to each contract/working group. The responsibilities of the ESE include:

1) Review and ensure the Contractor’s construction organization plan in compliance with the EMP and project engineering with regard to environmental protection and impact mitigation;
2) Review Contractor’s site-specific Environmental Protection Implementation Plan and Environmental Protection Construction Organization Plan for key project activities with potential environmental signification impacts (if any), prior to the project owner’s final review and approval.
3) Carry out day-to-day site inspection and ensure the Contractor's activities in compliance with EMP and other relevant regulations. Instruct the Contractor to take corrective actions within the ESE determined timeframe in case non-compliance or discrepancies identified.
4) Provide assistance to the Xiapu State Owned Assets Investment & Operation Co., Ltd., as necessary, in the implementation of the environmental monitoring and supervision program.

5) Regularly monitor the performance of the Contractor’s environmental management system, including environmental staff, procedure and reporting. Verify and confirm environmental supervision procedures, parameters, monitoring locations, equipment and results. In case any discrepancies identified, the ESE will instruct the Contractor to take corrective actions, including capacity building for or replacement of the Contractor’s environmental staff.

6) Regularly prepare environmental supervision reports and submit to the Xiapu State Owned Assets Investment & Operation Co., Ltd. for review and filing.

7) As integral part of Supervision Engineer, approve invoices or payments with consideration of EMP performance.

● **Independent Environmental Management Consultant (IEMC)**

Xiapu State Owned Assets Investment & Operation Co., Ltd. will engage an IEMC to provide technical support for environmental protection during the construction period. The IEMC is independent of the ESE and Contractors, and will directly report to Xiapu State Owned Assets Investment & Operation Co., Ltd. The IEC shall be led by a person who can independently and professionally examine records, procedures and processes. He/she may require a small team to assist he/she with checking the site (i.e. the IEMC team). The IEMC shall have extensive knowledge and experience in environmental monitoring and auditing to provide independent, objective and professional advice on the environmental performance of the project (at least 5 years experience is required). The IEC shall familiarize himself with the project works through review of the reports, including the project EMP. In particular, the IES is expected to perform the following duties:

1) Review and audit in an independent, objective and professional manner in all aspects of the EMP;
2) Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
3) Carry out random sample check and audit on monitoring data and sampling procedures, etc;
4) Conduct random site inspection;
5) Audit the EIA recommendations and requirement against the status of implementation of environmental protection measures;
6) Review the effectiveness of environmental mitigation measures and project environmental performance;
7) On a need basis, verify and certify the environmental acceptability of the construction methodology, relevant design plans and submissions. Where necessary, the IEC shall seek the least impact alternative in consultation with the designer, the Contractor(s), and Xiapu State Owned Assets Investment & Operation Co., Ltd.;
8) Verify the investigation results of any non-compliance of the environmental
9) Quality performance and the effectiveness of corrective measures;
10) Feedback audit results to Xiapu State Owned Assets Investment & Operation Co., Ltd. and ESE team according to EMP procedures of non-compliance in the EMP, and provide Supervision Engineer (ESE) suggestions on actions of penalty, suspension or other punishment;
11) Provide environmental training to the Contractors, Environmental Supervision Engineers (ESE) and the Xiapu State Owned Assets Investment & Operation Co., Ltd. staff prior to and during construction;
### Box 1 Terms of Reference for IEMC

**Terms of Reference for the Independent Environmental Monitoring Consultant**

The tasks outlined below are intended to assess the implementation and performance of the project EMP during construction, provide management recommendations to the project owner and ensure project compliance with the EMP.

**Task 1 – Review Project Documents**
The IEMC is expected to review the project EIA, EMP, RAP and relevant regulations. A work plan shall be prepared based on the review and submitted to the project owner for approval.

**Task 2 – Provide EMP Training**
Prior to the commencement of construction, the IEMC will prepare training materials based on the EMP and provide training to the Project owner, contractor and supervision engineer. During the Project implementation, the EEC will base on actual needs to carry out such EMP training at least one time a year.

**Task 3 – Field Visit and Supervision**
1) Prior to the commencement of construction, the IEMC will assist the Project owner in checking the contractor's construction plan's environmental protection measures and providing comments as appropriate.
2) During construction, carry out regular field visit to the project site. During the field visit, the IEMC will check the environmental management related documents such as construction environmental protection plan, environmental monthly report; check institution and staffing arrangement, and implementation of mitigation measures. Provide corrective recommendations to the non-compliance practices and promote good practices.
3) Visit and interview affected people and provide management recommendations to the Project owner. And
4) Identify environmental issues that may not be identified during the Project preparation stage, and provide recommendations on alternatives and/or mitigation measures to the Project owner;

**Task 4 – Environmental Monitoring**
The project owner will contract an environmental quality monitoring consultant to carry out monitoring during construction. The IEMC is expected to prepare the terms of reference for the monitoring based on EMP requirements, assist in the
implementation of monitoring, review the monitoring results and report to the project owner.

**Task 5 – Implementation of Ecological Compensation Program**
The project will support the implementation of ecological compensation program consisting of two components: fish breeding and release and habitats rehabilitation. The IEMC is expected to assist the project in working with design institute and local marine authorities to implement the ecological compensation program and carry out monitoring and supervision.

**Task 6 – Reporting**
During the Project implementation, assist in the Project owner to prepare semi-annual environmental monitoring and supervision report and submit to the Xiapu State Owned Assets Investment & Operation Co., Ltd., FDOF and the World Bank.

● **Environmental Monitoring Station (EMS)**

In order to closely monitor the environmental quality in the project area and minimize environmental impacts during construction and operational stage, the Xiapu State Owned Assets Investment & Operation Co., Ltd. will engage specialized environmental monitoring consultants to implement the environmental monitoring plan developed during EA stage. The responsibilities of the EQMC include:
1) Familiar with the project works and the EMP, particularly the environmental monitoring plan.
2) Carry out the environmental monitoring in a timely and professional manner in accordance with the environmental monitoring plan.
3) Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receptors.
4) Submit monitoring results and recommendations to Xiapu State Owned Assets Investment & Operation Co., Ltd. in a timely manner.

● **Xiapu Ocean and Fishery Bureau (XOFB)**

XOFB will be the implementing entity for the ecological compensation program. With dedicated fund provided under the project, XOFB will be responsible for the man-made reef deployment program, including: location selection, baseline survey, reef design and deployment, and monitoring and evaluation.

**3.3 Management of Contractors**
Contractors working on the project will be a key component in environmental management, pollution control and impact mitigation during construction. During the construction period, the contractor, who shall always station in the construction site, shall be mainly responsible for effective controlling and reducing the impact on the environmental. Most of the environmental protection measures shall be implemented by the contractor. In order to ensure the environmental protection measures and Environmental Management Plan to become the duty of the contractor, the following measures shall be taken:

1) During pre-qualification, the environmental management shall be included in the authentication clause when the contractor's qualification is reviewed. Under the same condition, priority shall be given to the bidders who have passed the ISO9000 and ISO14000 authentication;

2) In preparation the bidding document, the project owner shall ensure mitigation measures included in the EMP are fully incorporated, and require the potential bidders to prepare the bids that fully cover the budgetary estimates for EMP implementation. Therefore, the implementation of the environmental protection measures will become the obligation and responsibility of the successful bidder;

3) Every Contractor will be required to provide at least one dedicated full time environmental staff on each section of the Project. In order to be qualified for the job, the environmental staff will receive an environmental training program first;

4) Prior to construction, the Contractor are required to submit site-specific Environmental Protection Implementation Plan and Environmental Protection Construction Organization Plan for key project activities with potential impacts (if any). The Plans shall be demonstrate compliance with domestic environmental regulations, the mitigation measures specified in the EMP. The plans shall provide details such as commitment to environmental protection by the Contractor's project management team; methodology of implementing the project EMP; detailed designs and installation of pollution control facilities (e.g. drainage channel, settling tank, temporary noise barrier, etc); environmental control mechanism; detailed earthworks management plans and site operation plans outlining the measures that are proposed to minimize, mitigate and manage the effects, for the duration of the construction works; and environmental monitoring program during different stages of construction period.

5) Prior to the commencement of construction, the Contractor shall receive adequate training on EMP and relevant regulations. Each section/sub-contractor and a Contractor shall send at least one Project Manager and one environmental engineer to join the training. In addition, the ESE shall also join the training.
4. Environmental Impact and Mitigation Measures

Based on the key findings of EIA, the highlighted environmental impacts and mitigation measures are summarized in the following sections. Table 7, Table 8, and Table 9 list the major activities and stages of the projects, identified potential environmental impacts and typical mitigation measures, as well as implementation and monitoring responsibilities. Table 10 shows site-specific mitigation measures for sensitive receptors.

These mitigation measures are developed to address the identified impacts of design, construction and operation stages, in accordance with relevant national laws, regulations, guidelines and norms, as well as World Bank policies, including the *Environment, Health and Safety General Guidelines* and *specific Guidelines for Ports, Harbors and Terminals*.

Detailed management plan for marine ecological compensation and restoration, dredging and blasting compaction, dredged material disposal, contractor specifications and emergency plan are further elaborated in the Chapter 6-8.
## Table 7 Implementation Plan of Environmental Protection measures during Design Phase

<table>
<thead>
<tr>
<th>Activities</th>
<th>Potential Impact/Problem</th>
<th>Mitigation Measures</th>
<th>Reference to EMP/RAP</th>
<th>Who implement</th>
<th>Who Monitor</th>
<th>Monitoring Indicators</th>
<th>Monitoring Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land acquisition and resettlement</td>
<td>Potential impacts on aquaculture farmers</td>
<td>• Preparation of Resettlement Plan in accordance with national policy and World Bank policy.</td>
<td>Details in RAP</td>
<td>Hehai University</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd. and the World Bank.</td>
<td>RAP approved by World Bank</td>
<td>Prior to appraisal</td>
</tr>
<tr>
<td>Excavation of breakwater foundation trench and port basin, packing sedimentation by throwing stone and blasting and dredged material disposal at confined facilities</td>
<td>Benthic, inter-tidal habitats and fishery resources will be affected</td>
<td>• Ecological compensation (offset) Plans developed, budgeted and included in the EMP; • Offset program for man-made reef prepared.</td>
<td>EMP Chapter 9</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd. and the World Bank.</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd. and Ningde City Ocean and Fisheries Bureau and Ningde City Environmental Protection Bureau</td>
<td>Programs approved by FDOF EIA approved by FPEPD</td>
<td>Prior to appraisal</td>
</tr>
<tr>
<td></td>
<td>Sediments disturbance, dredged material spills to increase water turbidity and impact water quality and ocean ecology</td>
<td>• Prepare Environmental Management Plan, including Dredged Material Management Plan</td>
<td>EMP Chapter 7</td>
<td>EA Consultant</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd. and the World Bank.</td>
<td>EIA approved by World Bank, Ningde City Environmental Protection Bureau</td>
<td>Prior to appraisal</td>
</tr>
<tr>
<td>Emergency accidents of oil spill</td>
<td>Risk of oil spill from vessels during construction will affect coastal and ocean ecology</td>
<td>• Emergency response plan has been thoroughly assessed and developed in the EIA and EMP</td>
<td>EMP Chapter 8</td>
<td>EA Consultant</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd. and the World Bank.</td>
<td>EIA approved by World Bank, Ningde City Environmental Protection Bureau</td>
<td>Prior to appraisal</td>
</tr>
<tr>
<td>Contractor obligations</td>
<td>Inadequate environmental management practice may cause severe environmental impacts</td>
<td>• Contractor specifications developed in the EMP, and are to be incorporated into the bidding documents and construction contracts</td>
<td>EMP Chapter 6</td>
<td>EA Consultant</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd. and the World Bank.</td>
<td>EIA approved by World Bank, Specifications included in bidding documents</td>
<td>Prior to appraisal</td>
</tr>
</tbody>
</table>

- **EMP** indicates Environmental Management Plan.
- **RAP** indicates Resettlement Action Plan.
- **EIA** indicates Environmental Impact Assessment.
<table>
<thead>
<tr>
<th>Activities</th>
<th>Potential Impact/Problem</th>
<th>Mitigation Measures</th>
<th>Reference to EMP/RAP</th>
<th>Who implement</th>
<th>Who Monitor</th>
<th>Monitoring Indicators</th>
<th>Monitoring Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Layout</td>
<td>Potential disturbance to areas on the site and impacts from construction activities on land and sea area environment.</td>
<td>• Locate the construction site away from immediately adjacent property owners. A layout plan for construction activities needs to be developed and approved by the Environmental Supervision Engineer</td>
<td>EMP Chapter 6.2</td>
<td>Contractor</td>
<td>ESE, IEC</td>
<td>Site plan approved by ESE</td>
<td>Prior to construction</td>
</tr>
</tbody>
</table>
| Contractor management           | Sewage, domestic garbage, community disturbance, secure safety                                                                                                                                                        | • Staff facilities, ablutions, chemical toilets, potable water, first aid equipment must be provided for the staff  
• Enforce code of conduct for workers  
• Safe storage of fuel and dangerous materials.  
• Proper treatment of wastewater, collection and disposal of solid waste  
• Maintain continuous community consultation (including Liu’s Tomb, Shrine). Disclosure of project information. Keep complains register in camp office | EMP Chapter 6.3-6.9 | Contractor   | ESE, IEMC  | Facilities provided; Material and waste properly managed;  
Disclosure board installed                                                                 | Daily                |
| Excavation of breakwater foundation trench and port basin | Marine suspended sediment pollution  
Benthonic habitat and fish resources impact                                                                                                                             | • Dredging Management Plan developed in EMP.  
• Contractor will develop detailed construction plan to be approved by Environmental Supervision Engineer  
• On-site monitor the dredged                                                                                                                                         | EMP Chapter 7.2     | Contractor   | ESE, IEMC  | Dredging plan approved;  
On site supervision by ESE;                                                                      | Prior to dredging    | Daily
<table>
<thead>
<tr>
<th>Activities</th>
<th>Potential Impact/Problem</th>
<th>Mitigation Measures</th>
<th>Reference to EMP/RAP</th>
<th>Who implement</th>
<th>Who Monitor</th>
<th>Monitoring Indicators</th>
<th>Monitoring Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packing sedimentation by throwing stone</td>
<td>Marine suspended sediment pollution</td>
<td>- Dredging Management Plan developed in EMP.</td>
<td>EMP Chapter 7.2</td>
<td>Contractor</td>
<td>ESE, IEMC</td>
<td>Dredging plan approved; On site supervision by ESE; Specification followed; Man-made reef plan implemented</td>
<td>Prior to throwing stone</td>
</tr>
<tr>
<td></td>
<td>Benthonic habitat and fish resources impact</td>
<td>- Contractor will develop detailed construction plan to be approved by Environmental Supervision Engineer</td>
<td>EMP Chapter 9</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd.</td>
<td>ESE, IEMC</td>
<td>Man-made reef plan implemented</td>
<td>Routine</td>
</tr>
<tr>
<td></td>
<td>Impulse wave impact on ocean organisms, aquaculture farms</td>
<td>- Follow the Blasting Safety Procedure (GB136722-2011) and Blasting Technical Specification for Waterway Transportation Engineering (JTS204-2008);</td>
<td>EMP Chapter 7.3</td>
<td>Contractor</td>
<td>ESE, IEMC</td>
<td>Blasting plan approved by authorities; Explosive charge recorded;</td>
<td>Prior to blasting</td>
</tr>
<tr>
<td></td>
<td>Noise and vibration</td>
<td>- Packing sedimentation by blasting must be submitted to local ocean and fishery authority for approval before implementation;</td>
<td>EMP Chapter 7.3</td>
<td>Contractor</td>
<td>ESE, IEMC</td>
<td></td>
<td>Routine</td>
</tr>
<tr>
<td>Activities</td>
<td>Potential Impact/Problem</td>
<td>Mitigation Measures</td>
<td>Reference to EMP/RAP</td>
<td>Who implement</td>
<td>Who Monitor</td>
<td>Monitoring Indicators</td>
<td>Monitoring Frequency</td>
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</tr>
</tbody>
</table>
| Blasting safety                |                          | • Inform local Maritime Safety Administration, navigation, set Navigation Stopping Notice, and put up notice to nearby villages 6 hours ahead, check around area and put up notice 30mins ahead, set 250m safeguard distance;  
• Run noisy drilling machine and compressor to compel fish away from the area. Trial blasting with small load to drive away fish;  
• Blasting is arranged avoiding end of spring and early summer (concentrated breeding season for fishery resources) to minimize impact on fish breeding;  
• Establish safety zone, deploy watching ships, ban underwater personnel operation within 1500m radius;  
• After blasting, examine whether there is blind shot;  
• Monitor large-size marine fishes within 2km² area, once they are found, blasting will be canceled. Rescue large ocean fish if found and report to local ocean and fishery authority | EMP Chapter 7.4      | Contractor   | ESE, IEMC  | Notice issued; Fish compelling measures done; Schedule controlled; Safety zone patrolled; Inspection; Visual inspection | Routine               |
| Dredged Material Transportatio n through pipelines | Marine suspended sediment pollution | • Transported to designated backfill area, dumping at will is forbidden;  
• Keep pipes hermetic to avoid the mud water spill                                                                                                                                             |                      |              |            | No spill observed;                            | Routine               |
<table>
<thead>
<tr>
<th>Activities</th>
<th>Potential Impact/Problem</th>
<th>Mitigation Measures</th>
<th>Reference to EMP/RAP</th>
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<th>Who Monitor</th>
<th>Monitoring Indicators</th>
<th>Monitoring Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dredged material backfilling in Phase-1 of Sansha Fishing Port</td>
<td>Loss of intertidal habitat</td>
<td>• Establish cofferdam in backfill area and filter layer;</td>
<td>EMP Chapter 7.6</td>
<td>Contractor</td>
<td>ESE, IEMC</td>
<td>Cofferdam established;</td>
<td>Routine</td>
</tr>
<tr>
<td></td>
<td>Loss of benthonic organisms</td>
<td>• Dredging operation with CSD whose transfer blowing pump blows silt to backfill area by offshore pipelines;</td>
<td></td>
<td></td>
<td></td>
<td>Effluent water turbidity;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loss of aquaculture farms</td>
<td>• Arrange the layout of the reclamation pipeline to ensure adequate settling time before supernatant discharge;</td>
<td></td>
<td></td>
<td></td>
<td>No spill observed;</td>
<td>Yearly</td>
</tr>
<tr>
<td></td>
<td>Sediment discharge may impact the water quality of coastal area</td>
<td>• Control the elevation and side slope of the backfill region strictly to prevent spill;</td>
<td></td>
<td></td>
<td></td>
<td>Man-made Reef implemented</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Implement ecological compensation program of man-made reef</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction ships management</td>
<td>Oil-containing wastewater may leak into water</td>
<td>• Oil-contaminated water will be collected and stored in the slop tank and then be disposed of in on-land treatment facility</td>
<td>EMP Chapter 7.4</td>
<td>Contractor</td>
<td>ESE, IEMC</td>
<td>Waste disposal log;</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Garbage</td>
<td>• Solid waste and garbage are not allowed to dump into water, must be collected and treated in on-land facility.</td>
<td></td>
<td></td>
<td></td>
<td>Rules followed;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noise impacts</td>
<td>• Abide by the regulations of <em>Maritime Traffic Safety Law of the People’s Republic of China</em> and <em>International Regulations for Preventing Collisions at Sea</em> as well as the navigation requirements of the local maritime authorities.</td>
<td></td>
<td></td>
<td></td>
<td>Safety measures taken</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potential risk of disturbance on navigation channel, safety concerns of ship collision</td>
<td>• Prior notice to clear the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td>Potential Impact/Problem</td>
<td>Mitigation Measures</td>
<td>Reference to EMP/RAP</td>
<td>Who implement</td>
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<td>Monitoring Indicators</td>
<td>Monitoring Frequency</td>
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</tr>
</tbody>
</table>
| Physical cultural resources protection | Liu’s Tomb and Shrine found in the vicinity of Dajing Fishing Port and physical cultural resources may be damaged | • When construction possibly affects the Liu’s Tomb and Shine, the Liu’s descendents and villagers of Gangli village should be timely informed then proceed constructing when permitted.  
• In case of chance-find of any suspected physical cultural resources, dredging/disposal operation shall stop. Relevant cultural resources authority be notified. Dredging/disposal resumes only after approved by relevant authority. | EMP Chapter 6.10 | Contractor | ESE, IEMC | Dajing physical cultural relics unaffected  
Record of chance find | Daily |
# Table 9 Implementation Plan of Environmental Protection measures during Operation Phase

<table>
<thead>
<tr>
<th>Activities</th>
<th>Potential Impact/Problem</th>
<th>Mitigation Measures</th>
<th>Reference to EMP/RAP</th>
<th>Who implement</th>
<th>Who Monitor</th>
<th>Monitoring Indicators</th>
<th>Monitoring Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Rehabilitation</td>
<td>Camp and operation site may be left with garbage, unleveled or not rehabilitated which is subject to erosion</td>
<td>• Remove all rubble, rubbish, litter, unused building equipment, contaminated soils or any other relevant articles from the site following the end of the construction phase</td>
<td>EMP Chapter 7.2</td>
<td>Contractor</td>
<td>ESE, IEC, Xiapu State Owned Assets Investment &amp; Operation Co., Ltd.</td>
<td>Site cleaned and rehabilitated</td>
<td>Upon project completion</td>
</tr>
<tr>
<td></td>
<td>Visual and landscape nuisance</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
| Waste from ships              | Oil containing wastewater, solid waste from ships, if discharged into water, will cause adverse impact on marine ecology and water quality | • Enforcement of national and international regulations e.g. *Management Regulations on Preventing Vessels from Polluting Marine Environment, Fujian Marine Environmental Protection Regulations* and other relevant laws and regulations.  
• Wastewater and solid waste are forbidden to be discharged into the coastal sea area, and must be unloaded to the waste treatment facilities in the port for treatment. | EMP Chapter 8         | Ship owners                 | Xiapu State Owned Assets Investment & Operation Co., Ltd. | Visual inspection; Waste disposal record | Daily                |
| Navigation of Fishing ships   | Possible impact on entering ports for fishing ships; Oil spill may potentially affect the Fuying Island Marine Reserve | • Safety operation procedures are well established  
• Emergency response plan is in place.  
• Improve vessel traffic control system for sea area of Ningde City as well as the monitoring capacity of law enforcement team. | EMP Chapter 8         | Ningde City Maritime Affairs Bureau, Xiapu State Owned Assets Investment & Operation Co., Ltd. | Port authorities, Ningde City Ocean and Fisheries Bureau | Accidents records       | Monthly              |
<table>
<thead>
<tr>
<th>Ecological compensation and habitat offset</th>
<th>EMP Chapter 9</th>
<th>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd.</th>
<th>Ningde City Ocean and Fisheries Bureau and Ningde City Environmental Protection Bureau</th>
<th>Man-made Reef implemented with tracking monitoring on ecology</th>
<th>Yearly</th>
</tr>
</thead>
</table>

- Man-made reef construction to be implemented during 2014-2015, a TOR is developed in EMP to scientifically design the program.

<table>
<thead>
<tr>
<th>Cumulative impacts</th>
<th>EMP Chapter 10</th>
<th>FDOF</th>
<th>FDOF, FPEPD</th>
<th>Yearly</th>
</tr>
</thead>
</table>

- Ecological impacts such as loss of benthic organisms and inter-tidal zone; Water quality degradation; impacts on aquaculture, etc.
- Function Zoning has been developed following Integrated Coastal Management (ICM) approach;
- Habitat improvement programs under ICM framework (man-made reef program);
- *Fujian Provincial Marine Environmental Protection Planning*
  - The 12th FYP Planning for fish breeding and release in Fujian Province
- Sewage Treatment Factory construction under the *General Planning for Sansha Town*;
- Dialogue mechanism among stakeholders to monitor the development and ecological status of sea area

- Area of habitat improved;
- Meetings organized

- Yearly
<table>
<thead>
<tr>
<th>Fishing Port</th>
<th>Receptor</th>
<th>Environmental and Social Impacts</th>
<th>Main Mitigation Measures</th>
<th>Current Field Photos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sansha</td>
<td>Sansha Town People</td>
<td>Population: 42,000 persons</td>
<td>Access road from stock yard to construction site borders with residential area, the dust, exhaust and noise from transportation vehicles have certain impact on people's living.</td>
<td>1. Strengthen construction management, arrange transportation as little as possible in noon break or at night; 2. Spray water frequently on construction roads and increase the water content in dust, use closed compartment to transport sand to avoid diffusing along the way; 3. Equip with road sweeping team and facility.</td>
</tr>
<tr>
<td></td>
<td>Sansha Quarry</td>
<td>Land area vegetation system</td>
<td>1. Mountain blasting in stock yard causes damage on land area vegetation system; 2. Cuts and fills and material acquisition cause water &amp; soil erosion to certain extent.</td>
<td>1. Perform relevant procedures of land use; 2. Strictly follow the measures of ecological protection and restoration in the Soil &amp; Water Conservation Report; 3. Implement environmental supervision; 4. Strengthen vegetation planning, design, construction and management.</td>
</tr>
<tr>
<td>Luxia</td>
<td>Kelp Culture</td>
<td>15.5 hectare of kelp culture ground in the port</td>
<td>For vessels’ safety reason, the kelp culture will be replaced</td>
<td>Resettled and compensated for the kelp culture reasonably pursuant to laws</td>
</tr>
<tr>
<td></td>
<td>South shore pond culture</td>
<td>Shrimp and crab culture, pond area 0.3 hectare</td>
<td>Suspended solids diffusion during construction period will have negative impacts on seawater quality in culture area</td>
<td>Water inflow shall avoid construction time and implement 12 hours after dredging.</td>
</tr>
<tr>
<td>Shrimp pond water intake</td>
<td>Water intake is located in the middle of Luxia Sand Beach, drawing seawater 10m to 15m under the sand beach and providing service to the 14 hectares of backside shrimp pond area</td>
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</tr>
<tr>
<td>North shore pond culture</td>
<td>Located in the reclamation area of north bank, will be permanently moved out with the progress of construction. Resettled and compensated for the kelp culture pursuant to laws</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North shore pond culture</td>
<td>Located in the reclamation area of north bank, will be permanently moved out with the progress of construction. Resettled and compensated for the kelp culture pursuant to laws</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luxia Sand Beach</td>
<td>The construction of Luxia Fishing Port won't jeopardize the overall landscape and environment of Luxia Beach. 1. The Luxia sand beach occupation is not allowed; 2. Strictly control construction, protect the environment of sand beach and minimize the temporary occupied area, the access road passing directly and construction or living rubbish thrown at will in the sand beach are forbidden.</td>
<td></td>
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</tr>
<tr>
<td>Location</td>
<td>Aspect</td>
<td>Description</td>
<td>Measures</td>
<td></td>
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<td>--------------------</td>
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<td></td>
</tr>
<tr>
<td>Luxia Village</td>
<td>Village details</td>
<td>Totally 4,700 persons in the village; located in the north side of Luxia Fishing Port. Materials transportation, loading &amp; unloading, land reclamation, site excavation and leveling, packing sedimentation by blasting, oil-driven facilities during construction period easily has certain impact on sound and air environment of villages.</td>
<td>1. Use high-efficient and low-noisy machines and transportation vehicles and strengthen the maintenance of facilities; 2. Strengthen construction management, to avoid the interrupting residents; 3. Announce Luxia Villagers' Committee and surrounding villagers before construction and issue the <em>No Navigation Notice</em>, inform the surrounding agencies 6 hours ahead, clear site and announce 30 minutes ahead, as well designate the 250m safety distance; 4. Equip with road sweeping team and facility; 4. Establish service-rack at the entrance and exit for transportation in construction site.</td>
<td></td>
</tr>
<tr>
<td>Land area vegetation</td>
<td>Southern region land area vegetation system</td>
<td>1. Mountain blasting in stock yard causes damage on land area vegetation system; 2. Cuts and fills and material acquisition cause water &amp; soil erosion to certain extent.</td>
<td>1. Perform relevant procedures of land use; 2. Strictly follow the measures of ecological protection and restoration in the <em>Soil &amp; Water Conservation Report</em>; 3. Implement the environmental supervision; 4. Strengthen vegetation planning, design, construction and management.</td>
<td></td>
</tr>
<tr>
<td>Fenghuo Nori culture</td>
<td>Aquaculture area 0.3 hectare</td>
<td>Located in sheltered port, considering the safe navigation, the kelp.</td>
<td>Resettled and compensated for the kelp culture pursuant to laws.</td>
<td></td>
</tr>
<tr>
<td>Cage culture</td>
<td>15 cages for small yellow croaker culture</td>
<td>culture shall be relocated outside the port basin</td>
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<td></td>
</tr>
<tr>
<td>Fenghuo Quarry</td>
<td>Land area vegetation system of Fenghuo Island</td>
<td>1. Mountain blasting in stock yard causes damage on land area vegetation system; 2. Cuts and fills and material acquisition cause water &amp; soil erosion.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pond culture</td>
<td>Culture species are shrimp and crab; pond area is 0.08 hectare</td>
<td>Suspended solids diffusion during construction period will have negative impacts on seawater quality in culture area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beishuang Beishuang village</td>
<td>Totally 2,500 persons in Beishuang Village; per capita agricultural area is only 0.04 mu.</td>
<td>Access road from stock yard to construction site borders with residential area, the dust, exhaust and noise from transportation vehicles have certain impact on people's living.</td>
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<tr>
<td></td>
<td></td>
<td>1. Strengthen construction management, arrange transportation as little as possible in noon break or at night; 2. Spray water frequently on construction roads and increase the water content in dust, use closed compartment to transport sand to avoid diffusing along the way.</td>
<td></td>
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<tr>
<td>Location</td>
<td>Description</td>
<td>Impact</td>
<td>Measures</td>
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<td>-------------------</td>
<td>------------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>Beishuang Quarry</td>
<td>Land area vegetation system of Beishuang Quarry</td>
<td>1. Mountain blasting in stock yard causes damage on land area vegetation system; 2. Cuts and fills and material acquisition cause water &amp; soil erosion to certain extent.</td>
<td>1. Perform relevant procedures of land use; 2. Strictly follow the measures of ecological protection and restoration in the <em>Soil &amp; Water Conservation Report</em>; 3. Implement the environmental supervision; 4. Strengthen vegetation planning, design, construction and management.</td>
<td></td>
</tr>
<tr>
<td>Dajing Sand Beach</td>
<td>About 2.3 km long, 120 m wide.</td>
<td>1. Breakwater construction will occupy part of sand beach; 2. Construction will have certain impact on nearby landscape.</td>
<td>1. Perform procedures of sand beach requisition pursuant to laws and occupy after approved by relevant administrations; 2. Strictly control construction, protect the environment of sand beach and minimize the temporary occupied area, the access road passing directly and construction or living rubbish thrown at will in the sand beach are forbidden.</td>
<td></td>
</tr>
<tr>
<td>Liu's Tomb</td>
<td>Liu’s Tomb, built from 1940, located 45m east to the Dajing seawall end, the shortest distance is 33m. In every Tomb-sweeping Day, the descendants come to sweep tomb and worship</td>
<td>1. Since it is near to the construction site of breakwater, the construction will have certain impact on the Tomb; 2. When workers and fishermen enter or exit port, it may disturb Liu’s Tomb.</td>
<td>1. Avoid and protect, excavation in tomb-located slope isn't allowed; 2. Set up warning signals of no passing around physical sources; 3. Carry out training on physical cultural resources to workers and fishermen, include the “Respect local traditional culture and activities, custom” into the code of conduct; 4. Set aside passage wide enough to facilitate the Liu’s descendents to worship; 5. The construction shall not affect the worship, when affects possibly, the construction can proceed after permitted by the Liu’s descendents.</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Description</td>
<td>Impact and Proposed Solutions</td>
<td></td>
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<tr>
<td>Shrine</td>
<td>White Dragon Temple, built in 1950 as the place for villagers in Gangli village to worship, located on the top of small hill in the north shore of outlet.</td>
<td>1. Since it is near to the construction site of breakwater, the construction will have certain impact on the foundation of shrine-located slope and the vegetation; 2. When workers and fishermen enter or exit port, it may disturb the Shrine. 3. Avoid and protect, excavation in shrine-located slope isn't allowed; 4. The sacrificial altar rises as the seawall construction, which shall be implemented following the fishermen's will; 5. Set up warning signals of no passing around physical sources; 6. Carry out training on physical cultural resources to workers and fishermen, include the “Respect local traditional culture and activities, custom” into the code of conduct; 7. Set aside passage wide enough to facilitate the fishermen to worship; 8. The construction shall not affect the worship, when affects possibly, the construction can proceed after permitted by the fishermen.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gangli village</td>
<td>300 persons Access road from stock yard to construction site borders with residential area, the dust, exhaust and noise from transportation vehicles have certain impact on people's living.</td>
<td>1. Strengthen construction management, arrange transportation as little as possible in noon break or at night; 2. Spray water frequently on construction roads and increase the water content, use closed compartment to transport sand to avoid diffusing along the way;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wen'aopoliipes mitella</td>
<td>Distributed in the cliffs of Fuying Island.</td>
<td>The breakwater construction will directly reduce the habitat of Pollicipes mitella, which causes its number in this region to decrease. 1. The ecological compensation measures shall be implemented pursuant to laws; 2. The construction period shall avoid the concentrated breeding season.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wen‘ao village</td>
<td>Located on north side of Wen‘ao fishing port with totally 700 persons</td>
<td>Access road from stock yard to construction site borders with residential area, the dust, exhaust and noise from transportation vehicles have certain impact on people’s living.</td>
<td>1. Strengthen construction management, arrange transportation as little as possible in noon break or at night; 2. Spraying water frequently on construction roads and increasing the water content, use closed compartment to transport sand to avoid diffusing along the way;</td>
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<td></td>
</tr>
<tr>
<td>Wen‘ao Quarry</td>
<td>Land area vegetation system</td>
<td>1. Mountain blasting in stock yard cause damage on land area vegetation system; 2. Cuts and fills and material acquisition cause water &amp; soil erosion to certain extent.</td>
<td>1. Perform relevant procedures of land use; 2. Strictly follow the measures of ecological protection and restoration in the <em>Soil &amp; Water Conservation Report</em>; 3. Implement the environmental supervision; 4. Strengthen vegetation planning, design, construction and management.</td>
<td></td>
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</tbody>
</table>
5. Supervision and Monitoring Plan

5.1 Supervision for Environmental Management

The Supervision Engineer Company is responsible for inspecting, supervising and auditing all construction activities to ensure that mitigation measures adopted in the EMP are properly implemented, and that the negative environmental impacts of the project are minimized. The Supervision Engineer Company is required to designate Environment Supervision Engineer (ESE) who will be responsible for daily on-site supervision of environmental mitigation measures implementation by contractors.

The key supervision contents of ESE include:

5.1.1 Phase I: Preparation

Phase I is to lay the groundwork for the successful execution of the project. In this phase, the ESE will:

- Review the Environmental Impact Assessment (EIA), the Environmental Management Plan (EMP), project designs and technical specifications and confirm that there have been no major omissions of mitigation measures;
- Prepare guidelines for contractors for implementation of the EMP; and
- Develop and execute a training program for all parties involved in construction activities.

The main tasks in the phase I preparation is highlighted as follows:

- Review of Project Documents: The ESE will review the EIA, EMP, project designs and technical specifications and confirm in writing that there have been no major omissions of mitigation measures. If any issues are identified, the ESE shall propose to the Project Management Office (PMO) updates to the EMP and the design and technical specifications to address these issues. Once approved by PMO, the ESE will update the EMP.
- The ESE will review and approve the EMP Implementation Plan presented by the contractors.
- Environmental Supervision Checklist: The ESE will establish a comprehensive checklist which will be used during the construction of the project to monitor the contractor's performance. This will cover major aspects of the project, required mitigation/control measures and their implementation schedule.
• Log-Book: The ESE will keep a log-book of each and every circumstance or change of circumstances which may affect the EIA or which may result in non-compliance with the recommendations made by the ESE to remediate the non-compliance.

• Environmental Training: The ESE shall design and execute a comprehensive training program for all involved parties including Supervision Engineers, PMO staff, contractor’s Safety and Environment Officer (SEO), contractor’s workers, etc., on the environmental requirements of the project, and how they will be supervised, monitored and audited, giving particular attention to:

• EMP: The requirements of the EMP, the agreed environmental monitoring checklists, the environmental monitoring forms, how non-compliance with the EMP will be handled, and all other key issues shall be covered. Particular attention will be paid to the specific provisions in each contract’s technical specifications indicating how the EMP is to be complied with.

• Health and Safety: The health and safety requirements of the project shall be clearly identified and communicated with the contractors and the PMO.

• At the conclusion of the training, contractors will also sign a statement acknowledging their awareness of the environmental regulations, the EMP, the compliance framework, and health and safety obligations. The CST shall sign a similar statement confirming their understanding of the supervision responsibilities. This shall be provided to the PMO and the World Bank.

5.1.2 Phase II: Supervision of Construction Activities

• Review and inspect, in an independent, objective and professional manner, all aspects of the implementation of the EMP;

• Carry out random monitoring checks and review on records prepared by the contractor’s SEO;

• Conduct regular site inspections;

• Review the status of implementation of environmental protection measures against the EMP and contract documents. Major non-compliance by the contractor will be cause for suspension of works and other penalties until the non-compliance has been resolved to the satisfaction of the ESE.

• Verify contractor’s compliance with regulations governing the environment, public health and safety.

• Review the effectiveness of environmental mitigation measures and project environmental performance;

• Review the environmental acceptability of the construction methodology (both temporary and permanent works), relevant design plans and submissions. Where necessary, the ESE shall seek and recommend the least environmental impact alternative in consultation with the designer, the contractor(s), and the PMO;
- Verify the investigation results of any non-compliance of the environmental quality performance and the effectiveness of corrective measures;
- Provide regular feedback audit results to the PMO and CST according to the procedures for non-compliance in the EMP;
- Provide training programs at minimum six monthly intervals and every time there are new workers or new contractors coming into the site. The training shall include EMP requirements, prohibitions, compliance, and environmental awareness.
- Regularly monitor the performance of the ET, verifying monitoring methodologies and results. In case where the ESE considers that the SEO or any member of his team fails to discharge duties or fails to comply with the contractual requirements, instruct the contractor(s) to replace the SEO or the member of the team;
- Instruct the contractor(s) to take remedial actions within a specified timeframe, and carry out additional monitoring, if required, according to the contractual requirements and procedures in the event of non-compliances or complaints;
- Instruct the contractor(s) to take actions to reduce impacts and follow the required EMP procedures in case of non-compliance/discrepancies identified;
- Instruct the contractor(s) to stop activities which generate adverse impacts and/or when the contractor(s) fails to implement the EMP requirements/remedial;
- The ESE shall ensure compliance with the requirements of the health and safety clauses in the contract documents.
- The ESE shall closely audit the construction activities through regular site inspections accomplished through daily site visits, walks and visual inspections to identify areas of potential environmental problems and concerns. The area of inspection shall cover both the construction areas and the environment outside the site area that could be affected, directly or indirectly, by the contractor’s activities.
- The ESE shall have their own hand-held and portable monitoring equipment such as cameras, transport and other resources. Where additional monitoring is necessary to resolve contentious issues or to impose penalties, the ESE may contract third parties to carry out specific monitoring at the locations under review.
- Where there is infringement of technical specifications, or condition of contracts, or non compliance with the EMP, the ESE shall be immediately inform the contractor’s Safety and Environment Officer (SEO). The ESE shall also report all infringements to the PMO as part of the monthly reporting.
- Regular joint environmental site inspections (e.g. weekly) shall be organized by the ESE with participation of the contractor’s SEO. These shall be used as an opportunity for the ESE to further train contractors’ staff.
- ESE field engineer’s log-book shall be kept readily available for inspection by all persons assisting in project management.
• The ESE shall also regularly review the records of the contractors to ensure that they are up to date, factual and meet the EMP reporting requirements (e.g. environmental complaint register).

• Complaints will be received by the contractor’s site office. The ESE shall be provided a copy of these complaints and ESE shall confirm that they are properly addressed by the contractor in the same manner as incidents identified during site inspections.

• The ESE shall work closely with the contractors and the PMO in the event that an incident arises which was not foreseen in the EMP or EIA and confirm satisfactory resolution to the incident. The ESE shall then update the EMP and the implementation guidelines, training the contractors’ staff accordingly.

• The ESE shall confirm the monthly payments for environmentally related activities as recommended by the ESE to the client.

At a minimum the ESE shall prepare the following written reports:

• Weekly report of non-compliance issues;
• Summary monthly report covering key issues and findings from reviewing and supervision activities; and
• Consolidated summary report from contractor’s monthly report

The ESE shall also collect and report on data as requested by the PMO.

• At the end of the project the ESE shall prepare a final report summarizing the key findings from their work, the number of infringements, resolutions, etc. as well as advice and guidance for how such assignments should be conducted in the future.

• During the course of the project the ESE shall provide briefings as requested to the PMO, environmental agencies, the World Bank and others as requested by the PMO on the project progress, incidents, and other issues associated with environmental management and supervision. At a minimum these are expected to be at six-month intervals.

5.2 Environmental Monitoring Plan

The Independent Environmental Consultant (IEC) will check, review, verify and validate the overall environmental performance of the project through regular inspections and review. This review will provide confirmation that the reported results are valid and that the relevant mitigation measures and monitoring program provided in the EMP are fully complied with. IEMC will review and audit in an independent, objective and professional manner in all aspects of the EMP through regular and random inspection to:

• Audit the EMP measures against the status of implementation of environmental protection measures;
• Review the effectiveness of environmental mitigation measures and project environmental performance;
• On a need basis, verify and certify the environmental acceptability of the construction methodology (both temporary and permanent works), relevant design plans and submissions;
• Verify the investigation results of any non-compliance of the environment;
• Feedback audit results to Xiapu State Owned Assets Investment & Operation Co., Ltd. and ESE team according to EMP procedures of non-compliance in the EMP, and provide Supervision Engineer (ESE) suggests on actions of penalty, suspension or other punishment;
• Prepare semi-annual report to the Xiapu State Owned Assets Investment & Operation Co., Ltd., FDOF and the World Bank.

The environmental monitoring during project implementation stage will be carried out by Environmental Quality Monitoring Consultant (EQMC) appointed by the Project Proponent. The EMS will collect periodically environmental samplings (including water, air, noise, etc.) at selected locations. Such monitoring results, audits and sampling results will be submitted to the Proponent and they will serve as indicators of compliance of the project with environment regulations

Monitoring plans in this EMP context shall focus on the following key perspectives:
• The project proponent commits to undertaking numerous monitoring programs in relation to the Project;
• Monitoring programs will be implemented for aspects of the Project which have been predicted to have an effect on the environmental and social resources in the Project area, including air quality, noise, water quality, sediment quality, quality and quantity for aquatic resources, and socio-economic resources;
• Proponent periodically completes a trend analysis of the monitoring data on a program by program basis to evaluate the success of the various monitoring programs. This analysis will be used to determine if any changes or adjustments to the monitoring programs are required; and
• Work with Environment authorities to design updated monitoring programs as necessary.

Based on the EIA results, it is concluded that, under normal circumstances, during the implementation of the Project has little effect on the surrounding environment. In general, these effects can be decreased by environmental protection and ecological mitigation measures.
In order to examine the effectiveness of the mitigation measures, monitoring procedures need to be undertaken to confirm mitigation effectiveness over a reasonable timeframe. Monitoring must compare environmental parameters to the base line data and prescribed criteria objectives in the EIA Chapter Section 1.4 Laws regulations or standards.

5.2.1 Introduction to Monitoring Procedures

The monitoring program and monitoring frequency shall be designed to quantify the overall environmental performance of the project works as well as any short-term impact due to intense construction activities. More specifically, as an integral and critical part of the EMP, the environmental monitoring program shall include the following objectives:

- Confirm the impacts forecasted by environmental impact assessment processes, EMP development and monitoring processed;
- Determine the actual extent and magnitude of the impacts;
- Evaluate the effectiveness of the mitigation measures; and
- Identify and justify any additional mitigation measures against unexpected impact as may be necessary during project implementation; and
- Keep tracking and update the monitoring methods and objectives of the environmental quality relating to the project according any updated regulatory criteria.

During the peak construction period or at the request of the client, the EMS will also carry out additional measurements to monitor short-term impact. If non-compliance with environmental quality performance criteria is identified, additional monitoring may be carried out.

5.2.2 Monitoring Parameters

The monitoring program shall include the following:
- Seawater quality in the vicinity of site during construction period;
- Ecological environment quality of sea area during operation period.
### Table 1 Monitoring Plan during Construction Stage

<table>
<thead>
<tr>
<th>Monitoring Factors</th>
<th>Monitoring Place (Stretches)</th>
<th>Indicator</th>
<th>Monitoring Frequency</th>
<th>Who to implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Quality</td>
<td>1 monitoring point will be set at 100m, 200m, 300m respectively in flooding and ebbing direction to each dredged point, 1 monitoring point shall be set at 50m and 100m respectively in flooding and ebbing direction to the overflow port of hydraulic filling area.</td>
<td>SS, Petroleum, Total Chromium and Zinc</td>
<td>Once every month during dredging, separately for flooding and ebbing tide of big and small tide.</td>
<td>Independent Environmental Monitoring Consultant</td>
</tr>
<tr>
<td>Fishery Resources</td>
<td>Monitored in the place around 2000m outside the edge of Rock-blasting area</td>
<td>Maritime Large-size fishes</td>
<td>When blast rock for the first time, the maritime creature death shall be observed, if many creatures die due to blasting, the explosive for single stretch shall be reduced.</td>
<td>ESE</td>
</tr>
<tr>
<td>Water environment, sediment</td>
<td>The monitoring points set by Environmental Protection Bureau and Ocean administrations</td>
<td>Water quality, sediment, phytoplankton, zooplankton, benthos, fish eggs and larvae and juveniles and nekton etc.</td>
<td>Twice every year, separately in Spring and autumn</td>
<td>Independent Environmental Monitoring Consultant</td>
</tr>
<tr>
<td>and ecology</td>
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### Table 2 Monitoring Plan during Operational Stage

<table>
<thead>
<tr>
<th>Monitoring Factors</th>
<th>Monitoring Place (Stretches)</th>
<th>Indicator</th>
<th>Monitoring Frequency</th>
<th>Who to implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water environment, sediment</td>
<td>The monitoring points set by Environmental Protection Bureau and Ocean administrations</td>
<td>Water quality, sediment, phytoplankton, zooplankton, Shallow marine benthos, fish eggs and larvae and juveniles and nekton etc.</td>
<td>Twice every year, in Spring and autumn separately</td>
<td>Routine monitoring by marine authorities</td>
</tr>
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6. Contractor Environmental Specifications

Contractor Environmental Specifications provide guidelines, processes and procedures that can ensure that the ecosystem environment is not detrimentally affected by the contractor’s activities during project implementation. The Contractor is required to adhere to the guidelines established in this document. The general environmental issues associated with the contractor activities include the following:

- Site management
- Fuel and material storage and handling
- Dust and noise nuisance control
- Sewage management
- Waste management

Environmental issues related to specific project activities, i.e. dredging/packing sedimentation by blasting and throwing stone, dredged material disposal, ecological rehabilitation program, emergency response plan etc, are further detailed in the following chapters.

6.1 Contractor’s Environmental Protection Plan

The Contractor must be provided with a copy of the EMP and the EMP must form part of tender documents. Before commencement of construction, contractors are required to submit a site-specific Environmental Protection Plan (EPP) for their work which will be reviewed and approved by Environmental Supervision Engineers (ESE) and Xiapu State Owned Assets Investment & Operation Co., Ltd. The EPP shall include the plans for the generic environmental mitigation measures (as well as specific mitigation measures for dredging, blasting, disposal, emergency response etc.), including, but not be limited to, the following items:

- A site plan showing work areas, fuel containment areas and refueling locations, laydown areas, parking areas, equipment maintenance area, material storage area and camp area.
- A detailed drainage handling plan including ditching requirements, site runoff, location of detention pond(s) and check dams as well as the location of all water exit points and water quality monitoring locations;
- Sediment and erosion control installations including silt fence and containment berm locations;
- Waste management plan;
- Dust control plan;
- Noise control plan, and
6.2  Site Establishment

Locate the camp away from immediately adjacent property owners. A layout plan for construction activities needs to be developed and approved by the Environmental Supervision Engineer.

6.2.1 Labor employment

- If appropriate, the employment of labors should give priority to local labors.
- The contractors should publicize appropriate work positions to the villages and towns along fishing ports.
- The workers and the staff members should have legal contracts for employment.
- The contractors should provide the workers with the educational training of environmental protection and occupational health and safety.

6.2.2 Requirements for Camping Site

- The contractors should provide appropriate and safe quarters for the workers.
- Independent and sufficient toilet facilities (toilet and shower) should be provided on the camping site for male and female workers respectively. Sufficient water supply, soap and toilet paper should be provided in the toilet. All these facilities should be accessible and clean.
- The kitchen on the camping site should have clean water and should be in hygienic condition.
- The toilet should be indicated with "Male" or "Female" obviously.
- The domestic sewage of the camping site should be treated in the septic tank at least and should not be directly discharged into any waters.
- The camping site should provide medical and emergency facilities. First-aid kit should be provided at any camping site and managed by specially assigned persons who should have full first aid training and qualification and could send the injured or the diseased to local hospital in time. The above medical and health supplies should be replenished in time.

6.3  Code of Conduct

The Code of Conduct will be established for the workers with emphasis on appropriate behavior, refusing drug abuse and alcohol and conforming to the relevant laws and
regulations so as to reduce the influence on the society. Each worker should be informed of the Code of Conduct. The Code of Conduct for workers should be also known to the local community. Failing to obey the code of conduct, disciplinary punishment should be enforced. The "Code of Conduct" includes but not limits to the following measures:

- All the staff members should obey the national laws and regulations;
- Hazard materials and dangerous weapons are prohibited;
- Pornographic materials and gambling activities are prohibited;
- No fighting is allowed;
- No interference to the production and life of the neighborhood as well as the local people;
- No disrespect to native traditional culture, custom and traditional activities;
- Smoking is only allowed in appointed area;
- Appropriate clothes and personal hygiene standard;
- Appropriate sanitary condition for the dormitory;
- The workers should obey the relevant code of conduct when visiting the neighborhood as well as the local people.

### Prohibition

The following activities are prohibited on the construction site or nearby:

- Injury to the wild animals and the cultivated marine products in the sea areas nearby;
- Capture of protection animals or collection of protection plants;
- Purchasing protection animals as food;
- Interference and destruction of objects with architecture and history values;
- Interference and destruction of Liu's Tomb and Shrine in Dajing village;
- Bonfire;
- Drinking in working hours;
- Mechanical maintenance (replacement of engine oil and lubricant) outside the specified area;
- Dumping outside the specified area;
- Driving in danger on local road;
- Working without safety clothes (e.g. safety boots and crash helmet);
- Causing interference to the people nearby;
- Leakage of pollutants, e.g. oils;
- Fishing with explosion or other chemical methods;
- Burning refuse.

Any constructor, office worker or other staff member, if found breaking these regulations, should be punished by the discipline, by means from oral criticism to dissolution of labor contract as the severity.

### 6.4 Health and Safety
• The contractors should ensure the projects conforming to all the national and local safety regulations as well as the other measures about damage avoidance.
• Before the construction, the contractors should provide safety training for the workers.
• Sufficient daylight and night illumination should be provided;
• Adequate fencing needs to be provided around the site. This needs to be checked and maintained during the construction phase;
• No other people is allowed to enter camp site without approval by management staff of the contractor;
• The camping site should be provided and equipped with fire-protection equipment and fire extinguisher;
• The contractors should provide the workers with enough personal safety protecting devices, e.g. protective glasses, gloves, protective mask, dust cover, safety helmet, ear protectors, steel helmet and so on, and ensure them to be used on the construction site.
• The safety rules, the emergency pre-plan and the emergency contact information should be indicated on the bulletin board at the construction site.
• All the places with potential damage should be marked for warning.
• High risk regions, e.g. the areas at the channel for reef explosion, the areas with blind shot, should be marked with temporary caution lights to prohibit vessels.
• The explosives should be managed following the stipulations of the state strictly.
• Safety protection distance should be determined according to the relevant regulations.
• The contractors should take all reasonable measures to prevent the risk rising and ensure the construction site and all the camping sites provided with fire-protection equipments.
• The contractors should keep in contact with the meteorological department to understand disadvantageous weather conditions and start up the typhoon-protection and tide-control emergency pre-plan in time.
• Any engineering requiring open flame could only be performed at the places approved by and in supervision of the environmental supervision engineers. And meanwhile, the fire-protection equipments should also be in place.
• The contractors should carry out annual physical examination for all the workers.
• The contractors should also carry out the training of personal basic hygiene and epidemic prevention, including respiratory disease and infectious disease.
• The contractors should carry out the educational activities about disease prevention and cure, esp. the protection against AIDS and venereal disease, including the propaganda on the construction site and in the neighborhood in the form of notification and training class.
• The contractors should provide the workers with basic first-aid service and emergency.
• The contractors should establish necessary warn and speed bump etc. in the access road near local communities if any to ensure the traffic safety nearby.

6.5 **Storage of Fuel, Cement, Dangerous and Toxic Materials**

• All fuels that are stored on site shall be bunded to 110% of the capacity of the bulk fuel storage container. The fuel storage area must not be located near (i.e. less than 100m) any water resource.
• Hazardous materials should also be stored in specifically designed storage facilities. Provision needs to be made for the temporary storage of hazardous materials such as fuels, oils and paints. These could be stored in a ventilated, bunded area that can contain 150% of the volume of the largest container.
• Access to this storage area should be limited only to relevant staff.
• The site must be protected from vehicle damage and must be regularly inspected for leaks, damage or pollution.
• Machine and equipment repairs must only take place within the confines of the contractor’s camp. An appropriate work surface (i.e. bunded concrete floor) must be provided that can collect oils, fuels and the like and these must be collected into an appropriate bin. Where there have been oil/fuel leakages, contaminated soil must be removed and disposed of at an appropriately permitted site.
• Precautionary measures must at all times be taken to prevent the pollution or contamination of the soil and water by grease, oil, fuels, solvents, chemicals, etc.
• The Emergency Spill Response Plan will be posted on-site, and all personnel made aware of its content and location of response materials;
• Oil spill response materials and equipment such as sorbent pads, booms and leak proof containers, will be kept on-site in sufficient quantities and in an easily accessible location;
• Equipment operators and personnel responsible for spill response will review the spill response plan regularly to ensure that it is up to date, and all required materials are on site and easily accessible.

6.6 **Waste Management**

• During the construction phase the Contractor must make provision for the appropriate removal of waste from the site to a permitted waste disposal facility. The accumulation of construction waste materials must be avoided as far as possible.
• All domestic waste generated by the contractor’s activities at the contractor’s camp must be stored in either refuse bins (i.e. steel or plastic 210L drums) or in a waste skip. The Contractor must ensure that these containers are emptied on a weekly basis, or as and when required.
• All litter shall immediately be deposited into refuse bins or the waste skip. No litter must be left in the work areas or contractor’s camp.
• Construction waste must be stockpiled in the contractor’s camp and the Contractor must dispose of this waste properly. Contaminated construction waste must be dealt with separately.
• Soils that have been contaminated by diesel, petrol, oil or any other substance that may inhibit the growth of plants must be removed to a registered waste disposal site for hazardous waste. Only appropriate fill shall be used to replace the lost material.
• The burning of waste on site shall be prohibited.

6.7 Wastewater and Storm Water Management

• Wastewater from construction site and camp are not allowed to be directly discharged into sea water;
• Domestic sewage must be properly treated through, e.g. septic tank, before discharge.
• Implementation of measures to dissipate the energy of the stormwater before it is released into the drainage areas;
• The distribution of stormwater runoff as evenly as possible from the site; and
• Use of gabions and swales to reduce the velocity of water runoff.

6.8 Control of Noise

• Limit construction times to the day times;
• No noisy activities during weekend near local communities;
• Should blasting be required during the construction phase, the necessary permits must be obtained from the local authority and any other relevant authority.
• The contractor must comply with all applicable occupational health and safety requirements.
• Blasting times must be limited to the hours from 08:00 to 17:00 during weekdays only.
• Personnel, visitors and workers on the site must at all times be equipped with appropriate hearing protection measures to ensure noise impacts do not damage the persons hearing.
• The ESE must regularly inspect the site and ensure compliance with the *Occupation Health and Safety*.

### 6.9 Community Engagement and Complaints Register (CR)

• During the construction period, the contractors should remain open communication with the local governments and the people of the relevant community.

• Before the construction, the contractors should publicize the project information to the influenced party (e.g. local departments, enterprises and residents) in the form of community meeting.

• All the construction sites should have striking signs about the project information, including but not limited to:
  a) brief project description;
  b) construction plan;
  c) major construction activities;
  d) principal environmental problems and mitigation measures;
  e) names and telephones etc. of the project manager, the supervision engineer and the environmental protection personnel.

• The contractors and the environmental supervision engineer should regularly communicate with major sensitive receptors, including aquaculture farmers so as to minimize the negative influence on these objects.

• As for the construction activities with great influence, e.g. rock explosion, the contractors should communicate with the local parties that may be influenced.

• All the contractors should provide the workers with the training about neighborhood relationship maintenance, communication, local custom and the code of conduct as well.

• Complaints channel information must be disclosed at the entrance of the site;

• A complaints register must be kept on site in the main construction camp office. All complaints, issues and concerns shall be incorporated in feedback reports to ESE and Xiapu State Owned Assets Investment & Operation Co., Ltd.;

• Where a complaint requires corrective action, this must be communicated to the relevant parties to ensure that the complainant is satisfied.

### 6.10 Physical Cultural Resources

• To provide training for the workers about historic relic education as well as historic relic discovery and protection procedures;

• Impact or damage on Liu's Tomb and Shrine in Dajing village is forbidden, such as trampling and graffiti;
In case of chance-find:
   a) The contractors should stop the construction immediately and protect the scene;
   b) Report to the ESE and the owner as well as the local cultural resources authority;
   c) During the period of the investigation made by the local authority, the contractors should take appropriate measures to protect the historic relic spot and implement weather precaution;
   d) Only after consent by related authorities, the contractors can resume the construction.
7. Dredging, Rock Blasting and Dredged Material Management Plan

7.1 Dredging and Disposal Methodology

The dredging and disposal methodology and management measures to be implemented for the proposed fishing ports are designed to comply with the Technical Specification of Dredging Engineering and the actual condition of this project. In addition, as a best management practice of the dredging engineering practice, the dredging methodology for the Project aims to:

- Minimize sediment plume mobilization;
- Minimize any impacts of dredging operations on marine life and water quality; and
- Reduce the potential impacts from noise generated by dredge equipment.

The management of water quality to minimize adverse impacts from the mobilization of sediments will incorporate the following components:

- Proactive operational measures in dredging and disposal works to reduce sediment mobilization;
- Predictive modelling of Total Suspended Solids (TSS) levels and plume direction;
- Vessel based monitoring to confirm modelling predictions and actual affected scope;
- Visual observations of plume movement and dispersal; and
- Coping management based on continuous turbidity monitoring at all port area and dredging zones.

Soil investigations onsite in the ocean have revealed that the material to be dredged consists of three main types:

- Alluvial material – typically consisting of sand, gravel and clay;
- XW rock and stiff clays; and
- Competent weathered rock and fresh rock requiring drill and blast pre-treatment.

The equipment to be used in the dredging works are as follows:

- Cutter Suction Dredger (CSD) – for all dredging works;
- Survey and personnel transport vessels – in support of all dredging works

Mitigation Measures

The environmental protection measures for dredging (including the maintenance dredging during the operation period) are advanced based on the Technical Specification of Dredging Engineering and the actual condition of this project.
1) Well prepare and organize construction in a scientific and appropriate way. The constructors shall design the construction organization and appropriately choose dredging facilities and construction method after completely researching the contract terms and technical requirements, surveying and analyzing the site construction conditions, then make proper arrangement on the engineering quality, construction schedule and quality as well as the resource consumption, to make the construction quality and period meet the contract’s requirement.

2) The advanced dredging facilities and process are adopted, all the dredgers, survey vessels, shipping lighters shall be equipped with accurate auto-monitoring facilities and DGPS, dredge depth indicators, making the constructors adjust the drilling depth at any time based on draft and tide variation, so to realize high-accurate depth locating and dredging, on condition that the dredging effect and environment protection are ensured, try to reduce over-dredging volume, the disturbance on surrounding water and impact on surrounding water quality and marine ecology.

3) The dredging shall comply with the dredging specification, the overflow time of full dredger cabin shall be controlled within half an hour and the inflow suspended sediment shall be reduced.

4) All the construction facilities, especially the mud gate shall be strictly inspected before construction, if the possibly leaked pollutant is found (including oil for vessel use and excavated sediment), which shall be repaired first then the construction can be executed, whether the pollutants exist during construction shall be attached with great importance, arrange personnel and equip with necessary instruments to monitor the sea water quality, the necessary measures shall be timely taken once the oil or sediment leakage exists.

5) Dredging equipment will be selected to minimise turbid plume formation, for example by ensuring that the type and size of the dredge head matches the characteristics of the suction pump;

6) The constructors shall strictly monitor the environment during construction; the contracts shall cover clauses on environmental protection which shall be strictly followed.

7) The construction will avoid the concentrated breeding season for fishery resources in late spring and early summer (April-June), try to shorten the construction period and reduce the negative impact on environment to a lowest extent.”

8) Operational procedures for dredging will be optimized to reduce the mobilization and dispersion of suspended sediment. Such measures include:
   a) The use of a CSD, which is known to reduce turbidity generation relative to other types of dredge; and
   b) The operator will minimize spillage of material from the bucket into the surrounding water.
9) Operations will be conducted in favorable weather, tide, and current conditions to the extent practicable.

7.2 Rock Blasting

The research results documented in EIA and SEA indicate that it is feasible to use not bigger than 100kg explosive charge of single stage at a 450m safety distance to the closest net-cave cultivation. In relation to mitigation and control, all reasonable noise, vibration and blast emission mitigation measures will be implemented wherever be applied where reasonable and feasible, during dredging, drilling and blasting. A fundamental objective is to ensure that the best available technology and best management practices are used at the work sites in order to minimize the extent of adverse noise, vibration and blast emissions impacts.

Mitigation Measures

The environmental protection measures for rock-blasting are advanced based on the Specification of Blasting Safety (GB6722-2011) and the actual condition of the project.

1) ESE will review of detailed blasting design and the regulatory permit or approval processes before blasting operation, to confirm charge type, charge weight, shaped charges, using timing delays of large explosive charges, decking, stemming elements of the blasting design;

2) The constructors shall strictly follow the Specification for Blasting Security (GB6722-2011) and the Blasting Technical Specification of Waterway Transportation Engineering (JTS204-2008) to ensure the security of vessels and people. The millisecond delay blasting shall be applied, the maximum capacity of total explosive and explosive for each stretch (no more than 100kg) shall be strictly under control, the method of using explosive at low detonation speed shall be considered to reduce the impact from underwater shock on the marine creatures, the underwater blasting method (including the capacity of explosive for each stretch) shall be implemented after passing the safety assessment and can’t be changed at will;

3) Before the underwater blasting, the constructive sectors shall report to local marine and fishery administration and handle with the procedures after winning the approval;

4) In the early stage of construction, the explosive in small capacity will be initiated within the kill radius so to increase the explosive capacity by times after the fishes get away from the blasting area, then decide whether to reduce the maximum capacity of explosive by monitoring the result of site blasting experiment;

5) When drilling, the noise produced by air compressor, drill rigs as well as the large-area splash has the function to drive the fishes away from the construction area, therefore,
the blasting shall be implemented once the drilling is completed. If the air compressor, drill rigs stops running for a long time, it's recommended that before blasting, the air compressor, drill rigs be launched for 10 minutes to reach the aim of driving the fishes away from the blasting area;

6) The appropriate blasting plan shall be made based on the Approval on EIR, “The construction shall avoid the concentrated breeding season for fishery resources in late spring and early summer, try to shorten the construction period and reduce the negative impact on environment to a lowest extent.”;

7) After blasting, blaster should earnestly examine as stipulated whether there is blind shot in the blasting area. Blind shot found or in doubt should be reported immediately and treated in time. For those unable to be treated in time, clear signals should be set up nearby with corresponding safety measures and the administrations shall be informed. The vessels are not allowed to pass in this area. In case of blind shot for electric ignition, cutoff the power immediately and short-circuit the explosion network in time. When dealing with blind shot, safety and guard work should be performed well and nonessentials must not enter the scene. After treatment, the explosion stack should be examined carefully with explosive remnant collected for disposal. Registration card should be filled out by the handler for specific circumstance;

8) Safety guarding program for explosion
   a) The safety guarding scope for explosion is controlled to be 250m practically;
   b) Navigation Notice shall be released through the maritime administrative agency before construction. Region explosion bulletin shall be set up in the land area;
   c) At 6 hours before blasting, we shall give pre-notification to the surrounding entities. At 30 minutes before blasting, we shall give timing notification and clear the site within 250m around for the explosion;
   d) Three inter-visible guarding sentries shall be established at a spacious place 250m outside the land area of the blasting area;
   e) Three guard-ships shall be arranged within 300-1,500m sea area of the blasting area with clear megaphone aboard as flow guard to suppress underwater operation below 1,500m.

9) The post responsibility system shall be established during construction, the activities of large-size marine fishes within 2000m to the construction area shall be monitored, if these fishes emerge, the blasting must be canceled and the man-made acoustic wall is proposed to apply to drive them away from the blasting-influenced area to prevent the damage on them;

10) The post responsibility system shall be established during construction, the activities of large-size marine fishes near the construction site shall be monitored closely, before blasting, the person shall be specially assigned to monitor whether there are large-size fishes and notify to cancel blasting once found. When the large-size fishes wound, run aground during blasting, the blasting must be canceled and the emergency preplan shall
be launched to notify the Quanzhou Ocean and Fishery Resources Bureau and call for the first aids;

11) The emergency preplan for large-size fishes rescue shall be made to carry out the timely rescue to wounded, stranded large marine creatures, the Xiamen Ambulance Depots of Submarine World under the Xiamen Ambulance Centre for Aquatic Wildlife, Fujian Province is designated as the emergency aids institution and staffed with marine biology experts, veterinarian, cat man, diver, logistical supporters as well as special stretcher, medicine, probe tube and fresh-keeping box, diving equipments and rescue pool etc.

Monitoring

After monitoring for several years, there is no marine fauna, sea turtles and large schools of fish, as well as large flocks of seabirds and/or concentrations of jellyfish found in the east sea area of Xiapu County, the following monitoring methods come from the international best practices.

To minimise the likelihood of adverse impacts on marine fauna, Exclusion Zones will be monitored for the presence of marine mammals, sea turtles and large schools of fish, as well as large flocks of seabirds and/or concentrations of jellyfish. Detonation will not occur if these animals are detected within the designated Exclusion Zone, until the animals move out of the exclusion zone of their own volition.

Visual monitoring task will be undertaken by ground observer, boat based observers.

- Ground Observers: Ground Observers will visually monitor the Exclusion Zone. The observer teams will maintain radio contact with the Blast Observer. All personnel involved in visual monitoring will receive specific training in the monitoring methods and procedures.

- Boat-based observers: Two teams of boat-based observers will also visually monitor the seaward portion of the exclusion zone. One team will be located 1,150 m from the works. The second team will be located at the seaward edge of the 2 km exclusion zone and will monitor both the Exclusion Zone and the surrounding area to provide warning of approaching animals. Like the Ground Observers, the Boat-Based Observers will maintain radio contact with the Blast Observer and receive specific training in methods and procedures defined in the procedures manual.

A procedures manual will be developed for pre-detonation visual surveys and will include:

1) Provisions for structured sector-by-sector searches for prescribed time intervals;
2) A prescribed elevation for the observer (at a minimum, standing in the boat);
3) Minimum visibility conditions;
4) Prescribed intervals for alternating between searching with binoculars and the naked eye;
5) Passive acoustic detection;
6) Passive acoustic detection refers to the detection of marine mammals by listening for the sounds/calls that they make. If these sounds are getting louder with time, then the assumption can be made that these mammals are approaching the monitoring location. This means of detection is only meant to support visual detection methods and should not be considered the prime method of monitoring the safety zone;
7) The presence of marine mammals will be monitored by placing a hydrophone in the water at the outer rim of the safety zone (at 2 km) and at 1,150 metres from blasting site. The output of the hydrophone will be monitored aurally using a headset, and visually using a computer display of the acoustic frequency spectrum. The presence of marine mammals will be associated with their calls, and when picked up, this information will be relayed to the Blast Observer. If the marine mammal sounds continue and are getting louder, then the visual observers will be notified to be on the lookout. If the marine mammal sound level decreases, this indicates that the marine mammal is leaving the area and the visual lookouts will be notified accordingly;
8) All relevant personnel will be trained in the use of the equipment including familiarisation with the different possible sounds associated with marine mammals that frequent the area.
9) Proposed monitoring/mitigation program methodology
   a) This section presents an indicative procedure to be followed during the monitoring/mitigation program at HPCT. The procedure will be refined in relation to the exact procedures developed in the monitoring procedures manual.
   b) All monitoring teams (Boat-Based Observers and Ground Observers) will report to the Monitoring Coordinator, who will be responsible for supervising and communicating visual and acoustic detections and to halt the blast detonation in the event that an animal is spotted within or approaching the Exclusion Zone. The blast countdown will not resume until the animal moves away from the area of its own volition. Marine mammals and sea turtles must not be herded away or harassed into leaving. If the animal is not sighted a second time, the event will not resume until half an hour after the sighting.

**Pre-blast monitoring**

The monitoring procedure will be executed as follows:
• Monitoring will be undertaken during daylight hours and in conditions where visibility is adequate to monitor the Exclusion Zone.

• Half an hour prior to the blasting (following the cessation of blasthole drilling), monitoring of the Exclusion Zone and surrounding area will commence. The visual and acoustic monitoring teams will combine to monitor the Exclusion Zone. The Monitoring Coordinator will enter all visual and acoustic marine fauna detection/monitoring information, including species, numbers of individuals, time and location of detection and behaviour, into a marine animal tracking and detection database.

• Go/No-Go Decision Process: the Monitoring Coordinator will have the authority to declare the range fouled and recommend a hold until monitoring indicates that the Exclusion Zone is and will remain clear of detectable animals. The fire mission will be postponed if any marine mammal, sea turtle, large school of fish, large flock of seabirds, or concentration of jellyfish is visually or acoustically detected within or approaching the designated Exclusion Zone (2 km for cetaceans and 1,150 m for dugongs, turtles and large schools of fish). The delay will continue until the animal(s) that caused the postponement are confirmed to have moved outside the Exclusion Zone or until at least 30 minutes after the last sighting within the relevant Exclusion Zone.

Post-blast monitoring

Post-blast monitoring is designed to determine the effectiveness of the pre-blast mitigation by reporting any sightings of dead or injured marine species. Post-detonation monitoring will commence immediately after each blast. Boat-based and ground-based visual monitoring is intended to be utilised for post-blast monitoring. If any animals are observed or detected in the Exclusion Zone during the post-blasting monitoring, the location, number, species and behaviour will be recorded.

7.3 Mitigation Measures for Operation Vessels

1) The Management Methods of Treating Vessels Pollutions on Marine Environment (take effect since the Mar.1, 2010) shall be followed, at the request of maritime administrations, the oil-contained sewage in bilge of construction vessel shall be collected to store in the sewage cabin and disposed by qualified sectors. The construction vessels management shall be strengthened to prevent oil leakage accident;

2) Solid waste from construction vessel or facilities maintenance shall not be dumped into sea at will, the vessels shall be equipped with sewage recycling bin and records for waste reception, the recycling shall be managed by qualified waste-treatment ships;
3) Dredging and rock-blasting of this project last a long time, many vessels for construction results in the occupying the resources of channel will bring certain impact on vessel sailing, the construction vessels shall abide by the *Maritime Traffic Safety Law of the P.R.C.* and the *International Regulations for Preventing Collisions at Sea* and the navigation requirement of local maritime affairs administration;

4) The following effective measures shall be taken to prevent the occurrence of vessel risks and accidents and ensure the navigation safety, which include:
   a) The navigation notice shall be released before construction, the irrelevant vessels are prohibited to enter the operation waters;
   b) Equip necessary telecommunications facilities and formulate emergency plan, when the construction vessels encounter emergencies, the necessary measures shall be taken and reported to marine transport administration centre;
   c) During construction, all the constructive vessels shall display signals based on MOT's signals regulations;
   d) Arrange staffs to keep on duty on the constructive vessels, the operators shall strictly follow the operation procedures;
   e) When dredging is carried out, the contact with local weather prediction sectors shall be strengthened. The dredging shall be canceled at once under bad atmosphere to avoid the occurrence of vessel accidents;
   f) The construction vessels shall strictly abide by the *International Regulations for Preventing Collisions at Sea*, through the contact with local marine affairs bureau, marine administration, timely understand the inward and outward vessels in the same day and take corresponding anti-collision measures to avoid the occurrence of vessel accidents.

### 7.4 Mitigation Measures for Backfilling

1) Dredged material can only be disposed of in the designated backfilling area where cofferdam enclosure has been built. The backfilling can only be implemented after the cofferdam and filter layer is established, see the figure 4 for analogical backfill area;

2) Dredging operation with the CSD whose transfer blowing pump blows silt to backfill area by hydraulic filling;

3) The backfilling area shall be appropriately planned to make sure the sediment have the enough sedimentation time inside the cofferdam then make the suspended sediments settling to reduce the concentration of sediments discharged from overflow port.

4) Control the elevation and side slope of the backfill region strictly to prevent spill.
8. Emergency Response Plan

8.1 Emergency Response Plan

A major risk of fishing ports during operation stage is identified as potential oil spill. A Risk Assessment and Emergency Response plan has been developed in the EIA study process. In conclusion, Ningde City Maritime Affairs Bureau has established a vessel oil spill emergency system, thus laying a solid foundation for ensuring the navigation safety of incoming and outgoing vessels, avoiding vessel pollution accidents and facilitating the emergency recovery in case of abrupt accidents. On the basis of water area risk evaluation and supervision landscape study, the Xiapu State Owned Assets Investment & Operation Co., Ltd. will cooperate with the maritime affairs administrations to develop the oil spill emergency plan for the entire bay, and achieve integrated maritime supervision of fishing ports, so as to further enhance the oil spill emergency response capacity.

8.2 Spill Prevention Measures

During construction, the construction vessel will occupy the navigation channel and interfere with the navigation of incoming and outgoing vessels. Therefore, the contractor and the construction vessels must properly organize construction works according to the situations of vessels, earnestly follow the Maritime Traffic Safety Law of the People's Republic of China, and abide by the International Regulations for Preventing Collision at Sea 1972 (1989 Rev.), local port regulations and other navigations rules. Major measures include:

1) During operation, the construction vessels shall hang cresset and signal, which must comply with relevant state rules.

2) Before construction, the construction vessels must consult with the maritime safety authority and the dispatching department of port authority with respect to the mutual interference between construction vessels and navigation vessels, so as to develop a proper avoidance plan which will be released by the port navigation supervision department.

3) The maritime safety administration must strengthen the monitoring and management of incoming and outgoing vessels, continuously monitor the position and status of vessels, timely identify problems and take precautionary measures, so as to reduce accident potential and provide favorable conditions for the safe navigation of vessels.

4) Incoming and outgoing vessels must submit to the coordination, supervision and administration of maritime safety department and port administration department. The port will be equipped with necessary staff and maritime safety support facilities to provide safety and supervision services such as marine communication, marine
navigation, piloting, navigational aid, beacon guidance, warning, meteorological/oceanic forecast and etc.

5) The dock berthing and anchorage anchoring system shall be implemented. This shall include anchorage application, anchoring density (spacing), navigation speed for entering/exiting the anchorage, and the observation system under various weather conditions, so as to avoid the clubbing, collision, squeezing, grounding, and stranding of vessels at the anchorage.

6) The deck officer shall be qualified. According to the Regulations of the People's Republic of China on Administration of Prevention and Control of Pollution to the Marine Environment by Vessels (2010), the port shall impose rigid written management requirements on vessels and crew, and stipulate their responsibilities and obligations to prevent oil spills of vessels, while measures related to pollution prevention as stipulated therein shall be implemented. The crew shall study and understand the human factors and natural factors of potential oil spill accidents, and enhance their understanding of oil spill impacts and the consciousness of safe transportation.

8.3 Oil Spill Response Measures

Training on emergency reporting procedures must be provided to contractors and Environmental Supervision Engineer. Upon oil spill accidents, contractors and ESE shall immediately contact the Xiapu State Owned Assets Investment & Operation Co., Ltd. and the emergency response team which will implement mitigation measures according to the emergency response plans. Main oil spill response measures include:

1) Deployment of oil containment booms
The method of oil spill recovery with oil containment booms involves the operating ship and two towing ships. The steps are shown below:

   a) Deploy the operating ships at one end of the oil polluted water area and deploy the towing ship at the other end of oil polluted water area. Prepare for towing the oil containment booms and pump oil slicks.

   b) Two towing ships tow the oil containment booms from one end of the oil polluted water area to the operating ship at the other end. In the meantime, activate the skimmers on the operating ship.

   c) When the both ends of oil containment booms pass the telescopic guide arm mounted to the operating ship, use the guiding device to guide the oil booms and pull the inner side of oil booms to the sealing brush of guide arm.

   d) The towing ships continue towing at the set speed and gradually narrow the containment area until reaching the predetermined minimal value.
e) Upon completion of oil recovery, the guide arm will release the oil booms and the skimmers will stop operation.

2) Oil spill recycling and clean-up
By containing the oil spills with the oil booms, the recycling and clean-up devices will then be applied to quickly recycle the oil, or the dispersant will be used to clean up oil spills (or through biological degradation), so as to prevent other areas from being polluted.

Currently, recycling and clean-up facilities applied in China include: skimmers for recovering various oil products, oil recovery net, submersible pump, absorbent, oil spill recycling vessel and etc.
9. Marine Ecology and Habitat Offset Plan

9.1 Ecological Resource Loss

Based on the environmental impacts scoping and screening, the key impacts on marine ecology during construction stage include:
(1) Dredging will damage the benthic organisms at the dredged section;
(2) Dredging will cause turbidity of sea water which will have impact on marine life;
(3) Packing sedimentation by blasting will have negative impacts on marine life;
(4) Backfilling the dredged materials (Phase-1 of Sansha Fishing Port) will cause loss of coastal wetland, and its ecosystem service function for aquaculture cultivation.

These impacts have been thoroughly assessed in this EIA. In summary, the project will result in permanent loss of around 72ha inter-tidal zone along that are considered as habitats, and related benthonic and marine life. To mitigate such impacts, the project has one ecological compensation program: Man-made Reef Compensation, which will be monitored by FDOF, Ningde City Ocean and Fisheries Bureau, Xiapu County Ocean and Fisheries Bureau and Xiapu State Owned Assets Investment & Operation Co., Ltd. to ensure the compliance with relevant regulations and rules.

9.2 Ecological Compensation Program

The improvement function of man-made reef to the marine ecology is to produce the rising flow on the upstream surface and produce eddy flow on the dorsal stream surface through the changes of flow rate and direction around the man-made reef. The water rising, eddy and diffusion near the reef can carry the nutrients at the bottom to the medium and upper layer with plentiful sunshine to improve the nutrient structure of sea area and reproduce the phytoplankton and zooplankton; as well increase the COD and improve seawater quality, besides, there are a lot of algae living on the reef body and increasing the primary productivity. The algae can absorb nitrogen, phosphorus in the water and reduce the Eutrophication and improve the environment of water body, moreover, the microbes living on the reef body can eliminate organic carbon and nitrogen to purify seawater quality. The man-made reefs can also attract fishes and increase the catch quality. In short, the construction of man-made reefs means establishing a lot of small-scale benign man-made ecological systems in the coastal area which can improve the primary productivity of sea area.
9.2.1 Project Location and Area

The proposed man-made reef is located in the Douyu Sea Area to Bijia Mountain in outer bay of Dongchong Peninsula with water depth of 12-20m and reef area of around 600mu.

The proposed man-made reef in within the sea area of fishing ports, please refer to the Table 13 for the location relation between man-made reef and each fishing port.

<table>
<thead>
<tr>
<th>Table 13 Location Relation between Man-made Reef and Fishing Ports (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Man-made Reef</td>
</tr>
</tbody>
</table>

Figure 3 Location of Proposed Man-made Reef
9.2.2 Reef Zone Management

After placing the reefs, the boundary of management and protection region shall be designated, the routine maintenance and management will be in the charge of Xiapu Ocean & Fishery Bureau, and monitored by the Fujian Provincial Department of Ocean and Fisheries.

Monitoring and management measures for artificial reef deployment include:

- Upon the deployment of artificial reefs, a restricted navigation zone within 1000m reach from the reef shall be established and signs shall be deployed to avoid endangering the safety of vessels; Electricity, blasting, fixation, trawling and sand excavation are prohibited in the restricted navigation zone.
- Deployment will be carried out during winter where possible, and avoid Apr-July, to avoid/minimize impacts on fishing reproduction seasons;
- Regular monitoring the stability of artificial reef; and
- Regular remove solid wastes such as broken nets that may attach to the reefs;
- Divers’ quarterly check, evaluate the performance of ecological system restoration.

9.2.3 Reef Design

The design will be entrusted to qualified institutions by the construction agencies. The design shall meet the requirement of realizing best concentration of fishes and shells, fully considering the service life of reef and conforming to the geological structure and natural environment of sea area.

The usual man-made reefs include concrete reef body, old vessel and waste tyre etc., the concrete reef body applies to the Project to avoid the secondary pollution to marine environment.

9.2.4 Reef Construction

(1) Bidding
The open bidding for man-made reef construction shall be undertaken by the construction agencies based on the drawings from designing agencies and pursuant to the relevant regulations of bidding. The qualified agencies will be awarded and responsible for constructing and monitoring reef body.

(2) Quality monitoring
The construction agencies will be responsible for follow-up monitoring on reef quality as well the site quality monitoring on reef transportation and placing.
(3) Material and production requirement
The material procurement shall follow relevant specifications, procedures and design documents, the reef body shall be made as a whole and once-molded, each side shall be smooth and meets the standard of cement & concrete works, using vibrating rod to vibrate and pour without space while casting cement to meet the standard of placing man-made reef.

(4) Construction organization
The construction agencies shall meet the following requirements:
① Relevant waterworks quality and construction capacity; ② Necessary facilities and ground for making reinforced concrete reef; ③ Large hoisting equipment and marine construction equipment; ④ Complete safety protection facilities; ⑤ Certain offshore work experience.

9.2.5 Reef Transportation and Placing
After the reefs construction are completed and approved, they will be transported and placed by relevant construction agencies through bidding. The reef transportation shall hire hoisting equipments and barge with loading capacity over 100-200t. The reef transportation and placing shall be implemented in the neap tide with wind force below 4th level to ensure the safety and accuracy. The placing location, density and accuracy as well as other requirements shall be confirmed by construction and TA agencies. After the reef placing complete, the corresponding agencies shall submit the placing time, location, water depth, number and reef types and other technical data in figures and tables to construction agencies for record, and report to county channel, maritime affairs and port authorities etc.

9.2.6 Baseline Survey and Effect Assessment
After the man-made reef project is approved, the baseline survey and effect monitoring before and after placing shall be well implemented to provide scientific basis for the reef design, construction, placing and layout as well as the placing effects assessment.

9.2.6.1 Baseline Survey
The survey focuses on topography and terrain, water depth distribution and sediment type of reef zone, species composition of benthos and nekton.

(1) Survey method
The survey follows the Marine Monitoring Specification (GB 17378-2007) and Marine Survey Specification (GB/T 12763-2007). The routine surveyed items such as Chlorophyll-
a, primary productivity, phytoplankton, zooplankton and benthos will follow the above-mentioned two specifications. Considering the special characteristics of reef location and actual situation of local fishing area, the survey for nekton can be implemented through fishing gears such as set gillnet, fishing tackle, pot etc.

(2) Survey content
①Environment baseline survey
The surveyed items include: water depth and color, transparency, water temperature, salinity, pH value, DO, NO₂-N, NO₃-N, NH₄-N, PO₄-P, COD, Chlorophyll-a, primary productivity, phytoplankton, zooplankton, benthos and nekton.

②Resource baseline survey
Survey on species composition, quantity distribution, individual size of catches collected through fishing gears such as set gillnet, fishing tackle, pot etc. as well as survey of hanging-plate-attached and reef-attached organisms on catches’ quantity and individual size.

(3) Survey time
The survey on benthos, nekton, physical and chemical factors, sediment type was implemented on May 2013, one voyage for each surveyed item of each reef zone.

9.2.6.2 Effect Assessment
In addition to the routine environmental factors, the effect monitoring mainly tracks the species composition of reef-attached organisms, benthos and nekton as well as the biomass distribution and its seasonal variation.

(1) Survey method
The survey for routine items such as Chlorophyll-a, primary productivity, phytoplankton, zooplankton and benthos will follow the Marine Monitoring Specification (GB 17378-2007) and Marine Survey Specification (GB/T 12763-2007). The attached organisms will follow the method of hanging-plate-attached organisms survey, that is, sampling at 12 months after reef placing.

(2) Survey content
①Environment baseline survey
The surveyed time for benthos, nekton, physical and chemical factors, sediment type etc. was in May 2013, one voyage for each surveyed item of each reef zone.

②Resource baseline survey
Survey for resource effect assessment: survey on species composition, quantity distribution, individual size of catches collected through fishing gears such as set gillnet, fishing tackle, pot etc. as well as species composition and density (kg/m²) of attached organisms.

9.2.6.3 Survey Time
One voyage for sampling at the 12th month after reef placing.

9.2.7 Schedule Arrangement
Jan.-Mar.2014, project preparation, the main task is to arrange staffs for implementation as well as their respective responsibilities, and put fund, reef producing agencies to practice, establish operating agency and regulations for implementation.

Apr.-Aug.2014, baseline survey for reef zone and reef design & production, the task in early stage is to carry out the baseline survey for fishery resources and marine ecology in the proposed reef zone, which focuses on terrain and topography, water depth distribution, sediment type, species composition and quantity distribution of benthos and nekton. The task in later stage is to design and produce reefs and monitor their quality.

Sept.-Oct.2014, reef acceptance and placing, the main task is to organize the reefs acceptance and placing.

Oct.-Dec.2012, maintenance and management as well as the effect survey and assessment of reef zone, one task is to carry out the routine maintenance to prevent the outlaws from catching fishes by electricity, poison and blasting; the other is to carry out the survey and assessment on species composition of attached organisms, benthos and nekton and biomass distribution.

9.2.8 Cost Estimate
The investment is estimated to be 5.15 million RMB, including 3.75 million RMB for works cost, 0.4 million RMB for design and supervision, 0.78 million RMB for resources survey, assessment, exploration and patrol management in reef area, 0.22 million RMB for others.
10. Communication and Stakeholder Engagement

10.1 Public Participation

Public participation has been extensively conducted during the preparation of Environmental Impact Assessment (EIA) and Resettlement Action Plan (EIA), through which, public concerns have been incorporated into the EIA/EMP and RAP.

For the purpose of minimizing impacts, communication with project affected people will continue throughout the project. The aim of the communications is to provide a two-way information channel through which project progress and implementation of EMP can be introduced to the affected community, and communities’ feedback on ongoing project impacts can be timely communicated to the contractor and Xiapu State Owned Assets Investment & Operation Co., Ltd.

Contractors are required to disclose information about project contents, key environmental issues and mitigation measures, compliant receiving person contact at project construction site. Regular consultation meetings with project affected communities (aquaculture farmers) must be organized during the dredging/blasting and disposal operation period, at least quarterly.

A grievance mechanism is also established under the Resettlement Action Plan to address the public concerns about the land acquisition and livelihood compensation issues.

10.2 Stakeholder Dialogue Mechanism

A stakeholder dialogue mechanism will be established during the project operation stage. The dialogue mechanism provides a forum to monitor and evaluate the regional development activities, change of marine and terrestrial ecological environmental status and social development progress in the fishing ports. The key purpose of such a dialogue mechanism is to keep all the relevant agencies and public informed about the regional development and cumulative environmental and social impacts.

Xiapu State Owned Assets Investment & Operation Co., Ltd. will be responsible for organizing stakeholder dialogue meeting on a yearly basis. Stakeholders invited include (but not limited to) ocean and fishery bureaus in Ningde City and Xiapu County, environmental protection bureau of Ningde City, governments of Sansha Town, Changchun Town and Haidao Town, fishermen representatives, Administration of Fuying Island Reserve Authority (if any), and representatives from local communities and aquaculture business communities.
Environmental and marine ecological monitoring data in sea area during the project operation will be fully shared among the stakeholders. The key findings and recommendations from the meeting will be formally communicated to relevant governments for necessary follow-up actions to ensure a sustainable development of eastern coastal Xiapu, with integration and harmonization of socio-economic development and ecological functions maintenance.
11. Environmental Training Plan

The proponent Xiapu State Owned Assets Investment & Operation Co., Ltd. shall ensure that all staff is adequately trained prior to undertaking any activities associated with the fishing ports. The training will be provided to environmental management staff of Xiapu State Owned Assets Investment & Operation Co., Ltd., Environmental Supervision Engineer and contractors.

**Training to Xiapu State Owned Assets Investment & Operation Co., Ltd. staffs and ESE**

The aim of training to ESE and staffs from Xiapu State Owned Assets Investment & Operation Co., Ltd. is to strengthen the environmental management during construction and operation period and ensure the effectiveness of environmental management so as to improve the overall project quality. Through the training, the ESE and environmental management staff can identify the main environmental problems and defects in environmental management, and cause the contractor so take necessary preventive measures ASAP. During construction, the Xiapu State Owned Assets Investment & Operation Co., Ltd. will invite the environment consultants with similar experience (environment specialist or environmental institution) to carry out site training to potential problems and corresponding solutions.

**Training to Contractors**

Before commencement, the environmental staffs and workers of the winning bidder shall receive the systematic environmental knowledge training provided by ESE and MBAHB environmental management team, to avoid bringing environmental damages due to operation errors. The training to environmental staffs of contractors is to specify the environmental management liability of constructors, the training to workers is to address the correct operation method during construction to reduce or avoid unnecessary damage. Through training, the contractors shall be aware of environmental protection liability undertaken and result possibly caused by environmental damage, the workers can get a clear view of protection method and degree of environment-sensitive points, the training to workers shall last one week based on actual condition.

The training plan with budget estimation is developed in Table 14.
<table>
<thead>
<tr>
<th>No.</th>
<th>Trainee</th>
<th>Content</th>
<th>Organizer</th>
<th>Participants</th>
<th>Duration</th>
<th>Place</th>
<th>Budget (RMB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EP Staffs from Xiapu State Owned Assets Investment &amp; Operation Co., Ltd., ESE</td>
<td>- Learn Environmental protection and management knowledge - EMP measures</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd., IEC</td>
<td>3</td>
<td>5 days</td>
<td>Domestic</td>
<td>10,000</td>
</tr>
<tr>
<td>2</td>
<td>EP Staffs from Xiapu State Owned Assets Investment &amp; Operation Co., Ltd.</td>
<td>- Study tour to visit similar channel projects focusing on environmental protection</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd., IEC</td>
<td>3</td>
<td>5 days</td>
<td>Domestic</td>
<td>50,000</td>
</tr>
<tr>
<td>3</td>
<td>ESE</td>
<td>- Relevant regulations - EMP requirement - Emergency Plan</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd., IEC</td>
<td>10</td>
<td>10 days</td>
<td>Domestic</td>
<td>20,000</td>
</tr>
<tr>
<td>4</td>
<td>Main technical chief and construction chief from contractors</td>
<td>- Relevant regulations - EMP requirement - Emergency Plan</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd., IEC</td>
<td>30</td>
<td>10 days</td>
<td>Domestic</td>
<td>20,000</td>
</tr>
<tr>
<td>5</td>
<td>Construction Vessel and operation workers</td>
<td>- Relevant regulations - EMP requirement - Emergency Plan</td>
<td>Xiapu State Owned Assets Investment &amp; Operation Co., Ltd., IEC</td>
<td>20</td>
<td>3 days</td>
<td>Domestic</td>
<td>20,000</td>
</tr>
</tbody>
</table>

**Total** | 120,000 |
12. EMP Budget

The EMP implementation during construction and operation has been budgeted as is shown in Table 15 and Table 16. The total environmental investment includes the environmental mitigation measures, monitoring and engineering management for environmental protection and main works as well as the investment of alleviating or eliminating the negative impacts on environment. It should be noted that many mitigation measures are of management practice nature whose budget are all inclusive in the overall contract, and may not be practically specified.

Table 15 Budget for Environmental Measures During Construction Period

<table>
<thead>
<tr>
<th>No.</th>
<th>Mitigation Measures</th>
<th>Budget (Yuan)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ecological compensation program</td>
<td>5,150,000</td>
<td>Man-made reef deployment</td>
</tr>
<tr>
<td>2</td>
<td>Environmental management during construction</td>
<td>300,000</td>
<td>Wastewater, dust and solid waste management</td>
</tr>
<tr>
<td>3</td>
<td>Environmental management, risk prevention and monitoring</td>
<td>600,000</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Water conservation and soil erosion control</td>
<td>7,810,000</td>
<td>Incorporate into soil erosion budget</td>
</tr>
<tr>
<td>5</td>
<td>Pollution control in backfilling area</td>
<td>/</td>
<td>Filtration of coffer dam etc., Included in investment of Sanshan Phase I Project</td>
</tr>
<tr>
<td>6</td>
<td>Environmental Management Consulting During Construction</td>
<td>/</td>
<td>Included in TA</td>
</tr>
<tr>
<td>7</td>
<td>Wastewater water treatment facility</td>
<td>2,175,000</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Solid waste collection and disposal facility</td>
<td>38,000</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Land acquisition, resettlement and relocation of aquaculture facilities</td>
<td>7,690,100</td>
<td>Included in RAP</td>
</tr>
<tr>
<td>10</td>
<td>Environmental training</td>
<td>120,000</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Environmental management and monitoring during operation</td>
<td></td>
<td>Included in the routine operation cost of ocean and fishery authority</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>23,883,100</td>
<td></td>
</tr>
</tbody>
</table>

Note: The environmental protection investment during operation period isn’t included in the daily operating cost.