IPP699

National Cyclone Risk Mitigation Project

Indigenous People's Instrument

Environment and Social Management Framework

August 2009

National Disaster Management Authority

Safdarjung Enclave

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Chapter 1: Introduction

The National Cyclone Risk Mitigation Project (NCRMP) (the 'project') has been drawn up by the Ministry of Home Affairs (MHA), Government of India (GoI), with the purpose of creating suitable infrastructure to mitigate the effects of cyclones in the coastal states of India. The project also aims at promoting sustainability through conservation of coastal eco systems.

The program has identified thirteen cyclone-prone States and Union Territories (UTs), with varying levels of vulnerability, for the improvement of disaster management facilities. Based on the frequency of occurrence of cyclones, size of population, and the existing institutional mechanism for disaster management, these States and UTs have further been classified into the following two categories.

Category I: Higher vulnerability states i.e. Andhra Pradesh, Gujarat, Orissa, Tamil Nadu and West Bengal, and

Category II: Lower vulnerability states i.e. Maharashtra, Goa, Karnataka, Kerala, Daman & Diu, Pondicherry, Lakshadweep, and Andaman & Nicobar Islands.

1.1 Project Objectives

The key objectives of the project are:

- ➔ Reduction in vulnerability of coastal states through creation of appropriate infrastructure which can help mitigate the adverse impacts of cyclones, while preserving the ecological balance of a coastal region.
- ➔ Strengthening of cyclone warning systems enabling quick and effective dissemination of warning and advisories from source/district/sub-district level to the relevant communities.

1.2 Project Components

Based on the above objectives, the project has been divided into four components, namely:

- ➔ **Component A** – Last mile connectivity for the dissemination of cyclone warning and advisories from source/district/sub-district level to communities
- ➔ **Component B** – Construction of new physical infrastructure and repair & renovation of existing infrastructure for cyclone risk mitigation in the states of Gujarat, Maharashtra, Orissa, and Andhra Pradesh
- ➔ **Component C** – Technical assistance for capacity building on hazard risk management
- ➔ **Component D** – Project management and monitoring

1.3 Activities Proposed Under NCRMP

As a part of the Component B of the project (NCRMP), for the development of new physical infrastructure and repair & renovation of existing infrastructure for cyclone risk mitigation, a few sub-project activities have been proposed. A brief introduction of the major sub-project activities has been presented below:

Cyclone Shelters: Cyclone shelters will help the vulnerable sections of the community in accessing to safe shelters in the time of cyclones or floods. It can also act as a nodal point for receipt and dissemination of cyclone warnings and for carrying out post disaster response and relief activities. When there are no emergencies, they can be used as schools or for other community purposes. This sub-project involves renovation of existing cyclone shelters and construction of new shelters. The shelters are expected not to exceed 10,000 sq ft of built up area.

Construction/Repair of Coastal Canal: Coastal canals act as an effective tool for water management. The sub-project includes extension of canal length and improvements to canal design for better flood water management and for reduction of inundation.

Construction/Repair of Saline Embankments: Saline embankments help protect people, livestock, dwellings, and agricultural fields from saline water inundation/ storm surge. The sub-project activity involves (i) the construction of new and modification of existing embankments by increasing the height (and widening the base), number of locking gates or improving the design; (ii) strengthening the existing embankments, gap filling and renovation of sluices for improved drainage; and (iii) laying the top of the embankment with water-bound macadam.

Shelterbelt Plantation: Shelterbelts are barriers of trees planted to reduce the wind velocities and protect human habitations and agricultural crops from physical damage. They also help in reducing transpiration and wind erosion, and in moderating extreme temperatures. The sub-project will include planting of new saplings for improving the coastal shelter belts.

Plantation/ Regeneration of Mangroves: Mangroves act as a bio-shield for protecting life and property from cyclones, storms, and gales. They also protect the coastline from soil erosion and deposition of sand and salt by high winds. Under the sub-project, regeneration of mangroves will be undertaken over different wild life divisions of the coastal districts. Community dependence on mangroves for fuel wood, livelihood, and pisciculture are stressors to the growth and regeneration of mangrove forests and, therefore, they will be addressed.

Construction/ Repair of Missing Road Links and Bridges: Roads/ Culverts/Bridges would aid in improving the connectivity to Cyclone shelters. Roads/ Culverts/Bridges are essential for pre and post disaster responses. The activity aims at construction/ repair/ retrofitting of the infrastructure to ensure all weather serviceability of the roads/ bridges/ culverts and to ensure fast and timely movement of men/material and machinery in the pre and post disaster period.

1.4 Purpose of the Environmental and Social Management Framework (ESMF)

The ESMF provides the framework (policies, guidelines, and procedures) for the management i.e. prevention and / or mitigation of environmental and social issues due to the implementation of the sub-project activities in the participating states (i.e. Gujarat, Maharashtra, Orissa, West Bengal and Andhra Pradesh as of April 2009). The ESMF framework needs to be integrated in the preparation and implementation of the project.

The key objectives of the ESMF are:

1. Provide a framework for the integration of social and environmental aspects into the decision making process at all stages of planning, design, execution, operation & maintenance of various sub-projects.
2. Identify, avoid or minimize adverse social and environmental impacts.
3. Enhance positive social and environmental outcomes
4. Support and ensure compliance with applicable laws, regulations, and policies.

The ESMF identifies the potential impacts of various sub-project activities and outlines the indicative management measures required to effectively address the same. Appropriate institutional arrangements towards implementing the indicative measures have been detailed in the framework.

1.5 Application of the ESMF

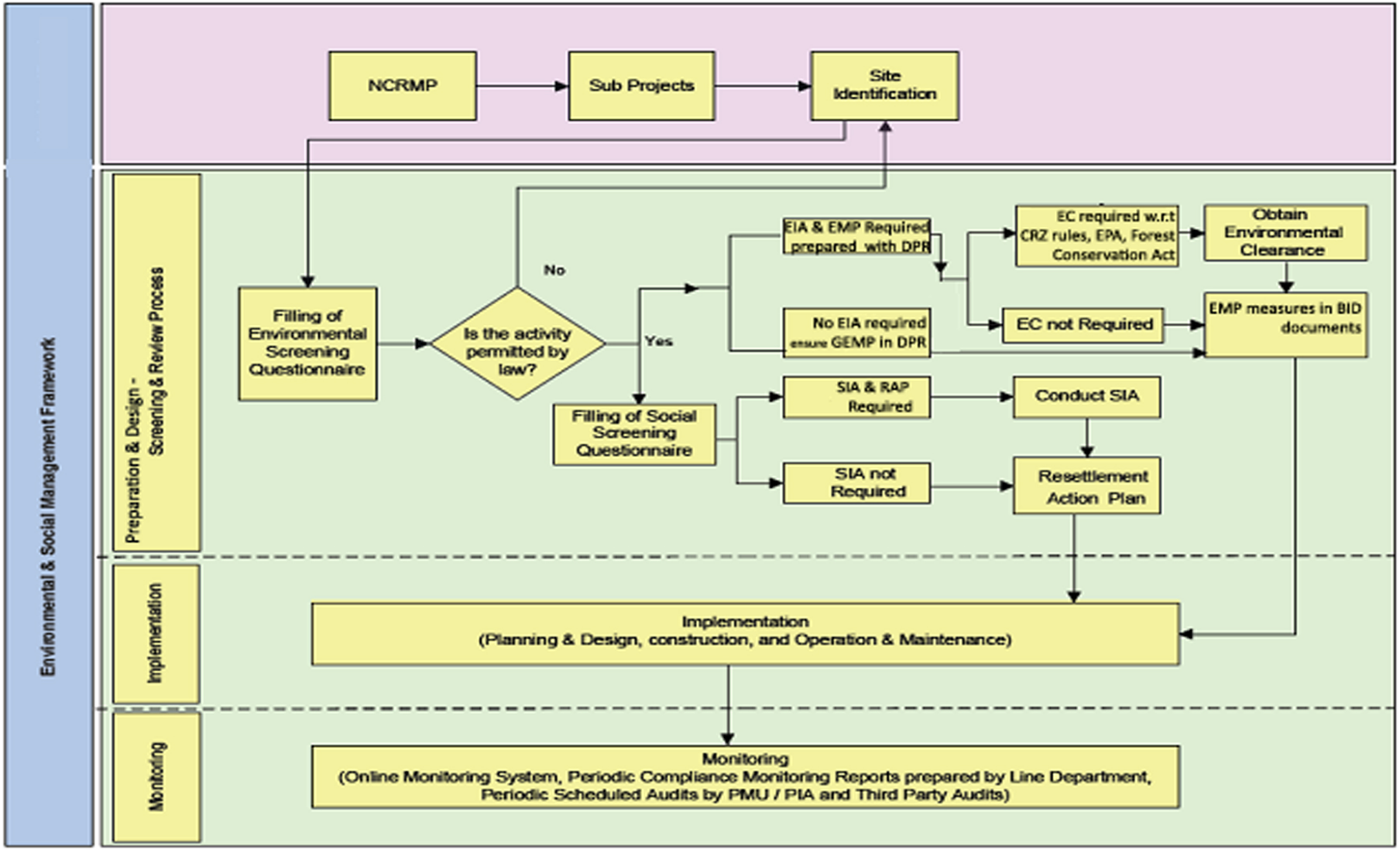
ESMF is an essential ingredient aligned with the project and sub project cycle and is to be followed through the entire project cycle from Site identification, screening and review, implementation, and monitoring. The flow chart indicates the process of integration of ESMF from screening to implementation of EMP's and monitoring.

1.5.1 Updating the ESMF

The ESMF should be an 'up to date' or a 'live document' enabling revision where and when necessary. It is possible that certain aspects not envisaged at this stage during project preparation are not included in this document. These may arise in the future, therefore should be assessed and appropriate management measures incorporated in to the ESMF. This needs to be done through year end and mid-term reviews aligned with the project cycle. This should also include any revision to existing laws and regulations.

1.5.2 Limitation of the ESMF

This ESMF has been developed based on the national and state laws & regulations and World Bank guidelines, as applicable on the date of this document. Any proposed laws & regulations or guidelines that were notified as 'draft' at the time of preparation of this document have not been considered.


Environmental & Social Management Framework
NCRMP
Sub Projects
Site Identification
Preparation & Design - Screening & Review Process
Filling of Environmental Screening Questionnaire
Is the activity permitted by law?
No
Yes
EIA & EMP Required prepared with DPR
No EIA required ensure GEMP in DPR
EC required w.r.t CRZ rules, EPA, Forest Conservation Act
Obtain Environmental Clearance
EC not Required
EMP measures in BID documents
Filling of Social Screening Questionnaire
SIA & RAP Required
Conduct SIA
SIA not Required
Resettlement Action Plan
Implementation
Implementation (Planning & Design, construction, and Operation & Maintenance)
Monitoring
Monitoring (Online Monitoring System, Periodic Compliance Monitoring Reports prepared by Line Department, Periodic Scheduled Audits by PMU / PIA and Third Party Audits)

Chapter 2: Laws, Rules, Regulations & Policies

The implementation of the proposed activities under the NCRMP must be consistent with all applicable laws, regulations, and notifications. It is the responsibility of the Implementing Agency to ensure that project activities are consistent with the national and state or municipal/local regulatory/legal framework. Additionally, it is also to be ensured that activities are consistent with World Bank policies and guidelines. This section is not a legal opinion on the applicability of the law but serves as guidance to the application of the legal and regulatory provisions to the current project context.

Applicable regulations are as follows:

2.1 National Laws, Rules and Regulation

1. Environment (Protection) Act, 1986 & EIA Notification S.O. 1533 dated 14th September 2006
The Environment (Protection) Act, 1986 was introduced as an umbrella legislation that provides a holistic framework for the protection and improvement to the environment. In terms of responsibilities, the Act and the associated Rules requires environmental clearances to be sought for specific types of new / expansion projects (addressed under Environmental Impact Assessment Notification) and for submission of an environmental statement to the State Pollution Control Board annually. As per section 3 of EIA Notification S.O. 1533 dated 14th September 2006, the Central Government forms a State Level Environment Impact Assessment Authority (SEIAA). All projects and activities are broadly categorized into two categories as Category A and B. All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification All projects or activities included as Category 'B' in the Schedule, including expansion and modernization of existing projects or activities as specified in sub paragraph (ii) of paragraph 2, or change in product mix as specified in sub paragraph (iii) of paragraph 2, but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, *will* require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC) as to be constituted for in this notification. In the absence of a duly constituted SEIAA or SEAC, a Category 'B' project shall be treated as a Category 'A' project; The application of the Act on the proposed project components are: **Cyclone Shelters*:*** Cyclone shelters being proposed under the project are less than 20,000 sqmt in size. If there is a Cyclone shelter/ building or a construction projects with ≥20,000 sq. m and <150,000 sq. m of built-up area, it will require prior Environmental Clearance as per the EIA notification of 2006.

Saline Embankments:

Considering the saline embankment as an open construction, if the area (base x width) is ≥20,000 sq. m and <150,000 sq. m, then prior Environmental Clearance as per the EIA notification of 2006 will be required.

Road/Culverts/Bridges, Plantation Shelter, Mangroves, Coastal Canal and Transmission Tower:

Assuming that the road /culverts / bridges will be mainly for the rural /link roads category meant to provide access to the infrastructure facilities created will not require a prior clearance. Wherein the proposed road passes through or in close proximity of any ecologically sensitive area may require prior EA. The clearance requirement shall be established on a case to case basis.

2. Coastal Regulation Zone Notification (CRZ)

Issued under the Environment (Protection) Act, 1986, coastal stretches have been defined in Coastal Regulation Zone (CRZ) and restrictions have been imposed on industries, operations and processes within the CRZ. For regulating development activities, the coastal stretches within 500 meters of High Tide Line on the landward side are classified into four categories, namely:

- CRZ-I:
  (i) Areas that are ecologically sensitive and important, such as national parks/marine parks, sanctuaries, reserve forests, wildlife habitats, mangroves, corals/coral reefs, areas close to breeding and spawning grounds of fish and other marine life, areas of outstanding natural beauty/historically/heritage areas, areas rich in genetic diversity, areas likely to be inundated due to rise in sea level consequent upon global warming and such other areas, and
  (ii) Area between low tide line and the high tide line.
- CRZ-II: The areas that have already been developed upto or close to the shoreline. For this purpose, "developed area" is referred to as that area within the municipal limits or in other legally designated urban areas which are already substantially built up and which have been provided with drainage and approach roads and other infrastructural facilities, such as water supply and sewerage mains.
- CRZ-III: Areas that are relatively undisturbed and those which do not belong to either CRZ-I or CRZ-II. These will include coastal zone in the rural areas (developed and undeveloped) and also areas within Municipal limits or in other legally designated urban areas which are not substantially built up.
- CRZ-IV: Coastal stretches in the Andaman & Nicobar, Lakshadweep and small islands, except those designated as CRZ-I, CRZ-II or CRZ-III.

The development or construction activities in different categories of CRZ area shall be regulated by the concerned authorities at the State/Union Territory level, in accordance with norms stipulated in the CRZ regulation and in the state / UT coastal zone management plan.

The application of the Act on the proposed project components are

Relevance to Cyclone shelters /Saline embankments /Coastal canals /Roads /Culverts /Bridges :

- No new construction is permitted in CRZ-I.
- In CRZ-II areas, new buildings are permitted only on the landward side of the existing

2. Coastal Regulation Zone Notification (CRZ)

(or approved) road or authorized structures.

- In CRZ-III areas:
  - The area from 0-200 mt from the HTL is the 'No Development Zone'. The proposed sub-projects under the NCRMP are permissible in this zone subject to approvals from the Coastal Zone Management Authority or the Central Government, as the case may be.
  - In CRZ-III areas, construction or reconstruction of dwelling units between 200m and 500m is permitted subject to certain restrictions on the number of dwelling units, height of structure etc
- For all other constructions within the CRZ areas statutory clearances should be obtained in concurrence to notification no. S.O.114(E) as amended on 3rd October 2001 and S.O. no. 1533 dated 14th September 2006.

3. Forest (Conservation) Act, 1980

Forest (Conservation) Act, 1980 pertains to the cases of diversion of forest area and felling of roadside plantation. Depending on the size of the tract to be cleared, clearances are applied for at the following levels of government:

- If the area of forests to be cleared or diverted exceeds 20 Ha (or, 10 Ha in hilly area) then prior permission of Central Government is required;
- If the area of forest to be cleared or diverted is between 5 to 20 Ha, the Regional Office of Chief Conservator of Forests is empowered to approve;
- If the area of forest to be cleared or diverted is below or equal to 5 HA, the State Government can give permission; and,
- If the area to be clear-felled has a forest density of more than 40%, permission to undertake any work is needed from the Central Government, irrespective of the area to be cleared.

Restrictions and clearance procedure proposed in the Forest (Conservation) Act applies wholly to the natural forest areas, even in case the protected/designated forest area does not have any vegetation cover.

The application of the Act on the proposed project components are

Cyclone shelters/Saline embankments/Coastal canals /Roads /Culverts /Bridge /Transmission tower:

If the proposed activities under the project require temporary and or permanent use/diversion of forest resources to non forest activities, then the implementing agency / line department needs to take the necessary clearances from the Forest Department / MoEF.

4. Water and Air (Prevention & Control of Pollution) Acts

Water Act and Air Act provides for the prevention and control of water and air pollution respectively. These Acts empowers the Boards to collect effluent and emission samples, entry to industrial units for inspection, power to prohibit on use of any water bodies for waste disposal and creation of new discharge outlets, provide consent to set up and operate certain facilities likely to create air and water pollution including power to give directions and prosecuting

4. Water and Air (Prevention & Control of Pollution) Acts
offenders. The application of the Act on the proposed project components are: **Cyclone shelters/Saline embankments/Coastal canals/Roads/Culverts/Bridges/ Transmission Tower:** The Air and Water Act are particularly applicable to all civil works activities. All construction contractors need to obtain the consent-to-establish and consent-to-operate for plants i.e. concrete batching, stone crushing and other plants that they may be required for the purpose of construction. The NOC certificates need to be obtained from the nearest regional offices of the SPCB. Wherein the existing plants are used, the contractor shall ensure that all applicable consents are obtained for operating the plant.

5. The Land Acquisition Act (LA) of 1894 amended in 1985
The private land acquisition will be guided by the provisions and procedures outlined in this Act. As per the LA Act, the District Collector or any other officer designated will function as the Land Acquisition Officer on behalf of the Government. There is a provision for consent award to reduce the time for processing if the land owners are willing to agree for the price fixed by the Land Acquisition Officer. The option of acquiring lands through private negotiations is also available. The application of the Act on the proposed project components are **Cyclone shelters/Saline embankments/Coastal canals/Roads/Culverts/Bridges/Transmission Tower:** Any land acquisition required for the activity should be in compliance with the aforesaid Act, and the policy that is adopted by the respective state government.

6. Ancient Monuments and Archaeological Sites and Remains Rule 1959
As per the Act, area within a radius of 100m and 300m from the "protected property" are designated as "protected area" and "controlled area" respectively. No development activity (including mining operations and construction) is permitted in the "protected area" and all development activities likely to damage the protected property are not permitted in the "controlled area" without prior permission of the Archaeological Survey of India (ASI). Protected property entails the site/remains/ monuments are protected by ASI or the State Department of Archaeology. The application of the Act on the proposed project components are **Cyclone shelters/Saline embankments/Coastal canals/Roads/Culverts/Bridges/Transmission Tower:** Activities in protected areas should not be undertaken. If activities are to be done in the controlled area of protected properties, then the implementing agency /line department need to under take the necessary clearances from ASI.

7. National Rehabilitation and Resettlement Policy, 2007
This policy strikes a balance between the need for land for developmental activities & protecting

the interests of land owners and others. The benefits under the new policy are available to all Project Affected Persons (PAP) & families whose land, property or livelihood is adversely affected by land acquisition, involuntary displacement due to natural calamities, etc.

The application of the Act on the proposed project components are:
Cyclone shelters/Saline embankments/Coastal canals/Roads/Culverts/Bridges/Transmission Tower:
All PAPs for the sub-projects should be compensated accordingly. State specific Rehabilitation & Resettlement Policies also apply based on the Entitlement Matrix adopted for the project.

8. The Ramsar Convention on Wetlands of International Importance 1971

The Ramsar Convention is an international treaty for the conservation and sustainable utilization of wetlands i.e. to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific and recreational value.

The application of the Act on the proposed project components are:
Cyclone shelters/Saline embankments/Coastal canals/Roads/Culverts/Bridges/Transmission Tower:
According to the Ramsar list of Wetlands of International Importance, there are 25 designated wetlands in the country which are required to be protected. Activities undertaken in the proximity of these wetlands should follow the guidelines of the convention.

***Note** : Should there be any changes enacted by the Government of India in the provisions in the various acts or notifications under the Environment Protection Act, Environment Rules during the course of implementation of the project, then compliance to the amended rules and regulations as applicable on the subprojects will become mandatory.*

2.2 World Bank Policies

The World Bank's environmental and social safeguard policies (ten of them) are a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and the environment in the development process. These policies provide guidelines for the identification, preparation, and implementation of programs and projects. The following policies are relevant for considerations under this ESMF.

9. Environmental Assessment (OP 4.01)

Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental impacts associated with Bank lending operations early in the project cycle. The policy states that EA and mitigation plans are required for all projects having significant adverse environmental impacts or involuntary resettlement. EA's should include analysis of alternative designs and sites, or consideration of "no option" requiring public participation and information disclosure before the Bank approves the project. In World Bank operations, the purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected

people have been properly consulted and their concerns addressed. The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment.

10. Involuntary Resettlement (OP 4.12)

The Bank's Operational Policy 4.12: Involuntary Resettlement is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects.

11. Indigenous Peoples (OP 4.10)

The World Bank Policy on indigenous peoples, OP/BP 4.10, Indigenous Peoples, underscores the need for borrowers and Bank staff to identify indigenous peoples, consult with them, ensure that they participate in, and benefit from Bank-funded operations in a culturally appropriate way - and that adverse impacts on them are avoided, or where not feasible, minimized or mitigated.

12. Cultural Property (OP4.11)

The World Bank Policy OP / BP 4.11 defines Physical cultural resources as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community.

The Bank assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances. The impacts on physical cultural resources resulting from project activities, including mitigating measures, may not contravene either the borrower's national legislation, or its obligations under relevant international environmental treaties and agreements.

The borrower addresses impacts on physical cultural resources in projects proposed for Bank financing, as an integral part of the environmental assessment (EA) process.

13. Natural Habitat (OP 4.04)

The policy implementation ensures that Bank-supported development projects give proper consideration to the conservation of natural habitats, in order to safeguard their unique biodiversity and ensure the sustainability of the environmental services and products which natural habitats provide to human society.

This policy is applicable when a project (including any subproject under a sector investment

or financial intermediary loan) **with the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly** (through construction) **or indirectly** (through human activities induced by the project).

14. Forest Policy (OP 4.36)

The implementation of the policy ensures that envisaged forest sector activities and other Bank sponsored interventions which have the potential to impact significantly upon forested areas:
(a) do not encroach upon significant natural forest areas that serve important social, environmental or local economic purposes
(b) do not compromise the rights of local communities to continue their traditional use of forests in a sustainable fashion
(c) In the case of primary tropical moist forest, do not finance commercial logging operations, nor the purchase of equipment for this purpose.

This policy is applicable wherein any of the project components by any proposal finance commercial logging operations / equipment, no government commitment for sustainable forest management, proposed activity in forest areas of high ecological value or proposed plantations.

Chapter 3: Baseline

This chapter provides a generic overview of the situation across the different states where investment under the NCRMP is being proposed. In addition, while preparing the ESMF, site visits have been made in all the participating States – refer Annexure 10 for the list of sites visited.

Based on these visits and a study of the States, the potential environment and social impacts of the investments have been identified and are sought to be addressed. These have been detailed in Chapters 5 and 7 on potential environment and social concerns. The screening form provided in Chapter 4 and the EMPs in Chapter 6 are based on this assessment of potential social and environment factors.

3.1 Orissa

3.1.1 Introduction

The state of Orissa extends from Latitude 17° 31' to 20° 31' N and Longitude from 81° 31' to 87° 30' E. It is surrounded by West Bengal North East, Bihar in North, Andhra Pradesh on the South East, and Chhattisgarh in the West and Bay of Bengal in the East. The total area is 155707 sq. km., which is divided into two natural divisions: The Coastal Plain & North Western Plateau. The location map of the state is given below:

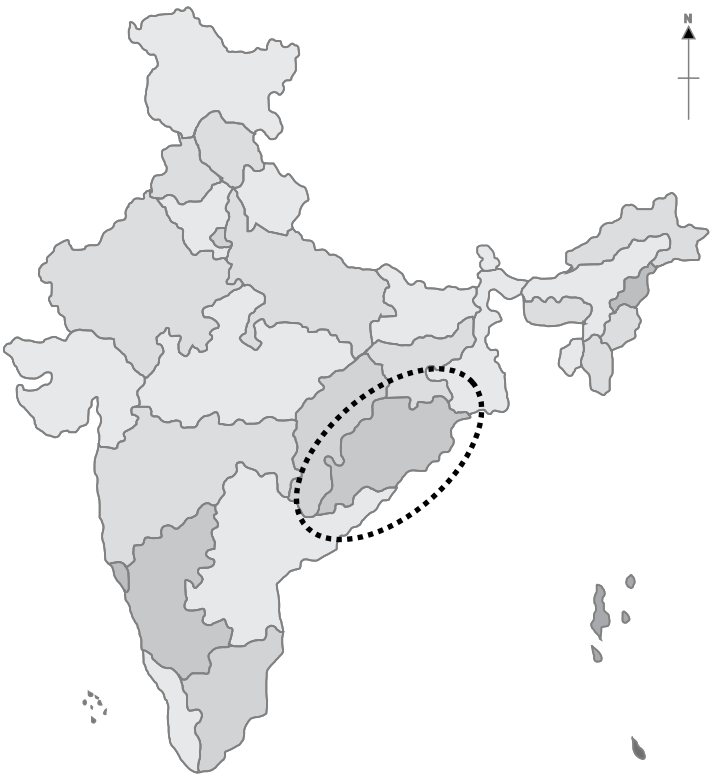


Figure 3.1. Orissa map

3.1.2 General Administration

The state is divided into 30 districts[1] consisting of 58 sub-divisions, 138 towns, 171 Tahsils, 314 Blocks, 6234 Gram Panchayats and 51349 villages. There are two Municipal Corporation working in Orissa, namely Bhubaneswar Municipal Corporation & Cuttack Municipal Corporation. Simultaneously 35 Municipalities and 66 Notified Area Council have been established. The total population as per 2001 census is 3,68,04,660. The number of Assembly Constituencies is 147 while that of Loksabha is 21 & Rajya Sabha is 10.

The areas proposed for Investment in the State of Orissa are located in the coastal areas of the districts of Ganjam, Khurda, Puri, Kendrapara, Jagjitsinghpur, Bhadrak and Balasore.

3.1.3 Climate

The state has tropical climate, characterized by high temperature, high humidity, medium to high rainfall and short and mild winters. On the basis of climate type, Orissa has been divided into ten agro-climatic zones. The normal rainfall of the state is 1451.2 mm. About 75% to 80% of rainfall is received from June to September. Floods, droughts and cyclones occur almost every year in varying intensity. The list of cyclone/earthquake occurrences in the state is given in Annexure 5.

3.1.4 Coastal environments

The Orissa coast, which is 480 km long and 10-100 km wide, forms a part of east coast of India. The coastal territory is drained by a number of rives like Mahanadi, Brahmani, Baitarani, Devi, Budhabalanga, Subarnarekha, Rushikalya and some other smaller ones. These rivers carry a large volume of sediments which have formed the above huge single delta. The coast line is in general oblique to the global wind system which generates strong littoral currents and represents one of the world's largest littoral drift areas with 1 million cubic meters of drift at Paradip. The average spring tide in the Orissa coast varies from 1m to 4m. The average significant wave height is within 2m. In the Northern Orissa coast, i.e. north of Dhamra coast, the tidal range increases and wave energy diminishes resulting in formation of mudflats. The brackish water coastal lagoon i.e. Chilika lagoon has been formed because of formation and growth of barrier spit from Paluru. The other important features of Orissa coast are mangroves, estuaries and other related sedimentary as well as sandy environments like sand dunes.

The oxygen values at Gopalpur transect exhibit relatively lower values of BOD and nitrate indicating the impact of discharge of untreated, domestic sewage. The sediment samples also showed high concentrations of lead and mercury.

A study of sources of pollution along the coastal waters revealed that direct discharge of domestic and industrial wastes was confined to few places. When the discharges reach coastal waters, there is a dilution due to interaction of salt and sea water and lack of flushing in certain areas, and the pollutans settle down and get absorbed and accumulated in sediments. Such areas are likely to become highly polluted areas (hot spots) in due course, severely affecting the benthic fauna and other bottom feeding organisms. Puri, Gopalpur port, Paradip port, mouth of rivers Subarnarekha, Baitharani, and Chilka Lake have been identified as such hot spots.

3.1.5 Soil

The soil of Orissa may be classified as transported and residual soil on the basis of its mode of formation. The catchment basins of the different drainage systems in Orissa are dominated by

Source: http://www.envis.nic.in/soer/soer-orissa/soer.htm

granite and gneissic rock, which have resulted in sandy soil. Clayey soils are predominant in the middle and lower reaches of the drainage channels.

3.1.6 Forests

In 1990, the state had only 57,183 sq. km of forests, which constituted 36.7% of the total geographical area of the state. However as per remote sensing data, the actual forest cover was only 30.3% of the total geographical area. The break up of the forest area is as:

- Parts of Angul, Balasore, Bargarh, Bolangir, Boudh, Cuttack, Deogarh, Dhenkanal, Gajapati, Ganjam, Jajpur, Jharsuguda, Kalahandi, Kandhmal, Keonjhar, Khurda, Koraput, Malkangiri, Mayurbhanj, Nabrangpur, Nayagarh, Nuapada, Puri, Rayagada, Sambalpur, Sonepur, Sundargarh districts – Dense forest (ecologically sound) – 27,349 sq. km
- Sparse dense forest (ecologically sensitive forest) – 19,661 sq. km
- Parts of Balasore, Bhadrak, Jagatsinghpur and Kendrapara districts – Tidal (Mangrove) forest – 195 sq. km
- Almost devoid of trees and fallow forest land – 9,978 sq. km
- Parts of Balasore, Bargarh, Bolangir, Boudh, Cuttack, Deogarh, Dhenkanal, Gajapati, Ganjam, Jagatsinghpur, Jajpur, Jharsuguda, Kalahandi, Kandhmal, Kendrapara, Keonjhar, Khurda, Koraput, Malkangiri, Mayurbhanj, Nabrangpur, Nayagarh, Puri, Rayagada, Sambalpur, Sonepur, Sundargarh districts – Reserve Forests
- Nandanakanan,Bhitarkanika,Similpal – National Parks
- Bhitarkanika, Chilika Lake, Similpal National Park, Nandankanan, Raigarh, Dhenkanal, Deogarh Sanctuary, Balukhand Sanctuary, Puri,Ushakothi Sanctuary, Sambalpur ,Avayaranya Sanctuary, Sambalpur ,Chilika Lake – Wildlife and Bird Sanctuaries
- Similipal – Tiger and Biosphere Reserve
- Chilika Lake and Bhitarkanika Mangroves – Ramsar areas

However, as per the remote sensing data given by the Forest Survey of India (FSI) the actual forest area is still being reduced. Koraput district alone lost about 7229 sq. km of forests since 1972 due to shifting cultivation. The Government of Orissa also reported that by 1993, the dense forest cover has further reduced to 18,000 sq. km (16.9% of the total area of the state).

3.1.7 Mangroves

The coastal mangroves house a number of rare and endangered species. Some of the mangrove species, including 38 angiospermic taxa have been identified to have medicinal values. Mangrove forests comprise taxonomically diverse, salt tolerant trees and other plant species, which thrive in inter-tidal zones of sheltered tropical source, estuaries and over-wash islands. Mangrove forest, which once dominated have depleted due to over-harvesting, fresh water diversion, urban growth pressures, charcoal and timber industries and mounting pollution. Rapid depletion of mangrove forest has made Orissa coast vulnerable to cyclones.

3.1.8 Seismic zones

According to GSHAP data, the state of Orissa falls in a region of low to moderate seismic hazard. As per the 2002 Bureau of Indian Standards (BIS) map, Orissa also falls in Zones II & III. Historically, parts of the state have experienced seismic activity in the M4.0 range. The seismic zone map of the state is given in the Annexure 4.

3.1.9 Socio-Economic Profile of coastal regions

The coastal region of Orissa comprises 6 districts - Balasore (80km), Bhadrak (50 km), Kendrapara (68km), Jagatsinghpur (67 km), Puri (155 km), and Ganjam (60 km), with Puri covering more than a third of the coastline. These 6 districts cover more than 14.5 % of the total land area in the state, but contain nearly 30% of its total population with an average population density more than twice that of the state as a whole (420 against 203). Nearly 89% of the coastal population resides in rural areas. Orissa has a total of 589 marine and 3289 inland fishing villages (Handbook on Fisheries Statistics of Orissa, 2000/2001). The distribution of poor people in the coastal, southern and northern zones of the state is 45, 25 and 32 respectively. Of the 45 % of poor people, 19% fall into 'very poor' and 26% into 'moderately poor' categories.

	Balasore	**Bhadrak**	**Ganjam**	**Jagatsinghpur**	**Kendrapara**	**Puri**
Population density (persons per Sq km)	546	532	385	NA	NA	NA
Sex Ratio (Female per 1000 male)	949	974	998	962	1014	923
Literacy Rate	60.90%	73.86%	46.72%	75%	77.33%	75%
Male Literacy	70.10%	84.65%	63.98%	81%	87.62%	80%
Female Literacy	51.20%	62.85%	29.87%	69%	67.29%	70%
Rural Families	167974	215185	4788.99	172300	219436	23672
Rural families below poverty line	121550	136849	293493	92920	1313424	163639
Percentage of BPL families to rural families	72%	64%	61%	54%	60%	69%

These six coastal districts are often subjected to tropical storm systems like cyclones as well as storm induced flooding and surges. With the burgeoning population, the threat of the coastal vulnerability risk has increased manifold. Severe flooding caused by storm surges during the 1999 super cyclone caused massive damage to life and property. The main agricultural products of the region include paddy, black gram, coconuts, betel leaves, cashew nuts etc. Fish catch and prawn culture are dominating the scene. Poverty and underdevelopment is the striking feature of theses areas.

3.1.10 Existing Infrastructure

1. Availability of Cyclone shelters and other cyclone resistant buildings:
Prior to 1999, only 23 cyclone shelters constructed by German Red Cross existed. In the post 1999 period, 97 Multipurpose Cyclones Shelters (MCS) have been constructed by the state government in the 10 km band of sea coast line through World Bank and CMRF support. 10,042 school buildings have also been constructed which can be utilized as shelter places. Further, 41 Cyclone Shelters buildings are being constructed by OSDMA through PMNRF. Indian Red Cross has built 42 more Cyclone Shelters here. The total number of Cyclone Shelters available is 204.

2. Shelterbelt plantation/mangroves and their impact on mitigating cyclone risks:
The shelterbelt plantations and mangroves were severely damaged due to severe cyclones in 1971 and super cyclone in 1999. The Cyclone Distress Mitigation Committee appointed by the GoI. in 1971 recommended afforestation along the coast up to 1km deep to protect to hinter land against the high winds and prevents soil erosion. Basing on the above recommendations coastal shelterbelt plantations to a depth 1km were raised between 1972 and 1986. But these plantations were uprooted and damaged due to the severe cyclone on 17th October 1999 and Super Cyclone of 29th October 1999.

3. Embankment Sector:
Flood embankment for a length of about 877 km and canal embankment of 332 km has been raised/ strengthened with World Bank assistance. 82 spurs and 19 sluices have been renovated/ reconstructed. 72.47 km of irrigation embankment have been strengthened under Calamity Relief Fund (CRF) assistance. A few km length of irrigation embankment which could not be completed with World Bank assistance in the stipulated project closure period have been completed with CRF assistance

4. Road sector:
275 km of road have been repaired and renovated under Works Department, 448 km of road under Rural Development Department and about 85 km of urban road under Housing & Urban Development Department have also been reconstructed with World Bank assistance. About 5 km of urban road and 28.46 km of road under Works Department have been reconstructed with assistance from CRF. 10 km of road is under construction with CRF assistance. 8.2 km of road works under Works Department, 66.6 km of road under R.D. Department which could not be completed with World Bank assistance in the stipulated project closure period have been completed with CRF assistance

3.1.11 Conclusion

The coastal districts of Orissa are prone to frequent cyclonic storms and concurrent flood hazards causing considerable loss and damage. The worst disaster of the 20th century hit coastal Orissa in the form of super cyclone in October 1999 inflicting severe damage. The State Government therefore has prior experience in creating disaster mitigation infrastructure with the objective of protecting life during cyclone and strengthening community based disaster preparedness.

A summary of such past experiences, problems faced by the State and future considerations is as follows:

1. Cyclone Shelters:
In the past, the Cyclone Shelters built by the State have been used for multiple purposes like schools, health centres and community centres during non-cyclonic/non-emergency periods. This ensured that the buildings are regularly maintained and hence do not fall into disrepair due to non-usage and lack of ownership.

The shelters are handed over to the community based Cyclone Shelter Management and Maintenance Committees (CSMMCs) for which budgetary allocations are provided through a Corpus Fund set up by the Government of Orissa. The CSMMC members and the community at large are oriented and trained regularly. Hence, an atmosphere of Community ownership and involvement in asset management is ensured.

In order to provide easy access to shelter and safety to the vulnerable population, the buildings are located in the precincts of specific villages and they are equipped with adequate shelter equipment to be availed during emergencies. As it is usually preferred to build the shelters within the village boundaries, it is not always possible to select optimally suitable sites for construction. Hence the buildings are designed with adequate plinth heights to ensure that it is well above the High Flood Level (HFL).

The shelters are usually built on public land and local labour is used for the construction which renders the setting up of construction camps unnecessary.

The primary issue faced by the State in the past has been that of ensuring adequate connectivity to the shelters. Due to an inadequately developed roads network connecting the shelter to its catchment population, accessibility is highly compromised and the structures cannot be utilized completely during emergency situations. In order to remedy the situation, the State has proposed to build connecting roads both to the proposed as well as some of the existing Cyclone Shelters. The connectivity gaps are therefore being suitably addressed under the NCRMP proposal.

The following aspects may also need to be considered by the State:

- As the Shelters would be constructed in the coastal areas, it is likely that they may require CRZ clearances (where applicable)
- In certain instances, there would be clearance of trees and shrubbery at the site

2. Saline Embankments**:**

Most of the embankments in the State are located in close proximity to the sea and hence may be subject to CRZ clearances. The presence of eco-sensitive areas (especially turtle nesting sites) in the nearby areas is also a critical factor that needs to be considered. Hence, necessary regulatory approvals and environmental measures may be required by the State.

Strengthening and extension of embankments may involve linear acquisition of land. In several parts of the State, this land is under private cultivation. However, as the embankments are usually in areas that are prone to flooding, the experience of the State has been that people voluntarily donate the land holdings in view of the expected benefits from avoiding floods.

Besides the factors listed above, the experience of the State with reference to construction of embankments has also indicated consideration for the following matters:

- *Flooding:* while planning construction, due consideration needs be given to the design and number of sluices to evacuate the excess water during ebb, with proper gates which can keep the water level in the system within acceptable limits and can prevent intrusion of saline water through the gates during high tides
- *Damage to standing crops: I*n order to avoid damage to the existing crops, the construction is usually planned to start after the cropping season. However, where it is not possible, adequate compensation is usually provided to the affected farmers.
- *Burrow areas:* In several instances, villagers donate their land for use as burrow areas as the site/plot can then be used for pisciculture. Where this is not done, consideration needs to be taken for obtaining that shall be transported from burrow sites at a distance
- *Mangrove areas:* In certain instances, mangrove areas may be damaged due to the construction of embankments.
- *Local communities:* Certain communities are dependent on the forests, fishing areas and other ecological resources in the area and adequate care needs to be taken to ensure that these communities are not harmed or denied the proper use of these resources as a result of the proposed interventions.

3. Roads**:**

The strengthening and improvement of existing village and other district roads is unlikely to have any environmentally or socially adverse effects as these are existing roads. However, in certain areas there may be tree-cutting or linear acquisition of land. The areas close to ecologically sensitive areas and within the CRZ areas need to be separately addressed. Besides, care needs to be taken to ensure that the Cross-Drainage works are provided to avoid flooding due to the construction of roads in the area.

3.2 Andhra Pradesh

3.2.1 Introduction

Andhra Pradesh was formed in 1956 on the basis of language. It is the fifth largest State[2] in India both in terms of area as well as population. The total area of the State is, 75,045 Sq. Kms of which 2,70,588.98 Sq. Kms is under rural and balance 4,480.02 Sq. Kms is urban area. Madhya Pradesh, Chattisgarh, and Orissa bound the State in the North, the Bay of Bengal in the East, Tamil Nadu, and Karnataka on the South and Karnataka and Maharashtra on the West. The statistical details of the State are shown in the Table below:

Physiologically, the State is divided into three zones of Coastal plains, Eastern Ghats, and the plains. The climate in the State is tropical, mostly hot and humid particularly in the coastal belt. The average temperature is 31.58°C. The location map of the state is given below:

Figure 3.2. Andhra Pradesh map

3.2.2 General Administration

Andhra Pradesh can be divided into three regions, namely Coastal Andhra, Rayalaseema and Telangana. The State has 23 districts: Adilabad, Anantapur, Chittoor, Kadapa, East Godavari, Guntur, Hyderabad, Karimnagar, Khammam, Krishna, Kurnool, Mahbubnagar, Medak, Nalgonda, Sri Potti Sreeramulu Nellore, Nizamabad, Prakasam, Rangareddy, Srikakulam, Visakhapatnam, Vizianagaram, Warangal and West Godavari. Each district is divided into multiple mandals and each mandal is a group of a few villages.

[2] Source: http://www.envis.nic.in/soer/ap/soeap%5B1%5D.htm

The areas proposed for Investment in the State of Andhra Pradesh are located in the coastal areas of the districts of Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Ongole, Prakasam and Nellore.

3.2.3 Climate

The state has a tropical climate, mostly hot and humid. Annual average temperature is 31.5^{o}C. The state is principally fed by the southwest monsoon while the northeast monsoon contributes about a third of the rainfall. The east coast region has been prone to disastrous cyclonic storms which have destroyed much life and the livelihood of the villagers in this area.

3.2.4 Coastal Environments

The 974 kms long coastline of Andhra Pradesh, a very productive stretch along the Bay of Bengal, supports a variety of economic activities. Multifarious industrial complexes, human settlements, fisheries, tourism, are all coming up along the coastline.

Ever increasing population and rapid developmental activities along the coastal zone, make coastal zone management a complex exercise. Increase in offshore activities for oil and gas extraction, mining of deposits, shipping and marine transportation add further complexity to the overall situation.

The coastal zone, an interface between land and water is traversed by important rivers such as Krishna and Godavari and other minor rivers such as Pennar, all of which drain into the Bay of Bengal. In addition, there are several creeks and important lakes such as Pulicat and Kolleru which again connects to the Bay of Bengal.

The continental shelf stretches over an area of 0.31 lakh sq. kms constituting 7.4 percent of the total 4.15 lakh sq.kms. Andhra Pradesh is one of the biggest maritime states of India having 453 maritime villages and 280 fish landing centers stretching along nine coastal districts and two major functional fishing harbors at Visakhapatnam and Kakinada. It is considered to be the second-highest cargo-handling state in India and has one major port at Visakhapatnam, two intermediate ports at Kakinada and Machilipatnam and 10 minor ports within the state

The coastal environment is being altered at ever-increasing rates, often without looking ahead at future consequences. This is due to a multitude of human activities. The coastal zone receives a vast quantity of sewage waste, dredge spoils, industrial effluents and river runoff. These markedly affect the composition and quality of coastal environment, causing marine pollution.

The studies conducted by the National Institute of Oceanography (NIO), Regional centre, Visakhapatnam, concluded that the impact of the anthropogenic inputs such as industrial effluents and domestic sewage has resulted in deterioration of water quality, causing mass mortality of fish due to asphyxiation. The new industrial developments along the coastline, like development of pharma-city and the effluent discharge needs attention. In view of lack of economically viable technologies to treat large effluents from industrial processes, the industrial groups, which are located in land-locked areas, are identifying new sites along the coast for discharge of effluents, bringing tremendous pressure on water resources, both for industrial and infrastructure needs, which may result in salt-water intrusions into groundwater zones .

3.2.5 Soil

The state is endowed with a wide variety of soils. These range from less fertile coastal sands to highly fertile deltaic alluviums. The six major soil groups present in the state are red soils, black

soils, alluvial soils, coastal sands, laterite and lateritic soils and problem soils which include saline, saline alkali and non saline alkali soils.

3.2.6 Forests

Forests represent not only biodiversity but are also instrumental in conservation of water, soil etc. They are also sources of nutrients for a large population especially through the non-timber forest produce (NTFP). Forests also contribute sources of fuel, timber, pulpwood etc. The forest types of Andhra Pradesh include Southern tropical thorn forest, Southern tropical moist deciduous, Tropical dry deciduous, Littoral and Mangroves representing 16,110, 16,110, 28,431, 2,856 and 317 sq. km respectively.

The forests also form major source of revenue to the Government. The major items which contribute to the State Exchequer are timber, bamboo, beedi leaf (Diospyrous melanoxylon) and non timber forest produce and minor forest produce (NTFP and MFP). The annual revenue from timber, bamboo and beedi leaf is about 40, 20 and 24 crore rupees respectively and about five crore rupees from NTFP. The forests are also the main source of livelihood for tribal people and other villagers living in and around the forest area. The beedi leaf collection in the lean summer months of April and May alone generates an employment of 80 lakh mandays. Similarly about one lakh mandays are generated by way of work involved in bamboo working and NTFP collection. The major beneficiaries are tribal.

As per the State Forest Report, 2001, published by the Forest Survey of India, Dehradun, the forest cover is 16.23% and recorded forest area is 23.20% of the State geographical area. The changes in forest cover as per 2001 assessment as compared to 1999 assessment shows a gain of 408 sq. km. These are in the districts, which happen to be catchments areas of Godavari, Vamsadhara, Swarnamuki and other small rivers. The efforts to adopt joint forest management seem to be paying dividends as the 2001 assessment shows improvement in the net forest cover.

3.2.7 Mangrove

According to Mangrove Cover Assessment 2003, the state of Andhra Pradesh has 15 sq. km of moderately dense mangroves, 314 sq. km of open mangroves. The major mangrove cover lies in the district of East Godavari, followed by Guntur, Krishna and Prakasham districts. However the mangrove cover of the Godavari delta is fast depleting due to the impact of shrimp aquaculture. The mangrove cover has reduced from 495 hectares in 1987 to 333 hectares in 2001. According to the study by Andhra Pradesh Remote Sensing Application Center in the year 1999, the impacts of shrimp aquaculture on land use in Godavari Delta is given in the table below:

Land use	Land use area in hectares			Converted to Shrimp farms		
	1989	1997	1999	1987-97	1997-99	1989-99
Crop land	-	-	-	4543	2324	6903
Fallow land	-	-	-	3149	1327	4497
Dense mangroves	16586	15987	15318	433	471	1137
Sparse mangroves	4530	3786	3199	604	666	1030
Total mangroves	21116	19773	18517	1037	1137	2187

Table 2.1. Impact of Shrimp Agriculture on land use in Godavari Delta

The list of mangrove species grown in the state of Andhra Pradesh is given in the Annexure 10.

3.2.8 Seismic zones

According to GSHAP data, the state of Andhra Pradesh falls in a region with low to moderate seismic hazard. As per the 2002 Bureau of Indian Standards (BIS) map, the state falls in Zones II & III. Historically parts of the state have experienced seismic activity in the M5.0-6.0 range. The seismic zone map of the state is given in the Annexure 4.

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3.2.9 Socio-Economic profile of coastal regions

The state's economy is agrarian oriented. Of ate, rapid growth of industrialization has resulted in growth of economy. The GDDP of the state stands at Rs.16338467 lakhs where as the per-capita income is rupees 19,087 at (2002-2003 ®) current prices. However, in the project area, the per-capita income stands at average rupees 19,915

Item	Unit	State	**Project Districts**	Srikakulam	Vizia-nagaram	Visakha patnam	East Godavari	West Godavari	Krishna	Guntur	Prakasam	Nellore
Literates	Nos.	39,934,323	**17,534,938**	1,217,659	997,482	2,002,316	2,807,728	2,458,822	2,539,974	2,455,965	1,532,126	1,522,866
Literacy rate	%	60.5	**62**	55.3	51.1	60.0	65.5	73.5	68.8	62.5	57.4	65.1
Rural Population as % to Total Population	%	72.70	**75.33**	89.02	81.67	60.05	76.50	80.26	67.92	71.20	84.72	77.55
Population below poverty line												
Scheduled Caste Population	Nos.	12,339,496	**5,172,956**	229,609	238,023	291,219	881,650	728,963	746,832	818,005	651,498	587,157
Scheduled Tribe Population	Nos.	5,024,104	**1,888,146**	151,249	214,839	557,572	191,561	96,659	107,611	208,157	118,241	242,257
Classification of Workers												
(A) Total Workers (i+ii)	No	34,893,859	**14,378,432**	1,201,816	1,174,164	1,602,761	1,940,214	1,678,335	1,841,597	2,190,299	1,537,544	1,211,702
a) Cultivators (i+ii)	"	7,859,534	**2,651,583**	266,702	331,882	433,777	218,947	209,055	209,485	389,821	378,494	213,420
b)Agriculture Labourers (i+ii)	"	13,832,152	**6,553,355**	557,032	471,381	421,612	985,980	951,723	877,277	1,073,447	673,018	541,885
c)Household Industry (i+ii)	"	1,642,105	**489,427**	49,540	43,405	56,394	78,112	49,637	54,202	53,177	56,469	48,491

3.2.10 Existing Infrastructure

1. Availability of Cyclone shelters and other cyclone resistant buildings

The Government of A.P. with its past experience of cyclonic storms, have constructed 1136 cyclone shelters, out of which now 126 cyclone shelters need repairs and 59 are in dilapidated condition. The maintenance, construction and repairs of cyclone shelters are being looked after by the Panchayati Raj Engineering Department with funds provided by the GoAP. In the last financial year, for repairs of shelters a sum of Rs.81.00 lakhs has been released with which 252 shelters were repaired. This year also a sum of Rs.236 lakhs is budgeted for maintenance and repairs of 1136 cyclone shelters. The cyclone shelters are kept under the control of the local Panchayat Raj authorities and in normal times they are being utilized as Schools, Anganwadi Centres, Fair price shops, Community Centres etc.

Cyclone shelters constructed by different organizations:

Sl.no.	District	PR Dept	R&B Dept	Indian Red Cross Society	Other Voluntary Organizations	Total Shelters
1	Srikakulam	9	105	25	0	139
2	Vizianagaram	2	36	4	0	42
3	Visakhapatnam	10	104	28	4	146
4	East Godavari	46	73	34	17	170
5	West Godavari	32	29	5	0	66
6	Krishna	1	12	80	73	166
7	Guntur	4	52	41	23	120
8	Prakasam	20	55	13	2	90
9	Nellore	19	118	49	5	191
Project Districts		**143**	**584**	**279**	**124**	**1130**
10	Khammam	6	0	0	0	6
	Total	**149**	**584**	**279**	**124**	**1136**

2. Shelterbelt plantation/ mangroves

The non-structural methods in handling disasters have been gradually evolved by the community with the traditional knowledge and strength. These have been time tested, economic, and cost effective, of user-friendly technology and can be done by local people. The non-structural mitigation plans should be made popular and encourage people to do things themselves. Financial incentives will encourage people to adopt them. Example – planting of Coastal Mangrove, Casuarina, Cashew Nut Trees, etc.

A.P. has a coastline of nearly 974 K.M. out of this coastal shelter-belt plantation comprising of Casuarina, Palmyrah and Mangrove were raised in 822 k.m. incurring an expenditure of Rs.18.20 crores. These plantations have been made in a coastal belt of 0.15 kms. of the coastline. Apart from this 804.53 lakh seedlings were raised and distributed among farmers for plantation in private farmlands within an area of 5 km. Lids from the Coastline to create tree cover

3. Embankments

The Kona tidal bank having a length of 18.55 kms connects the right bank of Gunderu Major Drain near Polatitippa Village with the Krishna left flood bank near Malakayalanka Village. It protects an ayacut of 20,000 acres from the tidal waters. The total length of the Kruthivennu Mandal Tidal Bank is 15.0 kms. It protects an ayacut of 11,600 acres from the tidal water and also the nearby villages. During the 1977 cyclone, these banks were completely wiped out and were re-constructed with higher standards within the same year. Due to inadequate maintenance, these bunds thinned over time. During the cyclone in May 1990, the sea water overtopped the bunds at several places causing heavy scours. The sea water not only damaged the

bunds but also entered into the agricultural lands and sand impacting the areas nearby. Under the Cyclone Emergency Reconstruction project (CERP) from 1990-91 to 1994-95, the Banks were reconstructed keeping the top levels at par with the flood banks. Frequent cyclones and disasters thereafter including Tsunami in 2004 and OGNI cyclone in 2006 badly damaged the tidal banks. In addition, lack of maintenance and repair work also deteriorated the condition of these banks. The Kona tidal bank is therefore proposed for restoration to the CERP standards based on the representations of Village presidents and Water User's Association presidents, that these banks be restored to the flood bank ISI standards.

4. Roads & Bridges

Out of 67,362 Km of road network in the state, the nine coastal districts covers 26,000 km of road length. The roads in coastal districts have bridged crossings at many places. However, some crucial /vulnerable locations along the coastal roads are still in need of linking bridges both High Level Bridges and Minor bridges to establish a continuous chainage to the network of other major roads in the vicinity, to reduce the risk of vulnerable habitations being cutoff from the major road networks in the hinterland during cyclones, monsoons, storm surges, floods, etc. and to provide free access to traffic for transportation of relief material, quick evacuation of all habitants, both human and animal, near the coastal area to safer places during emergencies. The different connecting roads to the various habitations in the zones refereed above are being managed and maintained by different Government departments such as Gram Panchayat (GP), Panchayati Raj Engineering Department (PRED), Municipal Engineering Department (MED) and Roads and Buildings Department (R&B).

Further, there are 118, 235 Kms of road network in rural road sector in Andhra Pradesh. The distribution by category and surface type of these roads is as follows:

Length of Rural Roads *in Kms*				
by Category		***by Surface Type***		
ODR	8,053		CC	1,219
MDR	2,123		B.T	16,863
VR	108,059		WBM	32,089
		Unmetalled	Motorable/ Gravel	38,721
			Unmotorable/ Earthen	29,343
Total	**118,235**		**Total**	**118235**

The following table presents a distribution of roads by category in the cyclone prone areas of the State:

Distribution of roads in Cyclone Prone areas				
Category	Surface	Zone-I (0-2.5 Kms)	Zone-II (2.5 – 5 kms)	Zone-III (5 – 10 kms)
VR	BT	9.65 km	9.09 km	8.16 km
	Earthen	255.83 km	271.61 km	368.45 km
	WBM	61.42 km	56.56 km	69.36 km

3.2.11 Conclusion:

The Government of A.P. with its past experience of cyclonic storms, have constructed disaster mitigation infrastructure previously, though most of them are now in severe need of repairs and renovation

A summary of such past experiences, problems faced by the State and future considerations is as follows:

1. Cyclone Shelters:
A crucial factor hindering the efficient use of the Cyclone Shelters in the State is inadequate connectivity. The earlier buildings were not well connected to their catchment population due to the lack of a well developed roads network. In the NCRMP proposal, adequate measures have been incorporated to ensure connectivity to all shelters.

Further, the earlier structures were rendered unusable due to several factors, including:

- Lack of ownership and inadequate maintenance over the years.
- Shelters were not built within specific village boundaries but were situated in the common grounds connecting two or more villages. As a result, these were not put to regular use during ordinary times and certain structures became disused/were used for anti-social activities
- Certain shelters did not have basic amenities such as water, electricity and were not equipped with emergency equipment.
- The design parameters used by the State in the past included circular buildings which were both difficult to construct as well as not practically usable. Adequate design modifications were made over a period of time to address these concerns.

As part of the NCRMP, the State has drawn lessons from its experiences especially in terms of location, use of shelter during normal times, amenities to be provided etc.

Further, certain buildings may be constructed in close proximity to the sea. Accordingly, adequate approvals may be required from relevant authorities to ensure compliance to CRZ norms and conditions.

2. Bridges:
Bridges serve as important links to the community and assist in improving communication and transportation. Some of the bridges proposed under NCRMP are in CRZ zones, and in such cases, it needs to be ensured that adequate approvals are taken from the relevant authorities to ensure compliance to CRZ norms and conditions.

Some of the proposed structures also involve the dismantling of old structures and construction of new structures with a fresh alignment. Any such fresh construction will necessarily involve linear land acquisition. It will be ensured that suitable measures are adopted to provide adequate compensations to the affected population wherever necessary.

The construction plan will also be designed to incorporate suitable and safe mechanisms in disposal of debris.

Adequate maintenance provisions have also been built into the proposal to preclude damage/dilapidation of the assets.

3. Embankments:
The primary issue faced by the State in its previous constructions has been that of inadequate maintenance and repair provisions. Due to inadequate maintenance, the embankments thinned over time causing overtopping at several places causing heavy scours. The sea water not only damaged the bunds but also entered into the agricultural lands and sand impacting the areas nearby. Thus, aspects of height of embankment and its maintenance needs to be addressed in the NCRMP proposal. Further, the design parameters also need to include provisions for adequate number and well sited sluices. Certain portions of these embankments are located in close proximity to the sea and hence may be subject to CRZ applicability. Hence, appropriate measures and approvals will be taken from the relavant authorities to ensure compliance with all environment norms and conditions.

3.3 Maharashtra

3.3.1 Introduction

Maharashtra is the second most urbanized (judged by the per capita income) and second richest state in India. Its area is 3,06,713 sq.km. It is located between 16°N and 22°N latitudes and 72°E and 80°E longitudes. Its 720 km long coastline stretches from Daman in the north to Goa in the south called the Western Plateau and Hill Regions of India. The location map of the state is given below

:

Figure 3.3. Maharashtra map

3.3.2 General Administration

Maharashtra is divided into thirty-five districts, which are grouped into seven divisions: Aurangabad Division, Amravati Division, Konkan Division, Nagpur Division, Nashik Division, Pune Division, and Nanded Division. These are official revenue divisions of government of Maharashtra. Geographically, historically and according to political sentiments Maharashtra has five main regions: Vidarbha or Berar (Nagpur and Amravati divisions), Marathwada (Aurangabad Division), Khandesh and Northern Maharashtra (Nashik Division), Desh or Western Maharashtra (Pune Division), and Konkan (Konkan Division).

The Investment area proposed in the state of Maharashtra includes the districts of Thane, Ratnagiri, Sindhudurg and Raigad.

3.3.3 Climate

The climate of Maharashtra is typically tropical with hot, rainy and cold weather seasons. The months of March-April and May are hot, while the period between June to September attracts heavy monsoons accompanied with storm surges, rainfall and floods specially along the coast leading to days of inundation in many parts specially in the cities of Mumbai and Thane. From November to February there is a cool dry spell, with clear skies and pleasant weather, though the eastern parts of the state experience rainfall.

3.3.4 Coastal environment

The Dudh, Vaitarna, Ulhas, Amba, Kundalika, Vashishthi, Savitri, Shastri and Terekhol rivers and their tributaries flows westward to drain in to the Arabian Sea in the west. The coastal areas of the Konkan region are populated and developed.. The coastal region is hilly, narrow, highly dissected with transverse ridges of the Western Ghats and at many places extending as promontories, notches, sea caves, embankment, submerged shoals and offshore islands. Some of the major problems faced by the littoral zone and the shore front areas of the coast are related to coastal erosion, siltation, pollution, destruction of mangrove swamps, salt marshes, sea level rise, landslides and slope failure, pressure of population, industrialization, road transport etc.[3]

As described by the Ministry of Environment and Forests, Government of India, the following are the eco zones in Maharashtra:

- Matheran and surrounding region – Matheran Eco-sensitive Zone
- Mahabaleshwar Tehsil & villages of Bondarwadi, Bhuteghar, Danwali, Taloshi and Umbri of Jaoli Tehsil of Satara District – Eco-sensitive Zone
- Dahanu Taluka, District Thane – Ecologically fragile area
- Murud-Janjira, Raigadh District – prohibiting industries

3.3.5 Soil

The soil and vegetation of the state are related to the climate and geology. The soil in the Deccan plateau is made up of black basalt soil, also known as black cotton soil which is rich in humus. The Wardha – Waliganga river valley has old crystalline rocks and saline soils which make the soil infertile. This type of soil can retain moisture making it suitable for irrigation. The vegetation are mainly in the forest region of the Western Ghats, Satpura ranges and Chandrapur region. The Konkan coast has paddy fields apart from mango and coconut trees as its main vegetation.

3.3.6 Forests

Maharashtra's forest cover in 1970s was 40,700 km^2, which reduced to 30,740 km^2 by 1980-82, and then increased to 46,143 km^2 by 1997 and 47,482 km^2 by 2001. The area under dense forest cover in Maharashtra was increased by 2,991 km^2 from 1997 to 1999 and a further 4,173 km^2

3.3.7 Mangrove

The state's coastline is characterized by pockets of beaches, rocky cliffs flanked by estuaries and patches of mangroves. The mangroves of the state are the most diverse among the west coast covering 116 sq. km as per the Forest Survey of India (FSI) in 2003. However these mangroves are not listed under the Indian Forest Act 1927, but are protected under the CRZ Notification. The details of the mangroves located in the state is given in Annexure 10.

3.3.8 Ecologically sensitive areas

Ratnagiri district

Ratnagiri city is located on the west coast of India, bound by Arabian sea with flora and fauna along its estuaries and woody Mangroves. Birds in these estuaries include egrets, herons, sandpipers, plovers, oyster catchers, kingfishers, lapwings, stilts and moorhens. Fish species include Ambasis Gumnocephalus, Batrachus grunniens, Caranx boops, Chateossus nasus, Chorinemus toloo, Chrysophrys haffara, Echeneis

[3] http://iomenvis.nic.in/EIA's%20Maharashtra.htm

naucratus, Equula dussumieri, E.fasciata, Gerres poeti, Gobius criniger, Hippocampus guttulatus, Mugil carinatus, Platycephalus macracanthus, Naucratus doctor, and Sardinella melanura.

In the Woody mangrove areas, the dominant species are Rhizophora mucronata, R.apiculata, Sonneratia alba, Avicennia officinalis, A.marina, Ceriops tagal, Aegiceras corniculatum, and Excoecaria agallocha. The subdominants are: Bruguiera gymnorrhiza, Kandelia candel, Lumnitzera racemosa, and Derris heterophylla. Acanthus ilicifolius helps as a biomonitor of sewage pollution. Rhizophora apiculata is found only along Bhatye estuary (Kajvi river). There are a total of 28 mangrove species, including mangrove associates.

3.3.9 Seismic zones

The State of Maharashtra falls in a region of moderate to high seismic hazard[4]. As per the 2002 Bureau of Indian Standards (BIS) map, Maharashtra also falls in Zones II, III & IV. Historically, parts of the state have experienced seismic activity in the M6.0 – 6.5 range. The seismic zone map of the state is shown in the Annexure 4.

3.3.10 Socio-Economic Profile of coastal regions

The 6 coastal districts of Maharshtra (Thane, Raigad, Ratnagiri, Sindhudurg, Mumbai and Mumbai Suburban) fall under the Konkan sub-division of Maharashtra). The details of this coastal area are as follows:

- Area: 30,746 km²
- Population (2001 census): 24,807,357
- Districts: Mumbai, Mumbai Suburban, Raigad, Ratnagiri, Sindhudurg, Thane
- Literacy: 81.36%
- Area under irrigation: 4,384.54 km²

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[4] According to GSHAP data,

The district-wise details are as follows:

1991 data	Thane	Raigarh	Ratnagiri	Sindhudurg	Mumbai and Mumbai (Suburban)
Sex Ratio (Female per 1000 male)	858	976		1079	818
Population Density (per sq km)	850.7	308.89	206.78	166.86	21880
Urban Population (%)	72.58	24.2		9.47	774
Literacy Rate	80.67	77	65.13	80.3	82.5
Male Literacy	87.06	86.1	-	90.3	87.87
Female Literacy	73.10	67.7	-	71.2	75.8
Primary Schools	4518	-		1500	-
Secondary Schools	937	-		200	-
Higher Education	189	-		50	-

3.3.11 Existing Infrastructure

1. Anti-Sea Embankments

Maharashtra State has a 720 km long sea coast. About 262 km length is subject to extreme vulnerability on account of wave action and proximity of habitation to the sea. Out of this, protection for 127 Kms has been tackled so far. The length 135 Km is yet to be protected. The works are mainly constructed by using large size rubble bunds. They are to be maintained properly. Rubble bunds are designed by carrying out scientific model studies for varying degree of acceptable damages. For very important and precious protection works are like Marine Drive at Mumbai, the criteria has to be " Zero order Damage" i.e., totally zero damage in the model study for continuous six hours attack of designed wave. For other works, depending on the area to be protected, the criteria can either be "First Order Damage" 0 to 1% damage in model study) or " Second Order Damage" (1 to 5% damage in model study). In no case, damages more than 5% are advisable.

On annual basis, the Maritime Board receives demand from the people for anti-sea protection works. These demands are validated by PWD by conducting field studies and visits with reference to vulnerability of the proposed villages to wave action and storm surges.

2. Saline Embankments:

In view of improving the coastal saline lands by protecting them from the saline tidal waters, protective earthen bunds have been constructed under the Kharland Development Board established by the Govt. of Maharashtra, during the year 1949 to 1980. Since then, the Govt. of Maharashtra has been trying to maintain the schemes to their minimum requirements as per the meagre availability of funds through Kharland Development Circle, Thane, established specially for this purpose.

There are 267 Saline embankment Schemes in Konkan Region, where the agricultural lands and the village population are protected by saline embankments. However, due to the continuous daily tidal effects and heavy downpour during rainy seasons, most of them need considerable repairs.

3. Casuarina plantations

Social Forestry Department has carried out extensive plantation of casurina along the seacoast. Since 1986 more than 477 ha sandy area has been brought under casurina cover. Most of this plantation has been successful and they have now become very effective shelterbelts. Cassurina plantations at places like Tarkoali in Malvan tehsil and Aravali in Vengurla Tehsil have definitely helped in increasing the tourists flow to the nearby beaches.

They have been successful in minimizing impact of wind velocity and saline ingress. It has provided benefits to agricultural crops, resulting in higher yield and protecting live stock, grazing lands and farms. It has

benefited in reducing wind erosion, reducing evaporation from soil, reducing transpiration from plants. The important impact of casurina plantation is moderating temperature. They have definitely help in tourist flow near beaches such of Tarkarli of Malvan Taluka and Aravali of Vengurla Taluka.

4. Mangroves:
As per the State of Forest Report (published by Forest Survey of Indian), out of total 4482 sq. kms of Mangroves in the country, 118 sq kms (2.63%) are confined in the Konkan Region. The report further states that 64 kms out of these 118 sq kms (around 54%) of the Mangroves are degraded.

Following is the status of existing mangroves in Mumbai and Raigarh district (in possession of Forests Department)

Sno	Nature of Mangroves	Alibhag Div	Roha Div	Thane
		Raigarh District (in hectares)	Raigarh District (in hectares)	Thane and Mumbai districts
1	Dense Mangroves	1153	415.55	3780
2	Sparse Mangroves	340	200	1000
3	Degraded mangroves and mud flats	150	100	620
	Total	1643	715.55	5400

3.3.12 Conclusion:
Maharashtra State has a 720 km long sea coast, of which about 262 km is subject to extreme vulnerability on account of wave action and proximity of habitation to the sea. The State has attempted to protect parts of the vulnerable coastline in previously.

A summary of such past experiences, problems faced by the State and future considerations is as follows:

1. Anti-Sea Embankments:
Almost all of the Anti-Sea Embankments in the State are located in the coast and therefore are in close proximity to the sea. CRZ applicability is a crucial issue in such constructions. Adequate approvals from the relevant authorities will be obtained in this regard to ensure compliance. The constructions will also necessitate Environmental Impact Assessments as wave patterns may be affected. Further, given the effect of wave action on anti-sea embankments, appropriate designs need to be selected to ensure longetivity.

2. Saline Embankments:
Most of the embankments are in close proximity to the sea and hence are within the CRZ zones. Also, these may impact the drainage patterns in the area. As an ordinary practice, sluices are usually provided by the Department. Given the importance of the construction of embankments, the State has already obtained the adequate clearances from the Ministry of Environment and Forests subject to certain conditions that need to be adhered to.

The construction of embankments usually involves linear land acquisition. However, considering the benefits that accrue to the people from the structures, the local population have in the past voluntarily given up land for such construction.

The existing embankments have often not been repaired or maintained after construction. Hence, these have been eroded over a period of time. Accordingly, the State would need to separately address maintenance works and budgets as part of the DPR.

The prevalent practice has been to use local labour and hence setting up of labour camps is usually avoided.

3 Cyclone Shelters:
The State has not constructed any Cyclone Shelters till date and hence will build on the experiences of Andhra Pradesh and Orissa in terms of design, alternate usage of the structures during peaceful times, repair and maintenance provisions and funding mechanisms.

4 Shelterbelt plantations:
The Casuarina plantations are usually planted on private/community land. As part of routine procedures, the community is actively consulted and public resolutions are passed before any action is taken. The local population voluntarily agrees to give the land for these plantations because:

- these plantations are found to be extremely beneficial to the local community as they provide protection to the agricultural lands
- the ownership of the casuarina plantation continues with the private land owner. Hence, they are also interested in maintaining and protecting them.

The nature of the intervention is such that it requires regular watches and monitoring to ensure the survival of the plantations. Adequate management and maintenance plans need to be factored. It may be noted that certain plantation areas will be within CRZ zones and hence, wherever applicable, site specific assessments need to be obtained. As a practice, the department has not been taking any approvals from the CRZ authorities for its plantation works as this is an activity prescribed under the CRZ notification.

Also, the plantation plan drawn up usually is reviewed to ensure that the rights species of shelterbelts are planted such that they are both available locally and are able to withstand the impact of high wind velocities without breaking. Adequate provisions are also made to ensure the use of minimum amounts of fertilizers and pesticides during the first 2-3 years.

5 Mangroves:
Almost all mangroves are located along the coastline and hence in close proximity to the sea. CRZ applicability is therefore a crucial consideration in such interventions. As a practice, the department has not been taking any approvals from the CRZ authorities for its plantation works. The presence of eco-sensitive areas in the nearby areas is also a critical factor. Hence, appropriate measures and approvals will be taken from the relevant authorities to ensure compliance with all environment norms and conditions.

Proper planning measures for addressing issues related to habitats and impacts on biodiversity will be undertaken. Adequate mechanisms will be put in place to ensure correct species selection and regular monitoring, especially in the initial growth period to ensure survival.

3.4 West Bengal

3.4.1 Introduction

West Bengal was formed on May 1, 1960. It has Bangladesh on its eastern border, the states of Assam and Sikkim and the country Bhutan to its northeast and state of Orissa to its southwest. To the west it borders the states of Jharkhand and Bihar, and to the northwest, Nepal.

The State of West Bengal can be divided into four physiographic divisions:

1. The Himalayan Region - Districts of Darjeeling, Jalpaiguri and Koochbihar
2. The Eastern Fringe of Chotanagpur Plateau - District of Purulia and Western part of the districts of Barddhaman, Medinipur, Birbhum and northern part of Bankura
3. The Deltaic Zone - Sundarban area of the South 24 Parganas and small part of North 24 Parganas
4. Plains - Remaining areas of the State

The location map of the state is given below:

Figure 3. 4 West Bengal map

3.4.2 General Administration

There are 19 districts in West Bengal. Each district is subdivided into Sub-Divisions, and again into Blocks. There are 340 Blocks. Blocks consist of panchayats (village councils) and town municipalities.

The areas proposed for Investment in the State of West Bengal are located in the coastal areas of Purba Medinipur district, North and South 24 Parganas, better known as the Sunderbans.

3.4.3 Climate

West Bengal's climate varies from tropical savannah in the southern portions to humid subtropical in the north. Summer in the delta region is noted for excessive humidity up to over 100% with the highest day temperature ranging from 38 °C to 45 °C. The Darjeeling Himalayan Hill region experiences a harsh winter, with occasional snowfall at places.

3.4.4 Soil

The soils of West Bengal can be classified into six agro-ecological sub-regions. These are:

1. Warm Humid
2. Warm to Hot Humid
3. Hot Humid
4. Hot Moist Sub-Humid
5. Moist Sub-Humid
6. Hot Dry Sub-Humid.

The warm humid agro-ecological sub region covers the mountainous region of Darjeeling District. It occupies an area of 0.26 m ha, representing 2.9 percent of the total geographical area of the state. Soils of this sub-region are heterogeneous in nature. The soils developed on steep hill slopes are shallow, excessively drained with severe erosion hazard potential. The soils of the foothill slopes and valleys are moderately deep, well drained, loamy in texture with moderate erosion hazards. Soil acidity, high runoff rate and limiting soil depth (on steep hill slopes) are the most important problems of this region.

The warm to hot humid agro-ecological sub-region comprising of foothills of Bhutan Himalayas constitutes the northern fringe of Jalpaiguri district with Tarai soils. The sub-region covers an area of 0.17 m ha, representing 1.9 percent of total area of the state of West Bengal. The soils are partly developed and are mainly formed of young alluvium on alluvial fans of the foothills. These are shallow to moderately deep and at places deep with medium to fine texture. Mostly tea and horticultural plantation are supported by these soils. Severe flood hazards coupled with abrupt break in gradient and severe runoff poses serious water management problems.

The hot humid agro-ecological sub-region comprising of the level Teesta Plain (Duars) below the Bhutan Himalayas, covers the districts of Koch Behar, Jalpaiguri (southern part) and northern parts of West Dinajpur. This sub-region occupies an area of 0.85 m ha representing 9.6 percent of the total geographical area of the state. The soils of this region have developed from the alluvium deposited by the rivers Teesta, Mahananda and Jaldhaka. These are moderately deep to deep, coarse to fine loamy in texture. At places these soils are moderately well drained but mostly they are imperfectly and/or poorly drained. The area is intensively cultivated for rice and jute. The major problems are water logging, severe flood hazards etc.

The hot moist sub-humid agro-ecological sub region comprises of the Ganga Plain (an eastward continuation of Indo Gangetic Plain covering the districts of Maldah, West Dinajpur (southern part), Murshidabad, Nadia, Haora, Hoogli, 24 Parganas (Northern Part), Bardhaman (eastern part), Birbhum, Bankura and Medinipur (eastern part). It covers an area of 4.39 m ha representing 55.7 per cent of the total geographical area of the state. The soils have been formed from the alluvium deposited by Ganga and its tributaries and sub tributaries viz. Ajoy, Damodar, Kansabati, Bhagirathi, Haldi, Rupnarayan etc. These soils are greatly variable in their morphological, physical and chemical properties depending upon the geomorphic situations, moisture regime and degree of profile development. The soils are intensively cultivated for rice, wheat,

potato and oilseed crops. Frequent inundation of low lying areas result in stagnation of water for certain times of the year. Besides flood hazards also affect the normal dry land crop yields. The soils of this sub-region have high nutrient content and mineral resource with a high potential for a large variety of agricultural and horticultural crops.

The moist sub-humid agro-ecological sub-region encompasses the coastal parts of the districts of 24 Parganas comprising mostly Sundarban areas of south 24 Parganas and coastal Medinipur. It covers an area

of 0.68 m ha, representing 7.6 per cent of the total geographical area of the state. The alluvium deposited by Matla, Haldi, Rupnarayan rivers have gradually developed into deep, fine loamy to fine textured soils, by and large salt impregnated due to tidal flow of sea water through creeks and sub-tributaries. These soils are imperfectly to poorly drain with moderate to very high salinity hazards. The soils remain wet and saline for considerable period of the year and are suitable particularly for salt resistant crops.

The hot dry sub-humid agro-ecological sub-region comprising the outlines of Chotonagpur Plateau includes the district of Puruliya and western parts of Bardhaman, Bankura, Birbhum and Medinipur. It covers an area of 1.98 m ha representing 22.3 per cent of the total area of the state. The soils have developed on parent materials of sedentary nature. They vary from shallow to deep reddish to yellowish red, loamy to clayey and are not fully drained. Relatively less aggregated red and laterite soils are prone to frequent development of surface encrustation. Poor capacity for retention of rainwater leads to severe runoff and soil loss. Soil infertility and limiting soil depth also pose problems.

3.4.5 Wetlands

These ecosystems encompass diverse and heterogeneous habitats ranging from rivers, flood plains and rain fed lakes to swamps, estuaries and salt marshes. The predominant wetland types of the State are marshes, jheels, terai swamps and char lands of the Gangetic plains, wetlands in Islands of Bay of Bengal and coastal brackish water wetlands. These wetlands harbour enormous diversity of floral and faunal species, many of which are endangered. Wetlands are a highly productive ecosystem, which serve as habitat for a variety of plants and animals. Wetlands perform essential functions including flood control, natural sewage treatment, and stabilisation of shorelines against wave erosion, recharging of aquifers and supporting rich biodiversity. Many wetlands serve as the winter habitats for migratory birds. Wetlands are subjected to reclamation, agriculture runoffs, pesticides, construction of dams and barrages, etc.

3.4.6 Coastal and Marine Ecosystem

West Bengal has a coastline of 650 km in the northern part of Bay of Bengal within Medinipur and South 24 Paraganas districts. The available data on faunal diversity reveals that it represents more than 15% of the total fauna of the country. Such ecosystem in the State is located in Sunderbans in South 24 Paraganas district under Tiger Reserve and Biosphere Reserve areas.

The Sundarbans is the largest single block of tidal halophytic mangrove forest in the world covering some 10,000 sq. km of mangrove forest and water (of which some 40% is in India and the rest in Bangladesh).It is formed from sediments deposited by three great rivers, the Ganges, Brahmaputra and Meghna, which converge on the Bengal Basin. The whole Sundarbans area is intersected by an intricate network of interconnecting waterways, of which the larger channels are often a mile or more in width and run in a north-south direction. These waterways, apart from the Baleswar River on the eastern edge of the Bangladesh Sundarbans, now carry little freshwater as they are mostly cut off from the Ganges, the outflow of which has shifted from the Hooghly-Bhagirathi channels progressively eastwards since the seventeenth century. This is due to subsidence of the Bengal Basin and a gradual eastward tilting of the overlying crust. In the Indian Sundarbans, the western portion receives some freshwater through the Bhagirathi-Hooghly river system but that portion designated as the tiger reserve is essentially land-locked, its rivers having become almost completely cut off from the main freshwater sources over the last 600 years. Thus, waterways in the tiger reserve are maintained largely by the diurnal tidal flow, the average rise and fall being about 2.15m on the

coast and up to 5.68m on Sagar Islands. Tidal waves are a regular phenomenon and may be up to 75m high. The land is constantly being changed, moulded and shaped by the action of the tides, with erosion processes more prominent along estuaries and deposition processes along the banks of inner estuarine waterways influenced by the accelerated discharge of silt from seawater. About half of the Sundarbans is under water and the rest of the landscape is characterised by low-lying alluvial islands and mudbanks, with sandy beaches and dunes along the coast. As with the rest of the Bengal Plain, alluvial deposits are geologically very recent and deep, sediment of just the last few million years being as much as 1,000m thick

3.4.7 Forests

Forests make up 14% of the geographical area of West Bengal, which is lower than the national average of 23%. Protected forests cover 4% of the state area. Part of the world's largest mangrove forest Sundarbans is located in southern West Bengal.

The predominant commercial tree species is Shorea robusta, commonly known as Sal and Casuarina. The coastal region of Purba Medinipur exhibits coastal vegetation with stretches of Casurina plantations. The most valuable tree from the Sundarbans is the ubiquitous Sundri (Heritiera fomes) from which the forest gets its name. Vegetation in North West Bengal is dictated by elevation and precipitation. For example, the foothills of the Himalayas, the Dooars, are densely wooded with Sal and other trees of the tropical evergreen type. Above 1000 m, the forest type changes to subtropical. In Darjeeling, which is above 1500 m, common

trees typifying the temperate forest are oaks, conifers, and rhododendrons. There are five national parks in the state — Sundarbans National Park, Buxa Tiger Reserve, Gorumara National Park, Neora Valley National Park and Singalila National Park. Wildlife includes the Indian rhinoceros, Indian elephants, deer, bison, leopards, gaur, and crocodiles. The state is also rich in bird life. Migratory birds come to the state during the winter. The high altitude forests like Singalila National Park shelter barking deer, red panda, chinkara, takin, serow, pangolin, minivet and Kalij pheasants.

3.4.8 Mangrove

The largest stretch of mangroves in the country lies in the Sunderbans of West Bengal covering an area of about 4200 Sq.km. The predominant mangrove species are Avisennia officinalis, Excoecana agallocha, Herittera Tomes, Brugutera parviflora, Cenops decandia, Rhtzophora mucronata and Zylocarpus granatum. Mangroves also harbour a number of molluscs, polychaetes and honeybees. The Sundarbans are noted for a reserve project conserving Bengal tigers. In addition to the Bengal tiger, the Sundarbans host many other endangered species like Gangetic dolphin, river terrapin, estuarine crocodile etc. The mangrove forest also acts as a natural fish nursery, supporting coastal fishes along the Bay of Bengal.

3.4.9 Seismic Zones

Western sections of the northern districts of Jalpaiguri and Kooch Bihar lie in Zone V. The remaining parts of these two districts, along with the districts of Darjeeling, Uttar Dinajpur, Dakshin Dinajpur, Maldah, 24 North Parganas and 24 South Parganas lie in Zone IV. The rest of the state along with the city of Kolkata lies in Zone III.

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3.4.10 Socio-Economic Profile of coastal regions

The coastal area of West Bengal comprises of 3 districts – North 24 Parganas, South 24 Parganas and Purba Medinipur.

A. Introduction - Overall

The coastal area of West Bengal is the home of some of the poorest people, living in some of the least served and remote areas of the State. The 3 coastal districts i.e. South and North 24 Parganas and Purba (East) Medinipur are densely populated with around 2.47 million fisherfolk living here. Majority of this population is classified as scheduled castes and schedule tribes.

Transport and Communication

A major part of coastal West Bengal comprises the Sundarbans region, located in the estuarine section of the Ganga- Brhamaputra river system at the mouth of Bay of Bengal. This is a unique delta system with dynamic ecosystem. In the "Indian Sundarbans" these Scheduled Castes and Tribes population are in many ways, faced with additional burdens because of poor communications resulting from the innumerable creeks,

canals and tidal rivers, which separate the islands from each other and from the mainland. Obstruction of water inflow by sedimentation and embankments further increases the pressures on the waterways. The extremely poor transportation infrastructure (roads, bridges, jetties) and inland waterways transport has meant that often even basic social services are lacking. This also reduces access to markets

Population and Livelihood

The process of uncontrolled population growth has reduced the per capita cultivable land and created overcrowding and high rate of disguised unemployment. The consequent difficulties in ensuring livelihood have also led to a high rate of out migration among males. The per capita real income in these 3 coastal districts as per 1993-94 prices is South 24 Parganas: INR 8394.74, North 24 Parganas: INR 9440.25 and in undivided Medinipur: INR 9263.49 comparing to district like Bardhaman: INR 11445. (Human Development Report, Dept. of Development and planning, GoWB, 2004). A large part of the population of this coastal area is basically dependent on rain fed mono cropping and whatever subsidiary activities are available, this has led to an increasing dependence upon fishing and the collection of shrimp seed from the backwater saline rivers. Involvement in alternative employment is usually during August and October when the fry are less abundant.

Gender Discrimination

Gender discrimination is common throughout the region. Women's life in the area is shaped by the patriarchal, patrilineal Society. The problems are compounded by extreme poverty, poor housing, health and sanitation, limited access to safe drinking water, low literacy rates, limited access to support services, resource opportunities and social exclusion.

In order to address the issues of poverty, backwardness and women's empowerment in the coastal districts of west Bengal, the government of West Bengal proposes to undertake a multi-sectoral developmental programme in the 80 community Development Blocks in 3 Districts i.e. South and North 24 Parganas and Purba Medinipur.

B. District-wise socio-economic profile

a. Employment (2001):

		North 24 Parganas		South 24 Parganas		Purba Medinipur	
		Male	Female	Male	Female	Male	Female
Work participation rate (W.B)	Rural	54.1 (54.1)	12.0 (20.9)	51.6 (54.1)	12.4 (20.9)	55.0 (54.1)	24.3(20.9)
	Urban	53.8 (53.7)	10.8 (11.6)	53.1 (53.7)	8.8 (11.6)	50.6(53.7)	10.1(11.6)
% of main worker (W.B)	Rural	48.4 (45.8)	6.1 (9.1)	41.5 (45.8)	4.8 (9.1)	43.4(45.8)	8.3 (9.1)
	Urban	50.6 (50.2)	8.7 (9.2)	47.3 (50.2)	6.3 (9.2)	45.4(50.2)	7.4 (9.2)
% of marginal worker (W.B)	Rural	5.6 (8.3)	5.9 (11.8)	10.1 (8.3)	7.6 (11.8)	11.6 (8.3)	15.9(11.8)
	Urban	3.2 (3.6)	2.1 (2.4)	5.8 (3.6)	2.5 (2.4)	5.1 (3.6)	2.7(2.4)
% of agricultural labourers(W.B)		13.9 (22.7)	12.2 (32.2)	26.1 (22.7)	25.9 (32.2)	28.7(22.7)	39.6(32.2)
No. of applications on live register of employment exch.(2003)		846043		476611		397907	
No. of Placements effected during 2003		219		89		87	

b. Education:

			North 24 Parganas	South 24 Parganas	Purba Medinipur
			2001	2001	2001
Literacy Rate (%) (W.B)	All	Total	78.07 (68.64)	69.45 (68.64)	80.2 (68.64)
		Male	83.92 (77.02)	79.19 (77.02)	89.1 (77.02)
		Female	71.72 (59.61)	59.01 (59.61)	70.7 (59.61)
		Rural	69.07 (63.42)	67.40 (63.42)	79.8 (63.42)
		Urban	85.19(81.25)	79.84 (81.25)	83.8 (81.25)
	SC	Total	70.79 (59.04)	67.36 (59.04)	63.57(59.04)
		Male	79.59 (70.54)	79.63 (70.54)	76.88 (70.54)
		Female	61.41 (46.90)	54.21 (46.90)	49.84 (46.90)
	ST	Total	46.09 (43.40)	43.29 (43.40)	47.05 (43.40)
		Male	58.38 (57.38)	56.33 (57.38)	62.92 (57.38)
		Female	33.27 (29.15)	29.88 (29.15)	30.83(29.15)

c. Health:

		North 24 Parganas	South 24 Parganas	Purba Medinipur
Infant Mortality Rate of W.B (2004)	**Male**	45	45	45
	Female	34	34	34
Infant Mortality Rate (2001)	**Male**	46	54	47
	Female	54	66	51
Life Expectancy (2001) (W.B)	**Male**	66 (65)	65 (65)	65 (65)
	Female	71 (69)	70 (69)	67 (69)
Mean age at Marriage(IIPS-2004) (W.B)	**Male**	24.9 (24.7)	24.0 (24.7)	24.6 (24.7)
	Female	19.6 (18.5)	18.2 (18.5)	17.6 (18.5)
Beds per lakh of population(2003)(W.B)		52 (86)	26 (86)	33 (86)

d. Others

	North 24 Parganas		**South 24 Parganas**		**Purba Medinipur**	
Per Capita Income(2003-2004) at current prices (in Rs) (W.B)	16502.79 (20895.64)		17759.77 (20895.64)		20914.35(20895.64)	
% of cultivable area to total area('04-'05) (W.B)	69.15 (65.48)		41.28 (65.48)		75.55 (65.48)	
Cultivable area per agri worker('04-'05) (hectres) (W.B)	0.38 (0.44)		0.42 (0.44)		0.39 (0.44)	
% of forest area('04-'05)	Nil (13.52)		44.72 (13.52)		0.23 (13.52)	
% of BPL families(P&RD,2002) (W.B)	37.7 (36.38)		37.21 (36.38)		26.89 (36.38)	
Offences reported against women	**2002**	1045	**2002**	888	**2002**	348
	2003	1073	**2003**	1116	**2003**	399
% change in offences reported against women	**2001-2002**	56.67	**2001-2002**	15.03	**2001-2002**	-7.45
	2002-2003	2.68	**2002-2003**	25.68	**2002-2003**	14.66

3.4.11 Existing Infrastructure

1. Existing Cyclone shelters and other Cyclone resistant buildings

There are 291 permanent rescue shelters in 16 out of 18 districts in the State. 131 of these are situated in six cyclone-affected districts, namely, Paschim Medinipur, Purba Medinipur, North and South 24 Parganas, Howrah and Hooghly. 13 are under construction. All educational institutions in all districts are used as temporary cyclone shelters. The District Disaster Management Plans document the names of all rescue shelter, both permanent and temporary.

Post Disaster damage assessment studies indicate that cyclone and consequential flooding claim many human lives and livestock in the coastal district of the state. Most of the housing stock in this region is made of temporary roof and wall material – thus being most vulnerable to the high velocity winds and flooding. Vulnerability of housing stock being the prime reason for loss of human life, there is a need to provide community cyclone/flood shelters to offset this situation

2. Other measures for cyclone risk reduction
West Bengal Disaster Risk Management Programme, a Ministry of Home Affairs and United Nations Development Programme sponsored programme, covers the districts of South 24 Parganas and North 24

Parganas along with eight other districts since 2003-04. The National Programme Implementation Committee for this Programme resolved years back to include the districts of Purba and Paschim Medinipur under the programme. This has not been implemented. Preparation of multi-hazard disaster management plans, capacity building of stake holders, formation of disaster management teams at the village level, etc. are some of the components of the programme.

Extensive trainings have been conducted at different levels for government officers, members of the three tier Panchayati Raj Institutions, members of the community and other stake-holders.
Specialized training in Search & Rescue techniques and psychological first aid has been provided to block level trainers.

3. Embankments
The original embankments (dykes) were constructed without any proper engineering guidelines and thus the slopes on the riverside and on the landside, embankment crest width and its elevation were all decided upon repeated human experiences. However, rising waters of the rivers cause failures of these embankments due to overtopping, sloughing, or slip failure due to erosion of the base due to river current at its base if it is too

close to the river. It has been observed that during high tide period, mainly in the flood seasons, when synchronized with cyclonic storm of moderate or high intensity, the rivers become furious causing formation of severe waves which dash on these embankments and thereby considerable erosion of the embankments takes place and sometimes breaches occur causing serious concern of saline inundation and destruction of public utilities in the countryside of the embankments. Due to downpour in rainy season and due to the erosion as stated above, the embankments almost each year exist in skeleton section which are repaired and strengthened as far as feasible by only earth work to face the next flood season. The number of villages affected by the damaged saline embankments comes to 51 in total. It is necessary to provide immediate revetment protection to about 235 kms critical length of embankments in the Sundarbans out of a total of about 3500 kms

According to a report by Kanjilal, the Irrigation Department adopted a design crest level of 4.80+GTS. According to information collected from the office of the Irrigation Department in Gosaba, there are no Benchmarks on the islands of their sub-division of which the levels has been established in relation to the Reference Level of the Sundarban.
For that reason the actual levels of the crests of the existing embankments and those of the embankments that need to be reconstructed cannot be established properly. Reliable and long ranging data about water levels in the rivers are also not available. Because of this a discussion about whether a crest level of 4.80+ is sufficient is not relevant.
Again, at many locations and over considerable lengths, the actual width of the crests is not according to the accepted standard. This is not because the embankments have been damaged by wave-dash or have been affected by slips initiated by bank failures including parts of the embankment, but simply because they are not constructed according to the standard specifications

4. Roads
A detailed look into the village level connectivity indicates that some of the villages are yet to have direct access through surfaced roads. Apart from these, culverts, bridges at key location are missing reducing the accessibility of these communities. These missing links are vital in the aftermath of cyclone/flood for emergency response as well as for faster restoration of normalcy. In addition to these, missing links will help induce economic development of these communities, often residing within the bottom most bracket of the socio-economic stratum.

3.4.12 Conclusion

The coastal districts of West Bengal are prone to frequent cyclonic storms and concurrent flood hazards causing considerable loss of human lives, domestic animals, agriculture and other properties. The resultant impacts of cyclonic depressions are breaches and embankment failures, over topping of saline water and flash floods. Such vulnerability is acute in the areas along sea coast and either side of estuaries.

The most recent calamity to have occurred was on May 25, 2009 when cyclone 'Aila' hit the State causing widespread damage and disruption.

West Bengal will currently be proposing only the construction of Cyclone Shelters under NCRMP.

The Department of Relief and Department of Disaster Management under the State Government therefore has prior experience in creating cyclone risk mitigation infrastructure with the objective of protecting life during cyclone and strengthening community based disaster preparedness.

A summary of such past experiences, problems faced by the State and future considerations is as follows:

1. Cyclone Shelters:
In the past, Cyclone shelters have been constructed by the State within the premises of government schools in specific villages. This has precluded the need for private land acquisition and has ensured, at the same time, that community involvement and ownership of assets is maintained.

The primary issue faced by the State in the past has been that of ensuring adequate connectivity to the shelters. Due to an inadequately developed roads network connecting the shelter to its catchment population, accessibility is highly compromised. The situation is especially critical in the Sunderban region in which small yet densely populated islands are intersected by an intricate network of interconnecting waterways.

The existing shelters also ail from improper maintenance to a great extent. Thus, regular maintenance and upkeep needs to be given adequate consideration in the NCRMP proposal to ensure that proper funds are available and other suitable mechanisms are adopted for the same.

Some of the buildings proposed are located in close proximity to the sea and hence are within CRZ zones. Thus, adequate approvals will be taken from the relevant authorities to ensure compliance to CRZ norms and conditions.

The State will ensure that all the issues faced earlier (as mentioned above) are suitably addressed in the NCRMP proposal. It will also build on the experiences and practices of Andhra Pradesh and Orissa to ensure that all probable environmental and social issues resulting from the proposed constructions are avoided.

3.5 Gujarat

3.5.1 Introduction

Gujarat came into existence as a separate State on 1st May 1960. It is situated on the west coast of India between 20°6' N to 24 ° 42' N north latitude and 68 ° 10'E to 74 ° 28'E east longitude. It is bounded by the Arabian Sea in the west, by the states of Rajasthan in the north and northeast, Madhya Pradesh in the east and Maharashtra in the south and southeast. Gujarat is largely flat with highlands towards its eastern part. It can be divided into four broad regions:

- Kachchh peninsulas

- Saurashtra peninsulas
- Northern Gujarat Plains
- Southern Gujarat coast.

The location map of the State is given below:

Figure 3.5. Gujarat map

3.5.2 General Administration

Gujarat has 26 districts and 222 Talukas with 18,569 villages and 242 towns and 4 large cities (Census, 2001) and 18000 Gram Panchayats. The state government offices are located in Gandhinagar[5].

The areas proposed for investment in the state of Gujarat under NCRMP are the coastal areas the districts of Ahmedabad, Amreli, Anand, Bharuch, Bhavnagar, Jamnagar, Junagadh, Kachchh, Navsari, Porbandar, Rajkot, Surat, Vadodara and Valsad.

3.5.3 Climate

The climate of Gujarat is moist in the southern districts and semi-arid to arid in the northern region. The Arabian Sea and the Gulf of Khambhat help reduce regional temperatures and render the climate more pleasant. Gujarat has a winter season from November to February, a hot season from March to May and south-west monsoon season from June to October.

The average rainfall in Gujarat ranges from less than 200 mm in northwestern Kachchh to a maximum of more than 2000 mm in the southern Gujarat. While south-eastern Gujarat lies within the monsoon belt, the northwest is an extension of the Thar Desert. The average rainfall of the state is about 700 mm.

[5] Source: http://www.gujaratindia.com/

3.5.4 Coastal environments

Gujarat has the longest coastline (1600 km) among all Indian states. It has many islands located along the Gulf of Kachchh and area bordering Pakistan. It also has several creeks and estuaries, with highly diverse ecological conditions, several mangrove areas and bird sanctuaries. India's first marine national park was established in Gulf of Kachchh.

3.5.5 Soil

Gujarat has several types of soils derived from volcanic (basalts), plutonic (granites) as well as marine and alluvial sediments. The state's geological history indicates that most areas have a tectonic history indicated by earthquakes, and marine transgressions and regressions since the Late Cretaceous Period. Igneous rocks include Deccan Trap Volcanics, which form shrinking black cotton soils with high water holding capacity. These soils cover most of Saurashtra, small parts of Kachchh and parts of southern Gujarat. In Saurashtra, areas are covered by rocky shallow soils.

3.5.6 Forests

Gujarat has several forest types ranging from moist to dry deciduous forests. While extensively forested in the past, forests are now mostly found in the hilly and uncultivable areas. The state has significant diversity of landform, soil conditions and water availability, which has created diverse microenvironments, reflected in the 17 types of forest types found across state. Managing existing forests and enabling reforestation is a major challenge due to terrain, edaphic and water resource constraints.

3.5.7 Mangrove

Mangroves of Gujarat are largely found along the western Kachchh peninsula, the Gulfs of Kachchh and Khambhat and South Gujarat. Genus *Avicenni*a is most common in high salinity environments, as in the Kachchh and Saurashtra. The less saline environments of South Gujarat are dominated by Genus Rhizophora and associated species. Avicennia is most common with three species; A. marina, A. officinalis and A. alba. The complete list of mangroves in the state is given in the Annexure 10.

3.5.8 Ecologically sensitive areas:

Gulf of Kachchh

Gulf of Kachchh, the largest coastal habitat in the West coast of India is in the State of Gujarat (20°15' to 23°35' N and 60 ° 05' to 70 ° 22' E) is encompassing over 1000 km long shoreline covering an area of 7350 km. It is a shallow water body with depth extending from 60 m at the mouth to less than 20 m at the head of the Gulf. While the average depth is 30 m, the minimum depth is up to 5 m, around Lushington Island. The Marine National Park and Marine Sanctuary are situated along the southern shore of Gulf from Okha (22 ° 30'N, 69 ° 00'E) and extends eastwards to the vicinity of Khijadia (22 ° 30'N, 70 ° 40'E).

The spectacular Gulf of Kachchh is the home for more than 800 species of organisms; 32 hard (Scleractinia) and 12 soft (Alcyonaria) corals, 150-200 species of fishes, more than 100 species of algae, great diversity of sponges and worms, brittlestars, marine turtles and other reptiles, over 200 species of migratory and resident bird species and also the rare and endangered marine mammal, the dugong.

Gulf of Khambhat

Geographically Gulf of Khambhat[6] located between 20 º 35'- 22 º 20'N and 72 º 05'-72 º 55'E. The climate is dry tropical monsoon with an average annual rainfall of about 800 mm. The monsoon commences on June or July and ends in September, but the rainfall is erratic in occurrence, duration, and intensity. The winters are generally cool and dry, with minimum temperatures around 10ºC. The pre-monsoon period in March-June is very hot, with temperatures reaching 45ºC.

The zonation of mangrove forests in the Gulf is: a seaward band of Avicennia marina gives way to a back-mangal consisting of salicornia brachiata, suaeda urochondra setulosa**,** which appears at the extreme eastern limit of its distribution.

Parasharya (1984) has recorded 62 species of water birds in the area. Other common breeding species include

Nycticorax nycticorax, Ardeola grayii, Bubulcus ibis, egretta garzetta, E. alba, Mycteria leucocephata, Threskiornis melanocephalus, Pseudibis papillosa, and platalea leucorodia. The heron colonies in this area are one of the few places where E.gularis and E.garzetta nest side by side and interbreed. The most abundant shorebirds are Recurvirostra avosetta, Charadrius Mangolus, C. leschenaulti, and species of Tringa, Calidris, and limicola falcinellus. Numerous of crab plovers (Dromas ardeola) settles here in winter, and sighting of few Indian skimmers (Rynchops albicollis) have been reported. Large roosing flocks of Grus, Anthropoides and Virgo are often present. Two species of marine turtles, Chelonia mydas and Lepidochelys olivacea, nest in large numbers along the coast and on Piram Island.

3.5.9 Seismic zones

According to GSHAP data, the State of Gujarat falls in a region of moderate to high seismic hazard. As per the 2002 Bureau of Indian Standards (BIS) map, this state also falls in Zones II, III & IV and V. Historically, parts of this state have experienced seismic activity in the M7.0. (A Richter Magnitude of 7.0 – 7.9 indicates a 'Major' earthquake which can cause serious damage over large areas.)

3.5.10 Existing infrastructure

1. Cyclone shelters and other Cyclone resistant buildings

Gujarat does not have a network of Cyclone and storm surge shelters unlike other risk prone states like Orissa and Andhra Pradesh. A network of cyclone shelters is proposed to be constructed under the NCRMP covering the most risk-prone settlements in two phases.

2. Coastal Canals and Embankments

There are several historical coastal embankments built using traditional techniques along the Jamnagar coast. They prevented ingress of saline water into coastal lands and also helped store rainwater on the inland side, which was used for agriculture and animal husbandry. The Gujarat Irrigation department has been building Check dams and Bhandaras to prevent saline water ingress in the Kachchh and Saurashtra region. These are implemented as per the recommendations of High Level Committee formed to control saline water ingress into coastal regions. The Khar Land Development Board (KLDB) had also built several embankments. Due to closure of KLDB, most of them are falling into various stages of disrepair.

3. Shelter Belt Plantations

The Forest department has been planting coastal shelterbelts over last three decades under various programmes. Recent satellite imagery (2006) was studied to map coastal vegetation to understand the status of coastal tree cover. The results indicate that the coastal tree belt coverage is diverse across the state. While large patches of dense coastal belts are found along some patches of Saurashtra, most other areas have discontinuous coastal plantations. A qualitative assessment of the coastal forest belt is provided in the following Table (5).

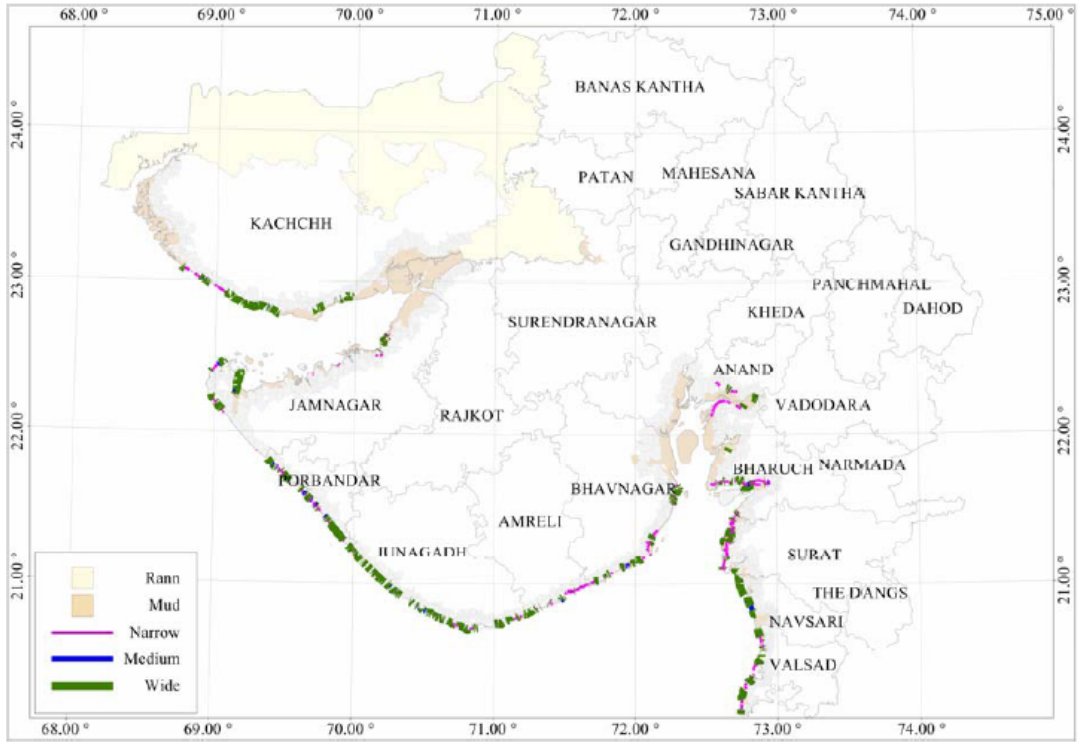
[6] http://www.annauniv.edu/ceg/iom/iomour/EIA's%20gujarat.htm

TABLE (5) : COASTAL VEGETATION ALONG GUJARAT COAST *(in km)*				
Type	**Wide**	**Medium**	**Narrow**	**Total**
Discontinuous	251	13	247	511
Continuous	155	9	23	187
Total	407	22	270	698
Source: TARU analysis, 2007				

The above table provides qualitative data on the basis of the width and length of the shelter vegetation patches. These may include wild growth of Prosopis Juliflora, which can be used as border fence for new plantations. The existence of vegetation indicates that the land is suitable for further afforestation

With an average of about 2 ha per km length of coastal shelter belts, only about 13,000 ha of coastal plantation are found. In an ideal case about 50,000 ha of coastal shelterbelt is necessary to protect the coastal zone of Gujarat. The distribution of the coastal vegetation in Gujarat shown in Fig. below:

FIGURE (7) : EXISTING SHELTER BELTS ALONG GUJARAT COAST (2007)



Source: TARU Analysis, 2007

This also shows that out of the total Gujarat coastal length of 1,640 km, only about one third length has permanent vegetation. More than 1,000 km of coastal belt plantation will therefore, be necessary to cover the entire coast. The existing coastal vegetation may also have to be improved to protect coastal settlements and agriculture.

TABLE (6) : AVAILABILITY OF FOREST AND CULTURABLE WASTE LANDS IN GUJARAT VILLAGES (WITHIN 5 KM FROM COAST (BASED ON 2001 CENSUS)						
District	**Coastal village Area (ha)**	**Forest Area (ha)**	**Area of Culturable waste, Gauchar and Groves (ha)**	**Forest Area to Geographical Area (%)**	**Wasteland to Village area (%)**	**Forest and wasteland to Village area (%)**
Ahmedabad	93,870	1,621	10,710	2%	11%	13%
Amreli	34,600	1,737	3,888	5%	11%	16%
Anand	64,594	7	3,409	1%	5%	5%
Bharuch	221,655	1,755	18,154	1%	8%	9%
Bhavnagar	129,281	4,883	11,000	4%	9%	12%
Jamnagar	257,882	8,773	34,456	3%	13%	17%
Junagadh	114,074	3,928	16,665	3%	15%	18%

TABLE (6) : AVAILABILITY OF FOREST AND CULTURABLE WASTE LANDS IN GUJARAT VILLAGES (WITHIN 5 KM FROM COAST (BASED ON 2001 CENSUS)						
District	**Coastal village Area (ha)**	**Forest Area (ha)**	**Area of Culturable waste, Gauchar and Groves (ha)**	**Forest Area to Geographical Area (%)**	**Wasteland to Village area (%)**	**Forest and wasteland to Village area (%)**
Kachchh	300,565	16,967	47,757	6%	16%	22%
Navsari	51,721	904	3,177	2%	6%	8%
Porbandar	74,041	5,655	9,072	8%	12%	20%
Rajkot	39,502	1,269	3,767	3%	10%	13%
Surat	64,296	35	7,064	1%	11%	11%
Vadodara	8,068	-	1,376	1%	17%	17%
Valsad	58,541	2,558	5,668	4%	10%	14%
Total	**1,512,688**	**50,093**	**176,163**	**3%**	**12%**	**15%**
Source: Census 2001, TARU analysis, 2007						

4. Regeneration of Mangroves

Mangroves are tropical evergreen trees or shrubs having stilt-like roots that form dense thickets along tidal shores. The geomorphology of mangroves is typified by inter-tidal regions with clayish soils with high organic content facing shallow sea with low wave energy conditions in the tropical sub-tropical zones. Most mangrove habitats are located in areas with some input of fresh water, where salinity is variable across daily as well as annual cycles.

TABLE (20) : GUJARAT: DISTRICT-WISE STATUS OF MANGROVE IN (SQ. KM) (1998)						
District	**Dense mangrove**	**Sparse mangrove**	**Total mangrove cover**	**Potential area for mangrove regeneration**	**Remaining intertidal mudflats**	**Total**
Kachchh	344.2	383.2	727.4	327.3	1122.6	**2177.3**
Rajkot	1	4.6	5.6	28.3	152.7	**186.6**
Jamnagar	78.7	62.8	141.5	1 II. 5	268.8	**521.8**
Junagadh	0.7	0.3	1	0.4	1.7	**3.1**
Bhavnagar	9.2	6,0	15.2	20	8.4	**43.6**
Ahmedabad	0.1	0.7	0.8	52.5	43.6	**96.9**
Kheda	-	-	-	16.2	251.8	**268**
Bharuch	5.7	9	14.7	37.3	88.7	**140.7**
Surat	7.4	6.8	14.2	20.7	42.9	**77.8**
Valsad	3.8	6.5	10.3	22.6	113.2	**146.1**
Total	**450.8**	**479.9**	**930.7**	**636.8**	**2094.4**	**3661.9**
Source: Singh, 2006						

5. Construction of Missing Roads and Bridges

Gujarat has a well-developed road network with 2,382 km of National Highways (NH); 9,761 km of State Highways (SH) and 30,019 Km of rural roads. It has a road density of 37.5 km per 100 sq km and is well connected with rest of India.

A total of 2344 km of roads are located inside the potential surge zone. The coastal road network is of varying vintage, standards and level of maintenance. Except of the national and state highways, the other roads are built with lower specifications and suffer from inundation and damage during floods. Most of them are laid on surface less than 1.5m above terrain surface.

The State government has been implementing several road development projects across the state including the Pradhan Mantri Gram Sadak Yojana (PMGSY), which aims at providing all weather roads with prescribed standards to all settlements above 500 population before the end of 2007. During 2006-2007, about 1298 km of roads were built under this programme covering about 300 habitations. Villages with existing roads will not be covered under this programme.

The PMGSY envisages only single road connectivity to be provided. If a Habitation is already connected by way of an all-weather road, then no new work can be taken up under the PMGSY for that habitation. This excludes significant number of roads in the surge prone zones which are either damaged or flood/surge prone. While PMGSY includes cross drainage works, no flood/surge studies are done to ensure that new roads will be accessible during floods and surges. PMGSY also does not permit repairs to existing BT or Cement Roads, even if the surface condition is bad.

The cost of about Rs. 12 lakhs per km as per PMGSY specifications is insufficient to build flood and surge resistant roads in surge prone zones, which require raising the road levels above surge inundation depths and providing sufficient cross drainage. It is suggested that the NCRMP investments should be focused on developing and adoption of new surge/flood resistant road standards for rural roads in surge prone regions.

There are 43 settlements (including three islands) with the population of less than 500 persons among the surge prone villages in the state. These would not be eligible for road improvement under PMGSY

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Chapter 4: Project Screening

4.1 Screening

Screening is the first step in the ESMF process. . The purpose of screening is to get an overview of the nature, scale and magnitude of the issues in order to determine the scope of the detailed EA and SIA that would be subsequently carried out. After identifying issues, the applicability of the Bank's environment and social safeguard policies is established along with Government of India's regulatory requirements. Based on this, boundaries and focus areas for the EA and SIA along with the use of specific instruments are determined.

4.2 Key steps involved in project screening

The key steps involved in the screening process are briefly outlined below.

Step 1: Ascertain presence of any environmentally sensitive areas as detailed in screening criteria section Part-B and w.r.t. CRZ zones during site identification.

Step 2: Confirm applicability of regulations and whether any of the sub-projects are prohibited as per the existing law / regulations in the proposed sites. Wherein the proposed activity is restricted, Step 1 needs to be performed again. Section 3.3 provides additional details on the restricted land use activities.

Step 3: Conduct reconnaissance site visits for ground truthing to incorporate additional information

Step 4: Revisit the screening check list and ascertain outcomes of the Part B (2) and Part C (2) of the screening checklist. Undertake the detailed screening process for all investments in consultation with the line department.

Step 5: Determine the requirement of an EIA / SIA study & its scope and other applicable rules /regulations and clearances.

Step 6: If EIA/SIA is required, then:

Step 6.1 Prepare ToR for EIA / SIA studies and appoint Environment and Social Management Consultants.

Step 6.2: Conduct EIA / SIA as per the scope defined in the ToR along with preparation of the detailed DPR documents.

Step 8: Check for applicable NOC / Clearances from MoEF/ State PCB's etc as applicable

Step 9: Ensure integration of GEMP and / or Specific EMP measures (as applicable) with bid documents and contract provisions.

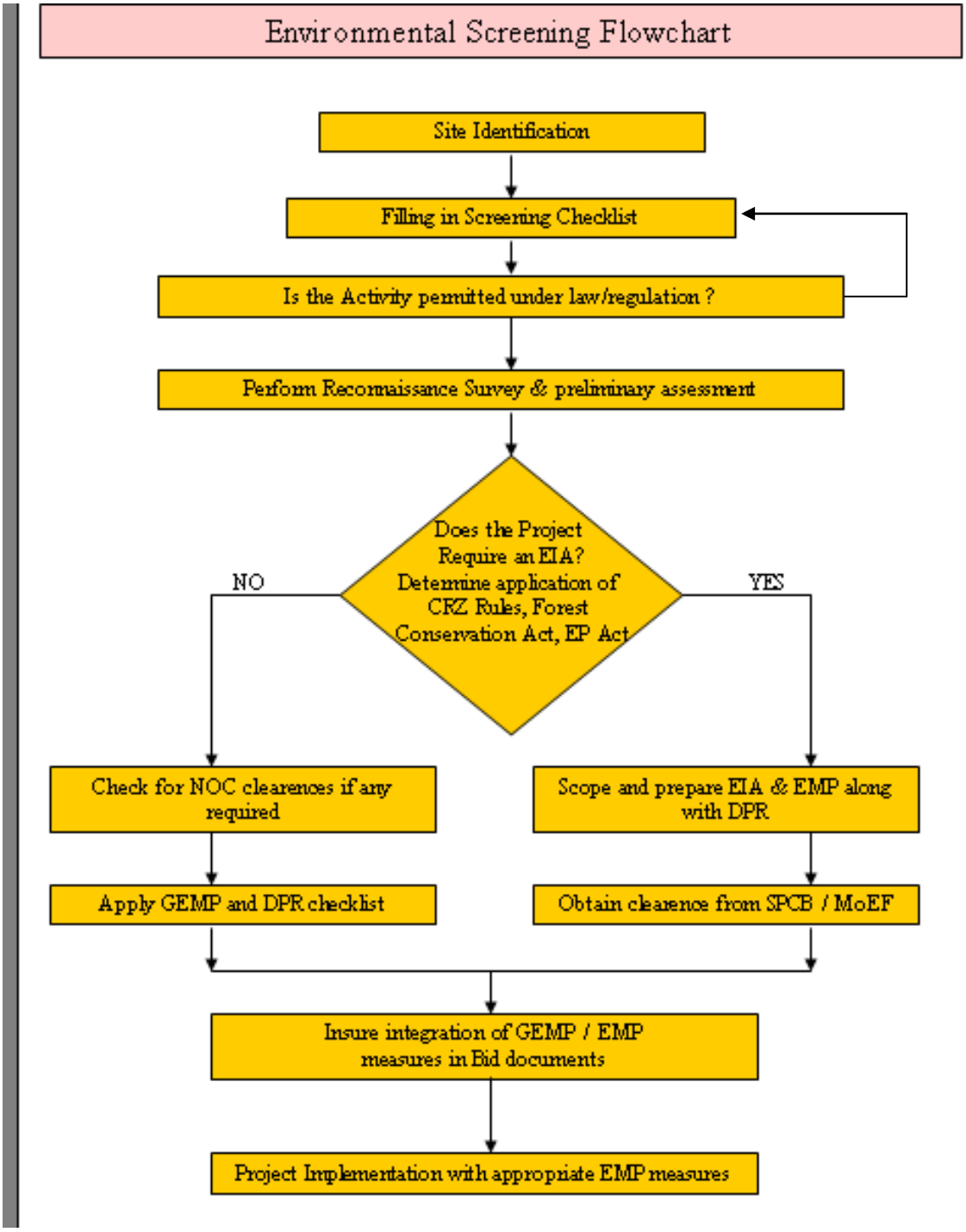
Step 10: Project implementation and monitoring to ensure EMP / GEMP implementation.

- *Note 1: It is necessary that the PIU and Line Departments have detailed topographic maps of all the proposed sub project sites with CRZ zones identified along with details of ecologically sensitive areas, habitat areas, Reserve Forest, Wildlife Sanctuary at a suitable scale to undertake the screening tasks..*

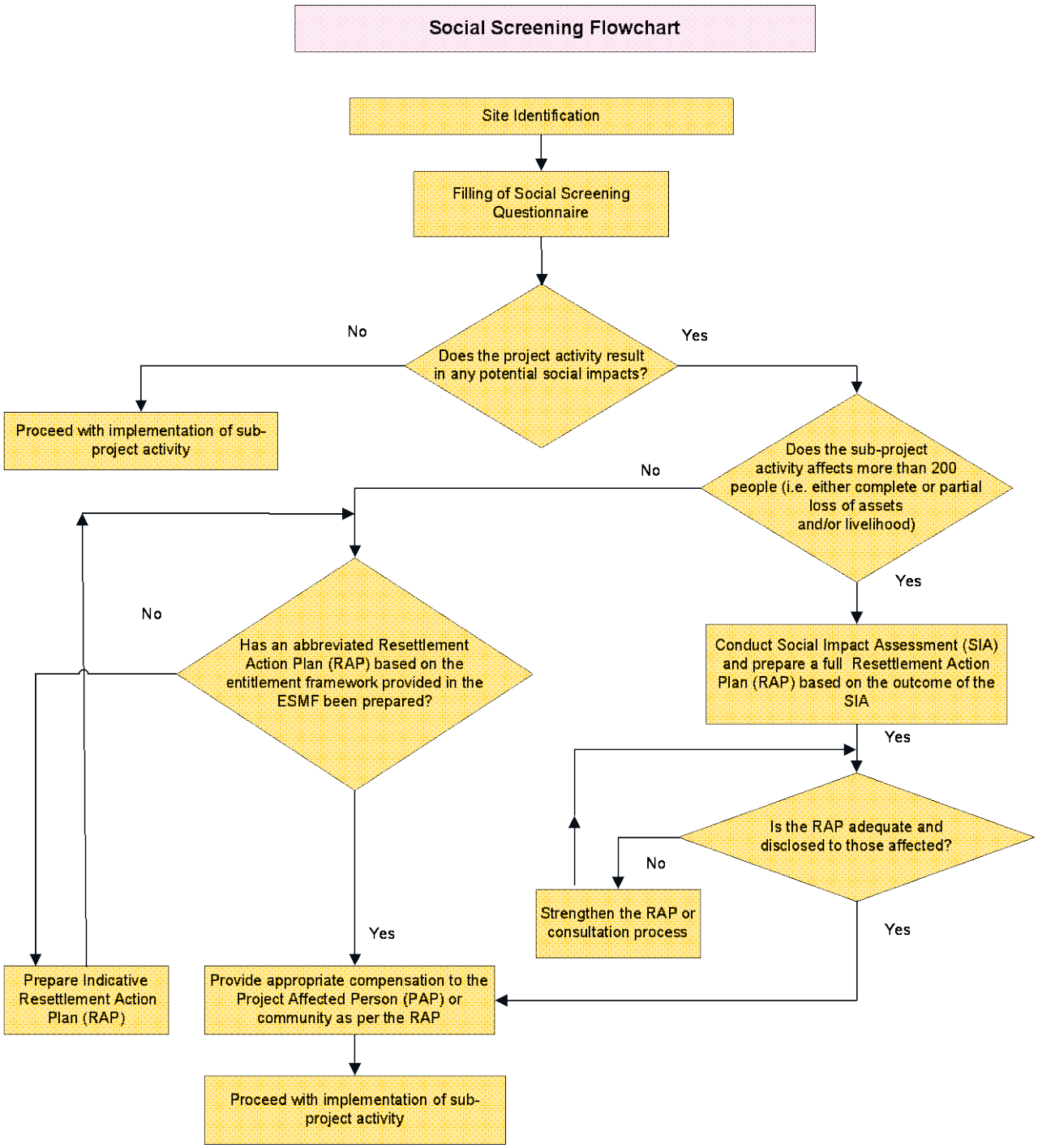
- *Note 2: It is advisable to have a meeting with all the Line Departments and the concerned officials of the State Environment & Forest Department and agencies like the Pollution Control Board before starting the process to gain a better understanding of the clearance process.*

The outcome of the screening process will help prioritize the various investments and where required, start the clearance process in a timely manner e.g. project sites (in particular requiring Forest Clearance etc) wherein clearance process is expected to take longer duration can be sequenced / phased later in overall project implementation but the clearance process for such sites is initiated at the start of the overall project. This shall help ensure that no sub projects are dropped merely due to delay in the clearance procedures. . The environmental and social screening flowcharts depicted below illustrate the overall screening process.

Diagrammatic representation of steps for environmental screening


Environmental Screening Flowchart
Site Identification
Filling in Screening Checklist
Is the Activity permitted under law/regulation ?
Perform Reconnaissance Survey & preliminary assessment
Does the Project Require an EIA? Determine application of CRZ Rules, Forest Conservation Act, EP Act
NO
YES
Check for NOC clearences if any required
Scope and prepare EIA & EMP along with DPR
Apply GEMP and DPR checklist
Obtain clearence from SPCB / MoEF
Insure integration of GEMP / EMP measures in Bid documents
Project Implementation with appropriate EMP measures

Diagrammatic representation of steps in social screening



4.3 List of prohibited sites

Sub-projects with any of the attributes listed below will be ineligible for support under the proposed project. The following is a list of sites that is prohibited:

As per EPA Act and EIA Notification 2006
(http://envfor.nic.in/divisions/iass/eia/Cover.htm)
(http://envfor.nic.in/legis/eia/so1533.pdf)

a) Any new construction within a biosphere reserve, national park wildlife/bird sanctuary, game reserve, tiger reserve/elephant reserve, wetland, important bird areas, coastal area with corals, mangrove area, estuary with mangroves, turtle nesting grounds, swamps/mudflats, notified sensitive eco zones.
b) Any activity within a distance of:
    i. 200 meters from the estuary boundaries.
    ii. 500 meters from flood plain or modified flood plain or by flood control systems of a riverine system.

As per the Ancient Monuments and Archaeological Sites and Remains Rules 1959
(http://asi.nic.in/asi_legislations.asp)

a) Any sub-project activity within 100 meters from the protected limits of notified archaeological sites or monuments

4.4 Environment and Social Screening Form

Part A: General Information

1. Name of the State	
2. Type of proposed sub-project activity (tick the applicable option)	
▪ Cyclone Shelter	
▪ Cyclone Shelter with Access Road/Culverts	
▪ Plantation of Mangroves	
▪ Roads/Bridges/Culverts	
▪ Shelter Belt Plantation	
▪ Saline Embankment	
▪ Coastal canal	
▪ Any Other (Please Specify)	
3. Location of the sub-project	
▪ Village	
▪ Taluka	
▪ District	
4. Size of the sub-project (approx. area in sq. mt/hac or length in mt/km, as relevant)	
5. Land Requirement (in hac./sq. mt.)	
▪ Total Requirement	
▪ Private Land	
▪ Govt. Land	
▪ Forest Land	

6. Implementing Agency Details (sub-project level)	
▪ Name of the Department/Agency	
▪ Name of the designated contact person	
▪ Designation	
▪ Contact Number	
▪ E-mail Id	
7. Details about the Screening Exercise	
▪ Date	
▪ Name of the Person	
▪ Contact Number	
▪ E-mail Id	

Part B (1): Environment Screening

Question	Yes	No	Details
1. Is the sub-project located in whole or part within the Coastal Regulation Zone?			If yes, specify the zone.
2. Is the sub-project located in whole or part in/near any of the following environmentally sensitive areas? [7]			
a. Biosphere Reserve			If yes, mention name and distance.
b. National Park			If yes, mention name and distance.
c. Wildlife/Bird Sanctuary			If yes, mention name and distance.
d. Tiger Reserve/Elephant Reserve			If yes, mention name and distance.
e. Wetland			If yes, mention name and distance.
f. Important Bird Areas (IBAs)			If yes, mention name and distance.
g. Coastal area with corals			If yes, mention name and distance.
h. Mangrove area			If yes, mention name and distance.
i. Estuary with mangroves			If yes, mention name and distance.
j. Natural Lakes			If yes, mention name and distance.
k. Swamps/Mudflats			If yes, mention name and distance.

[7] The PIU should take adequate steps to ensure that there are no adverse impacts on the environment **within 1 km radius** of the listed protected areas during sub-project implementation. The Environmental Officers at the PIU/PMU need to ensure that the required avoidance, minimization and mitigation measures are taken care of during site selection, DPR preparation and implementation/construction stages of a sub-project. This will help facilitate project supervision and monitoring during the implementation stage as well.

Question	Yes	No	Details
l. Habitat of migratory birds (outside protected areas)			If yes, mention name and distance.
m. Migratory Route of Wild Animals/Birds			If yes, mention name and distance.
n. Area with threatened/rare/endangered fauna (outside protected areas)			If yes, mention name and distance.
o. Area with threatened/rare/ endangered flora (outside protected areas)			If yes, mention name and distance.
p. Reserved/Protected Forest			If yes, mention name and distance.
q. Zoological Park /Botanical Garden			If yes, mention name and distance.
3. Is the sub-project located within 500 meters from rivers, streams, estuaries or deltaic mouths?			If yes, mention name/s and distance/s.
4. Is the sub-project located in whole or part near any of the following sensitive features? [8]			
a. World Heritage Sites			If yes, mention name and distance.
b. Archaeological monuments/sites (under ASI's central/state list) [3]			If yes, mention name and distance.
c. Historic Places (not listed under ASI – central or state list but regionally/locally important)			If yes, mention name and distance.
d. Reservoirs/Dams			If yes, mention name and distance.

[8] The SDMA should take adequate steps to ensure that there are no adverse impacts **within 1 km radius** of the listed sensitive features/areas during sub-project implementation. The Environmental Officers at the PIU/PMU need to ensure that the required avoidance, minimization and mitigation measures are taken care of during site selection, DPR preparation and implementation/construction stages of a sub-project. This will help facilitate project supervision and monitoring during the implementation stage as well.

[3] In case of archaeological sites/monuments, the prohibited area is 100 mts and the controlled area is 200 mts.

e. Public Water Supply Areas from Rivers/Surface Water Bodies/ Ground Water Sources			If yes, mention name and distance.

Part B (2) : Result/Outcome of Environmental Screening Exercise		
1.	No Environment Impact Assessment Required	
2.	Environment Impact Assessment Required	
3.	CRZ clearance required	
4.	Environmental Clearance Required	
5.	Forest Clearance Required	

Guideline for updating the results/outcome of the screening:

- CRZ clearance is required if the answer to question 1 is yes
- An EA/EIA is required if the project is:
    - An embankment or a canal ; or
    - Any other sub-activity but the answer to any question listed in points 2-4 is yes
    - depending up on the nature and location specificity of the sub-project, as determined by the State Level Environment Impact Assessment Authority (SEIAA), as detailed in Section 3.5.3 below.
- Forest Clearance is required if the proposed activities under the project require temporary and or permanent use/diversion of forest resources to non forest activities or tree cutting. The implementing agency / line department needs to take the necessary clearances from the Forest Department / MoEF
- Environment Clearance is required from Central / State Authorities as below:
    - The MoEF if the built up area for covered construction or facilities open to the sky (base area = base x width), referred hereunder as Construction Area for any sub-project is:
        - in excess of 150,000 sq m; or
        - ≥20,000 sq. m and <150,000 sq. m and the said built-up/construction area of the sub-project is within 10 km of sensitive area. The sensitive area is as defined below (based on MoEF Notification No. SO 1533 dated September 14, 2006).

- The State Level Environment Impact Assessment Authority (SEIAA) if the sub-project's builtup/construction area as detailed above is ≥20,000 sq. m and <150,000 sq. m but lies outside 10 km of the sensitive area

Notes:

1. Sensitive Area = (i) Protected Areas notified under the Wild Life (Protection) Act, 1972, (ii) Critically Polluted areas as notified by the Central Pollution Control Board from time to time, (iii) Notified Eco-sensitive areas, (iv) inter-State boundaries and international boundaries.

2. No EC is required if the built up/constructed area is <20,000 sq.mt but will be subjected to obtaining other statutory clearances if any applicable to the subproject as listed above.

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Part C (1) : Social Screening

1. Does the sub-project activity require acquisition <u>of private land?</u>			
Yes		No	
Give the following details:	Private Land (sq mts/hac.)		
	Govt. Land (sq mts/hac.)		
	Forest Land (sq mts/hac.)		
2. Does the proposed sub-project activity result in demolition/removal of existing structures?			
Yes		No	
If so, give the following details:			
▪ Number of public structures/buildings			
▪ Number of common property resources (such as religious/cultural/ drinking water/wells/etc)			
▪ Number of private structures (located on private or public land)			
3. Does the proposed Project activity result in loss of crops/trees?			
Yes		No	
4. Does the proposed Project activity result in loss of direct livelihood/ employment?			
Yes		No	
5. Does the proposed activity result in loss of mangrove ecosystem/community forest on which near by residents/local population are dependent for fuel wood/grazing etc.?			
Yes		No	
If yes, give the details of the extent of area to be lost (in acres/hac.).			
6. Does the proposed Project activity affect schedule tribe/caste communities?			
Yes		No	

Part C (2) : Result/Outcome of Social Screening Exercise		
	Output	**Outcome**
1.	Answer to all the question is 'No' and only forest land is being acquired	☐No SIA/RAP required
2.	Answer to any question is 'Yes' and the sub-project does not affect more than 200 people (i.e. either complete or partial loss of assets and/or livelihood)	☐Abbreviated RAP is required
3.	Answer to any question is 'Yes' and the sub-project affects more than 200 people *(i.e. either complete or partial loss of assets and/or livelihood)*	☐SIA/RAP Required

4.5 Further Assistance towards informed decision making

4.5.1 Coastal Regulation Zone

As part of the regulation, the central government declares the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action (in the landward side) up to 500 metres from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) and the HTL as Coastal Regulation Zone; and imposes certain restrictions on the setting up and expansion of industries, operations or processes, etc. in the said Coastal Regulation Zone (CRZ). Additional details of the activities permitted and restrictions are available at URL;
http://envfor.nic.in/divisions/iass/notif/crz.htm

The central government constitutes various state specific CZM authorities with powers to take measures for protecting and improving the quality of the coastal environment and preventing, abating and controlling environmental pollution in the coastal areas including examination of proposal for changes or modifications in classification of CRZ zone areas and ICZM plans. State specific legislation for setting up the CZM authority and its powers are available at URL:
http://envfor.nic.in/legis/crz.htm

4.5.2 Forest Clearance

Project interventions requiring the clearance of the forest land, diversion of forest land to other land use category or tree cutting will require prior clearance under the Forest (Conservation) Act 1980. Rule 4 of the Forest (Conservation) Rules, 1981 prescribes the procedure for submission of proposals for seeking prior approval of the Central Government under Section 2 of the Act.

Additional details on the various activities requiring clearance and procedure for submission of application for clearance and other details are available at URL:
http://www.envfor.nic.in/divisions/forcon/fca1980.html

4.5.3 Environmental clearance and requirements of EIA/EMP

The sub-projects under the NCRMP require Environmental Clearances either from the State level authorities, or Central Authorities based on their nature and location as per procedure laid down by the MOEF. In this regard, MoEF notifications issued from time to time under Environment (Protection Act, 1986) and MoEF Notification No. SO 1533 dated September 14, 2006) would govern. The guidelines are provided under **Section 3.4** above.

During its appraisal, the SEIAA will also determine whether or not the sub-projects requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) prior to the grant of environmental clearance (if the clearance is in its purview), or before sending to the MoEF for clearance (if the clearance is MoEF's purview); depending up on the nature and location specificity of the sub-project.

Upon receipt of clearance, adherence to the directions issued in the statutory Clearance and the responsive steps referred in the EMP must be complied with by the respective implementing agency and contractors.

The general EMP provided in this ESMF document should be adopted wherein specific EIA/EMP documents are not required during the various phases of the project cycle to mitigate or reduce any potential adverse impacts that may occur.

4.5.4 Prohibited Activities

The Project would not allow "Prohibited" activities as per clause 3.3 above.

Chapter 5: Potential Environmental Impacts and Measures

5.1 Environment Issues in coastal areas

Coastal environmental issues in the Indian context are influenced by anthropogenic factors such as population growth, pollution, habitat degradation, multiple resource use conflicts and over exploitation of resources. All of these have contributed to increase in coastal degradation in the last few decades, which have witnessed the growing importance of coastal areas as areas of economic and industrial growth. This has created pressure on coastal resources (major resources under stress are sand, lime, shell, fish and other bio resources), adversely affecting flora and fauna in these fragile coastal ecosystems. Activities such as unregulated tourism, discharge of untreated sewage and pollution from industries into the near-shore waters, infrastructure growth / coastal development, aquaculture, sand mining, overexploitation of fisheries, eutrophication has lead to physical destruction of marine coastal habitats and health of these ecosystems. These impacts exacerbate with coastal construction activities such as sea walls, alteration of drainage pattern, and rapid urbanisation. Such activities also adversely affect livelihoods of coastal communities and cause hydrological imbalances leading to severe impacts during cyclonic conditions. Additionally, encroachment and reclamation of wetlands, for various activities along with unauthorized occupation is continuing and cumulatively adding to adverse impacts, especially during storm conditions.

The coastal areas are subjected to high tidal variations ranging from 2-4m, with higher variations recorded in the east coast during cyclonic conditions. Recurring cyclones (especially along east coast) causes physical destruction, flooding and saline intrusion. This sea erosion and a surge of sea water cause heavy loss to agricultural production and dislocates large number of agricultural and fishermen population. Vulnerable population affected by cyclones include people below poverty line, the fisherman families, etc. Grass root level infrastructure at the community and panchayat level such as dispensaries, primary schools, village roads and plantation area, standing kharif crops which constitute the backbone of the rural economy and community support system are equally vulnerable to sometimes irreversible damage. Besides, cyclones contribute to shoreline changes and littoral drift.

In the foregoing context, NCRMP focuses on reducing the vulnerability of coastal states through creation of appropriate infrastructure which can help mitigate adverse impacts of cyclones while preserving ecological balance of coastal regions

5.2 Potential Environmental Impacts due to NCRMP

While NCRMP is expected to benefit the coastal communities, the implementation of proposed components of the project could lead to potential environmental impacts. This section identifies the potential environmental impacts of the sub-project activities, considering coastal environmental context as described above, with a view to facilitate early evaluation of such impacts and integrate suitable mitigation measures. The environmental impacts identified are broad in nature and need to be assessed in detail for each of the sub-project as part of preparatory activities. The impacts identified

are also used for preparing generic environmental management plans for the sub-projects not requiring detailed environmental assessments, identified through environmental screening process.

Considering the nature of the sub-project activities, this chapter identifies the positive and negative impacts of the various sub-projects project components. The negative impacts are further classified as: (a) sub-project specific impacts; and (b) generic impacts, especially related to construction activities, applicable to all the sub-projects. The impacts identified relate to construction, post construction activities of the sub-projects, irrespective of the location of the site. Thus, sub-project location sites that could lead to impacts due to the presence of sensitive environmental features and/or prohibited sites for development are expected to be screened out as part of the environmental screening process defined in Chapter – 4.

Likely potential impacts of the proposed sub activities are defined below:

Sr.No.	*Potential Impacts of Project Components / Sub-projects*
Cyclone Shelters (including multi-purpose facilities for use during non-cyclone periods)	

1.	Designated use of Cyclone Shelter:
	• Impacts due to poor site selection
	  o Tree Cutting
	  o Potential of Flooding
	  o Destruction of critical / endangered species habitat
	• In addition to emergency use, if regular designated use is not defined, the shelters could lead to socio-cultural impacts, and vandalism

2.	Solid Waste Management (SWM): • Inadequate provision of SWM measures (during cyclone period as well as non-cyclone period) could lead to unhygienic conditions, public health issues, and land pollution • During non-cyclone period, lack of periodic maintenance could lead to misuse of shelters and surrounding areas (as illegal waste dumping grounds, vandalize shelters, etc.)
3.	Water, Sanitation, and Drainage: • Lack of adequate water supply, sanitation, and site drainage with adequate connectivity to existing facilities, and maintenance provisions could lead to impacts such as coastal water and land pollution, and health impacts
Shelter and Mangrove Plantations	
4.	• Impacts on critical / endangered species habitat due to poor site selection. • Impacts on coastal eco-systems due to plantation of invasive species • Possible contamination of coastal waters due to synthetic fertilisers and pestisides • Lack of adequate maintenance (such as clearance of shelterbelt clippings) could affect beach fauna, community access and use of coast • Lack of adequate planning to ensure tidal flows could impact mangrove

	plantations and also would lead to water stagnation and associated impacts such as insect/vermin breeding
Coastal Canal	
5.	• Improper spoil/dredged material disposal could lead to serious impacts such as: (a) coastal pollution; (b) local drainage distortions; (c) impacts on productive use of land, etc. • Inadequate planning and construction of canals could lead to: (a) impacts on natural drainage pattern and thereby flooding; (b) saline intrusions (c) impacts on critical habitats, mangrove plantations etc • Impacts due to uncontrolled disposal of solid and liquid wastes in to canals could lead to: (a) ground water and coastal water pollution; and (b) growth of aquatic weed preventing value of canal system • Inadequate canal maintenance could impact the use of canals due to siltation
Saline Embankments	
6.	• Impacts of salt water intrusion in the adjoining areas due to inappropriate planning and design of embankments • Impacts on coastal flora / fauna due to changes in movement of tidal waters • Impacts of flooding and changes in local drainage patterns • Impacts of erosion due to poor selection criteria for borrow areas.
Roads / Culverts / Bridges	
7.	• Impacts on natural drainage pattern due to inadequate cross drainage works • Impacts of physical environment (air, water and noise) due to increased traffic • Impacts on coastal flora / fauna due to increased traffic movement and other induced developments • Issues of road safety and increased accidents due to faster movement of vehicles / increased traffic

5.3 Potential Construction Phase Impacts of Sub-Projects

Activity	*Potential Impact*
1.Site Clearance and Preparation	
(i)	Loss of top soil at critical coastal locations
(ii)	Loss or disturbance to local habitat
(iii)	Impacts on movement of local habitat
(iv)	Impacts on local drainage due to disposal of debris and other waste matter in the local water bodies
2. Setting up Construction Camps / Other facilities	
(i)	Loss of vegetation and sensitive coastal land for various construction facilities
(ii)	Impacts on coastal ecology due to the increased human activity in the influence area
(iii)	Impacts on local water resources due to increased demand for water and discharge of untreated domestic sewage
(iv)	Deterioration of Ambient air (including dust) and noise levels due to various activities at the construction facilities and increased vehicular movement
(v)	Impacts on local resources such as fire wood, fuel, etc. due to construction workers

(vi)	Soil and water contamination due to spillage of lubricants and other substances from the construction facilities
(vii)	Damage of local access roads due to movement of increased and / or heavy vehicular traffic
(viii)	Conflicts with the local community due to impacts on local resources and activities
(ix)	Impacts on local land use and environment due to quarrying and development of borrow areas for the project
3 Construction Activities	
(i)	Deterioration of Ambient Air and Noise levels in the project area due to construction activities and associated vehicles
(ii)	Disruption to the movement of local habitat due to construction activities
(iii)	Impacts on natural drainage pattern due to temporary diversion or blockage of local water bodies
(iv)	Temporary disruption of movements of traffic and people in the influence area of construction activities
(v)	Impacts on quality of surface water resources due to disposal of debris and other construction waste
(vi)	Safety and Accident risks due to construction activities to the population in the neighbourhood
4.Occupational Health and Safety Issues	
(i)	Health Impacts on construction personnel due to exposure to increased dust, noise and other construction risks
(ii)	Accident risks to construction Personnel

Chapter 6: Generic Environmental Management Plans

Generic Environmental Management Plans have been prepared for the proposed project components under the NCRMP. These GEMP documents need to be translated to the specific site conditions through inclusion into the bid and contract documents (refer Annex: 9) for sub components wherein specific EMP documents are not prepared.

6.1 GEMP for Roads/Bridges/Culverts

Potential Issues	*EMP Measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to Contract Document clause*
Planning & Design Phase					
Improper Siting	• Apply Siting / Screening Criteria of ESMF • Integrate stake holder consultation prior to the selection road alignment of site location	Design Consultant / Project Management Unit			Refer ESMF section 3.3 Part (B)1 for screening criteria
Destruction of or disturbance to habitat	• Apply Siting / Screening Criteria of ESMF • Conduct sub-project specific EA to identify impacts and mitigation measures for the projects in environmentally sensitive locations	Design Consultant / Project Management Unit			Refer ESMF section 3 for screening criteria and Annex *** for the scope of EA study
Flooding	• Provide adequate cross drainage works based on detailed analysis of drainage pattern of the area	Design Consultant/ Project Management Unit			
Loss of Vegetation due to tree cutting	• Selection of alignment with minimum/ no loss of trees	Design Consultant/ Project Management Unit			
Construction Phase					
Site Clearance and Preparation					

Potential Issues	*EMP Measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to Contract Document clause*
Loss of Top Soil	• Preservation of top soil and restoring the same after construction is completed	Contractor / Supervision consultant			To be incorporated in the contract document of the respective works
Loss or disturbance to local habitat	• Prepare site specific measures to ensure no loss or disturbance to local habitat	Contractor / Supervision consultant			To be incorporated in the contract document of the respective works
Impacts on movement of local habitat	• Preparation of construction schedule to avoid / minimize impacts on the movement of local habitat (including site specific protection measures)	Contractor / Supervision consultant			To be incorporated in the contract document of the respective works
Impacts on local drainage due to disposal of debris and other site clearance waste	• Identification of suitable sites for the disposal of debris and disposal of all the waste material at the designated sites	Contractor / Supervision consultant			To be incorporated in the contract document of the respective works
Setting up of Construction Camps and Other Facilities					
Loss of vegetation and sensitive coastal land for various construction	• Selection of site for various construction facilities such as camp site, plant sites, project office, etc. at places without	Contractor / Supervision consultant			To be incorporated in the contract document of the

Potential Issues	*EMP Measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to Contract Document clause*
facilities	sensitive environmental features				respective works
Impacts on coastal ecology due to the increased human activity in the influence area	• Selection of site for various construction facilities such as camp site, plant sites, project office, etc. at places without sensitive environmental features	Contractor / Implementing Agency			To be incorporated in the contract document of the respective works
Impacts on local water resources due to increased demand for water and discharge of untreated domestic sewage	➢				
Deterioration of Ambient air (including dust) and noise levels due to various activities at the construction facilities and increased vehicular movement	➢				
Waste disposal	➢ Solid/ liquid/ construction/ domestic waste, contaminants	Contractor / Implementing Agency			To be incorporated in the

Potential Issues	*EMP Measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to Contract Document clause*
	(oil/ grease etc.) shall not be disposed in water bodies/ open lands. ➢ Construction debris shall be disposed separately and properly. ➢ In case of bituminous waste, dumping should be carried out over a 60mm thick layer of rammed clay so as to eliminate any chances of leaching.				contract document of the respective works
Transport of construction materials	➢ All construction material must be transported in covered trucks and stored in closed barns. ➢ Local materials should be used as much as possible so as to avoid long distance transportation, especially that of earth and stone.	Contractor			To be incorporated in the contract document of the respective works
Water pollution	➢ Run off from the construction site must be diverted to proper drains. ➢ Wastes should be properly disposed off or contained.	Contractor			To be incorporated in the contract document of the respective works
Air pollution	➢ Water should be sprayed during construction phase, at the mixing sites, and temporary roads. ➢ Mixing equipment should be well sealed, and vibrating equipment should be equipped with	Contractor			To be incorporated in the contract document of the respective works

Potential Issues	*EMP Measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to Contract Document clause*
	dust control devices. ➢ It shall be ensured that all machinery, equipment and vehicles comply with existing Central Pollution Control Board emission norms. ➢ Bitumen burning must be avoided.				
Soil erosion	➢ The stockpiles for preserving top soil should be designed such that the slope does not exceed 1:2 (vertical to horizontal) and the height of the pile is restricted to 2m. ➢ In slopes and other suitable places along the roadside, trees and grass should be planted. ➢ On sections with high filling and deep cutting, their slopes should be covered by stone walls and planted with grass, etc.	Contractor / Implementing Agency			
Occupational health and safety	➢ Workers shall be educated about personal safety measures and location of safety devices. ➢ Personal Protective Equipment shall be provided to all workers.	Contractor			To be incorporated in the contract document of the respective works
Noise	➢ Controlled use of drilling and rolling machines.	Contractor			To be incorporated in the contract document

Potential Issues	*EMP Measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to Contract Document clause*
					of the respective works
Post construction/ Operational phase					
Public safety	➢ Informative road signs shall be provided. Inspection and maintenance of installed regulatory and informatory signs shall be undertaken. ➢ It must also be ensured that during the maintenance operation of road, road materials are stored at allocation such that they shall not create any risk to road users.	Implementing Agency			
Water pollution	➢ Run off – Proper drainage system.				
Noise	➢ Green belt on both sides to filter noise.				
Poor drainage	➢ Regular inspection and cleaning of drain to remove any debris or vegetative growth that may interrupt the flow.	Implementing Agency			

6.2 Indicative EMP for Saline Embankments

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
Planning & Design Phase					
Impact on ecologically sensitive areas	➢ Survey is to be carried out to study the impact of gap filling at areas with proximity to environmentally sensitive areas like mangrove forests/ coral reefs/agricultural lands. ➢ Identify CRZ applicable zones.	Implementing Agency / PIU			
Improper Drainage	➢ Drainage patterns should not be altered as this may lead to flooding of low lying areas on the landward side of the embankment. ➢ The alignment is to be selected from alternatives so as to minimize the land occupation, to avoid unfavorable geological & hydrological conditions.	Implementing Agency / PIU			
Flooding of landside	➢ Adequate number of sluices of proper size and design must be provided for better drainage.	PIU / Implementing Agency			
Improper Construction Schedule	➢ The activities of construction shall be scheduled taking into consideration factors such as sowing of crops, harvesting, availability of labor during particular periods and other site specific conditions.	Implementing Agency			
Construction Phase					
Tree cutting	➢ Tree cutting shall be	Implementing			

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	minimized; Afforestation/ reforestation measures should be adopted. ➢ Cutting of trees with specific medicinal, religious, archaeological, environmental importance should be avoided.	Agency / PIU			
Siltation during construction	➢ Construction in rainy season/ monsoon will be avoided or minimized.	Contractor			
Soil erosion	➢ In slopes and other suitable places along the landward side, grass should be planted. ➢ Strengthening of sides by laying stones.	Contractor			
Saltwater intrusion	➢ Appropriate planning/ construction measures will be adopted.	Contractor / Implementing Agency			
Transport of construction materials	➢ All construction material must be transported in covered trucks and stored in closed barns. ➢ Local materials should be used as much as possible so as to avoid long distance transportation, especially that of earth and stone.	Implementing Agency / PIU			To be incorporated in the contract document of the respective works
Burrow areas	➢ Burrow areas must be located at distance of 10h (h is the height of the embankment) or 30 meters which ever is greater. ➢ The soil used for preparing the	Contractor / Implementing Agency			To be incorporated in the contract document of the respective works

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	embankment should be tested for usability. ➢ Borrow areas should be selected such that irrigated/ agricultural/ grazing land and land close to settlements are avoided.				
Water pollution	➢ In sections along the river, earth and stone will be properly disposed of so as not to block rivers, resulting in adverse impact on water quality. All justifiable measures will be taken to prevent the waste water produced in construction from entering into rivers and irrigation system.	Contractor			To be incorporated in the contract document of the respective works
Air pollution	➢ Water should be sprayed during construction phase, in the line and earth mixing sites, asphalt mixing site, and temporary roads. Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust control devices.	Contractor			To be incorporated in the contract document of the respective works
Noise pollution	➢ As far as practicable, use of drilling machines, mixers, blenders, pumps, blowers, motors, etc. will be limited to daytime.	Contractor			To be incorporated in the contract document of the respective works
Public safety	➢ The construction site	Contractor			To be

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	must be restored. Any construction related waste must be cleared and transported to waste disposal sites.				incorporated in the contract document of the respective works
Soil erosion	➢ In slopes and other suitable places along the landward side, grass should be planted.	Contractor / Implementing Agency			
Post construction/ Operation phase					
Improper drainage	➢ Inspection and cleaning of sluices shall be done regularly to remove any debris or vegetative growth that may interrupt the flow.	Implementing Agency / Local Community managing the resource			

6.3 Indicative EMP for plantation/regeneration of mangroves

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
Planning and Design Phase					
Improper siting	➢ Nesting/breeding grounds of threatened or endangered species must be avoided.	Implementing Agency / PIU			
Species selection	➢ The hydrology, depth, duration and frequency of tidal inundation, tidal flooding shall be considered while choosing mangrove species. ➢ Monoculture and introduction of exotic species shall be avoided.	Implementing Agency / PIU			
Biodiversity impacts	➢ Proper planning measures for addressing issues related to habitats and impacts on bio diversity. ➢ Address the arrival of new species and changes in habitat food chain.	Implementing Agency / PIU			
Fertilizer/ pesticide use	➢ Use of fertilizers and pesticides during the life of the crop shall be planned in consultation with the Environmental Expert of the state.	Implementing Agency / PIU			
Plantation/Regeneration phase					
Health and survival of plantation	➢ Ensure all stresses to mangrove regeneration have been addressed prior to initiation of plantation activity. ➢ Plantation should be undertaken in the	Contractor / Implementing Agency			

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	appropriate season in consultation with the Environmental Expert of the state to ensure maximum survival.				
Contamination of nesting/breeding grounds	➢ Minimize the use of pesticides and fertilizers.	Contractor / Implementing Agency			
Soil contamination	➢ Minimize the use of pesticides and fertilizers.	Contractor / Implementing Agency			
Water pollution	➢ Minimize the use of pesticides and fertilizers. Excessive use of fertilizers may lead to eutrophication of water bodies. ➢ Avoid or minimize the run off of pesticides and fertilizers.	Contractor / Implementing Agency			
Impact of grazing by cattle	➢ Adopt proper planning measures/ Adequate provisions of alternate grazing lands	Implementing Agency			
Air pollution	➢ Minimize the use of chemical fertilizers/ insecticides during nursing/ initial stages of plantation	Contractor / Implementing Agency			
Post plantation/regeneration phase					
Survival rate	➢ The mangrove plantation shall be monitored and maintained regularly for the initial growth period. ➢ The periodicity for monitoring must be developed in	Implementing Agency / PIU			

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	consultation with the State Environmental Expert.				
Impact of grazing by cattle	➢ Adopt proper planning measures/ inadequate provisions of alternate grazing lands.	Implementing Agency			
Increase in disease spreading vector population	➢ Remove water logging and ensure proper drainage.	Implementing Agency / Local Community managing the resources			
Soil contamination	➢ Minimize the use of pesticides and fertilizers.	Local Community managing the resources			
Water pollution	➢ Minimize the use of pesticides and fertilizers. Excessive use of fertilizers may lead to eutrophication of water bodies. ➢ Avoid or minimize the run off of pesticides and fertilizers.	Local Community managing the resources			

6.4 Indicative EMP for Cyclone Shelters

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
Planning & Design Phase					
Improper siting	➢ Apply siting criteria ➢ Siting will be done after proper consultations	Implementing Agency / PIU			
Destruction of or disturbance to habitat	➢ Wildlife habitat areas will be established and such areas not be used.	Implementing Agency / PIU			
Flooding	➢ Proper siting – select less vulnerable site	Implementing Agency / PIU			
Construction Phase					
Tree felling	➢ Tree felling shall be minimized; Afforestation/ reforestation measures should be adopted. ➢ Cutting of trees with specific medicinal, religious, archaeological, environmental importance should be avoided.	Contractor / Implementing Agency			
Waste disposal	➢ Solid/ liquid/ construction/ domestic waste, contaminants (oil/ grease etc.) shall not be disposed in water bodies/ open lands. ➢ Construction debris shall be disposed separately and properly. ➢ In case of bituminous waste, dumping should be carried out over a 60mm thick layer of rammed clay so as to eliminate any chances of leaching. ➢	Contractor / Implementing Agency			To be incorporated in the contract document of the respective works
Transport of construction	➢ All construction material must be transported in	Contractor / Implementing			To be incorporated

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
materials	covered trucks and stored in closed barns. ➢ Local materials should be used as much as possible so as to avoid long distance transportation, especially that of earth and stone.	Agency			in the contract document of the respective works
Water pollution	➢ Run off from the construction site must be diverted to proper drains ➢ Wastes should be properly disposed off or contained	Contractor / Implementing Agency			To be incorporated in the contract document of the respective works
Air pollution / Odor	➢ Water should be sprayed during construction phase, at the mixing sites, and temporary roads. ➢ Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust control devices. ➢ It shall be ensured that all machinery, equipment and vehicles comply with existing Central Pollution Control Board emission norms. ➢ Controlled use of paints, thinners, varnishes, and solvents to minimize release	Contractor / Implementing Agency			To be incorporated in the contract document of the respective works
Soil erosion	➢ The stockpiles for preserving top soil should be designed such that the slope does not exceed 1:2 (vertical to horizontal) and	Contractor / Implementing Agency			To be incorporated in the contract document

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	the height of the pile is restricted to 2m. ➢ Containment measures should be undertaken to avoid soil wash off				of the respective works
Occupational health and safety	➢ Workers shall be educated about personal safety measures and location of safety devices. ➢ Personal Protective Equipment shall be provided to all workers.	Contractor / Implementing Agency			To be incorporated in the contract document of the respective works
Noise	➢ Controlled use of drilling and rolling machines	Contractor / Implementing Agency			To be incorporated in the contract document of the respective works
Post construction/ Operational phase					
Public safety	➢ It must also be ensured that during the maintenance operation of road, road materials are stored at allocation such that they shall not create any risk to road users.	Local Community managing the resource / Implementing Agency			
Water pollution	➢ Adequate sewerage and sanitation facilities ➢ Proper disposal of liquid waste, construction debris, and other solid wastes ➢ Proper containment to avoid rain water runoff carrying wastes and/or materials	Local Community managing the resource / Implementing Agency			
Solid waste management	➢ Adequate provision and connection to existing	Local Community			

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
including municipal waste	facilities	managing the resource / Implementing Agency			
Sewerage and sanitation facilities	➢ Proper design and siting of latrines/ septic tanks ➢ Adequate provision and connection to existing facilities	Local Community managing the resource / Implementing Agency			
Poor drainage	➢ Regular inspection and cleaning of drain to remove any debris or vegetative growth that may interrupt the flow.	Local Community managing the resource / Implementing Agency			

6.5 Indicative EMP for Coastal Canals

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
Planning & Design Phase					
Impact on ecologically sensitive areas	➢ Survey is to be carried out to study the impact of gap filling at areas with proximity to environmentally sensitive areas like mangrove forests/ coral reefs/agricultural lands. ➢ Identify CRZ applicable zones	Implementing Agency / PIU			
Improper Drainage	➢ Drainage patterns should not be altered as this may lead to flooding of low lying areas on the landward side of the embankment. ➢ The alignment is to be selected from alternatives so as to minimize the land occupation, to avoid unfavorable	Implementing Agency / PIU			

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	geological & hydrological conditions.				
Flooding of landside	➢ Adequate number of sluices of proper size and design must be provided for better drainage	Implementing Agency / PIU			
Improper Construction Schedule	➢ The activities of construction shall be scheduled taking into consideration factors such as sowing of crops, harvesting, availability of labor during particular periods and other site specific conditions.	Implementing Agency / PIU			
Construction Phase					
Tree cutting	➢ Tree cutting shall be minimized; Afforestation/ reforestation measures should be adopted. ➢ Cutting of trees with	Contractor / Implementing Agency			

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	specific medicinal, religious, archaeological, environmental importance should be avoided.				
Siltation during construction	➢ Construction in rainy season/ monsoon will be avoided or minimized.	Contractor / Implementing Agency			
Saltwater intrusion	➢ Appropriate planning/ construction measures will be adopted	Contractor / Implementing Agency			To be incorporated in the contract document
Transport of construction materials	➢ All construction material must be transported in covered trucks and stored in closed barns. ➢ Local materials should be used as much as possible so as to avoid long distance transportation, especially that of earth and stone.	Contractor / Implementing Agency			To be incorporated in the contract document
Air pollution	➢ Water should be sprayed during	Contractor / Implementing Agency			To be incorporated in the

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	construction phase, in the line and earth mixing sites, asphalt mixing site, and temporary roads. Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust control devices.				contract document
Water pollution	➢ Proper disposal of construction debris, solid/ liquid waste	Contractor / Implementing Agency			To be incorporated in the contract document
Noise Pollution	➢ As far as practicable, use of drilling machines, mixers, blenders, pumps, blowers, motors, etc. will be limited to daytime.	Contractor / Implementing Agency			To be incorporated in the contract document
Soil erosion	➢ In slopes and other suitable places along the landward side, grass should be planted.	Contractor / Implementing Agency			

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	➢ Weak sections that are likely to subside or break off during high flow conditions to be strengthened.				
Post construction/ Operation phase					
Improper Drainage of landside	➢ Inspection and cleaning of sluices shall be done regularly to remove any debris or vegetative growth that may interrupt the flow.	Implementing Agency `			
Soil erosion	➢ In slopes and other suitable places along the landward side, grass should be planted. ➢ Strengthening of sides by laying stones	Implementing agency			
Water pollution	➢ Educate local community to avoid discharging or disposing toxic materials in the canal	Implementing agency			
Eutrophication/clogging by weeds	➢ Proper land management and drainage	Implementing agency			

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	system ➢ Proper waste disposal techniques ➢ Controlled use of fertilizers in upstream fields				

6.6 Indicative EMP for Shelter Belts

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
Planning and Design Phase					
Improper siting	➢ Nesting/breeding grounds of threatened or endangered species must be avoided	Implementing Agency / PIU			
Species selection	➢ The hydrology, depth, duration and frequency of tidal inundation, tidal flooding shall be considered while choosing trees for shelter belts ➢ Species with good foliage cover will be selected for better wind resistance ➢ Monoculture and introduction of exotic species shall be avoided.	Implementing Agency / PIU			
Biodiversity impacts	➢ Proper planning measures for addressing issues related to habitats and impacts on bio diversity ➢ Address the arrival of new species and changes in habitat food chain	Implementing Agency / PIU			
Fertilizer/ pesticide use	➢ Use of fertilizers and pesticides during the life of the crop shall be planned in consultation with the Environmental Expert of the state.	Implementing Agency / PIU			
Plantation Phase					
Health and survival of plantation	➢ Plantation should be undertaken in the appropriate season in	Contractor / Implementing Agency			

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	consultation with the Environmental Expert of the state to ensure maximum survival.				
Contamination of nesting/breeding grounds	➢ Minimize the use of pesticides and fertilizers.	Contractor / Implementing Agency			
Soil contamination	➢ Minimize the use of pesticides and fertilizers	Contractor / Implementing Agency			
Water pollution	➢ Minimize the use of pesticides and fertilizers. Excessive use of fertilizers may lead to eutrophication of water bodies. ➢ Avoid or minimize the run off of pesticides and fertilizers	Contractor / Implementing Agency			
Impact of grazing by cattle	➢ Adopt proper planning measures/ inadequate provisions of alternate grazing lands	Implementing Agency			
Air pollution	➢ Minimize the use of chemical fertilizers/ insecticides during nursing/ initial stages of plantation	Contractor / Implementing Agency			
Post plantation phase					
Survival rate	➢ The plantation shall be monitored and maintained regularly for the initial growth period. ➢ The periodicity for monitoring must be developed in consultation with the State Environmental	Implementing Agency / PIU			

Potential Issues	*EMP measures*	*Responsibility*	*Budget*	*Timeline*	*Reference to contract document clause*
	Expert.				
Impact on grazing by cattle	➢ Adopt proper planning measures/ inadequate provisions of alternate grazing lands	Implementing Agency / Local Community managing resource			
Increase in disease spreading vector population	➢ Remove water logging and ensure proper drainage	Implementing Agency			
Soil contamination	➢ Minimize the use of pesticides and fertilizers	Local community managing the resource			
Water pollution	➢ Minimize the use of pesticides and fertilizers. Excessive use of fertilizers may lead to eutrophication of water bodies. ➢ Avoid or minimize the run off of pesticides and fertilizers	Local community managing the resource			

Chapter 7: Potential Social Impacts and Measures

7.1 Potential social issues

The sub-project activities of NCRMP as explained in Chapter 1 are in 6 categories namely

- Construction of cyclone shelter
- Construction of link roads/bridges and culverts
- Construction of saline embankments
- Regeneration of mangroves
- Shelterbelt plantations
- Towers for communication

A description of the activities (provided in Chapter 1) clearly indicates that the implementation of these sub-projects is not expected to lead to adverse social concerns. The activities are small civil works which do not require extensive manpower or machinery and can be well executed with locally available resources. The impacts, if any, are expected to be minor, localized and readily managed. The aim of undertaking these sub-project activities is to directly or indirectly protect the communities from cyclones. The adverse social concerns as well as other positive impacts likely to arise due to execution of one of the sub project activities are:

Sub-project activity	Possible social concerns	Positive impacts
Construction of cyclone shelter	• Acquisition of small amount of private lands • Use of public lands • Impacts to non title holders on public lands • Resettlement of families • Damages to standing crops and plantations. • Loss of livelihoods	• Safe shelter in case of a cyclone • Building of social infrastructure for community use (school, health centre etc)
Construction of link roads/bridges and culverts	• Acquisition of small amount / linear strips of private lands • Use of public lands • Resettlement of families • Impacts to non title holders on public lands • Damages to standing crops and plantations • Loss of existing structures and community property. • Loss of livelihoods	• Connectivity to main roads or shelters • Evacuation route during the times of a disaster • Connectivity to major business centers in the locality

Sub-project activity	Possible social concerns	Positive impacts
Construction of saline embankments	• Private land acquisition • Use of public lands • Impacts to non title holders on public lands • Resettlement of families • Damages to standing crops and plantations • Temporary influx of labour • Loss of mangrove ecosystem/community forest on which near by residents/local population are dependent for fuel wood/grazing etc	• Protection of agriculture lands from saline water intrusion, surge and inundation • Protection of habitation from surge and inundation • Connectivity to main roads and evacuation routes
Regeneration of mangroves	• Loss of livelihood • Small amount of land requirement for plantations	• Protection from surge in event of a cyclone disaster • Increase in vegetative cover
Shelterbelt plantations	• Small amount of land requirement for plantations (land acquisition)	• Protection from cyclonic winds • Protection of agricultural lands from saline winds, which boasts agriculture
Towers for communication	• Acquisition of land. • Access restrictions to the land	• Ensuring connectivity through VHF

Note: *The above list is only illustrative and any additional activities that may be considered will be mitigated in accordance with requirements and needs.*

Over and above these impacts there may be some proposal for development of infrastructure in regions inhabited by indigenous communities. In such cases, mitigation measures will be proposed in accordance with World Bank's safeguard policy of Involuntary Resettlement OP/BP 4.12.

7.2 Guiding Principles for Addressing Social Issues

7.2.1 Land Acquisition and Involuntary Resettlement

7.2.1.1 Involuntary Resettlement

Location of facilities has to be planned so as to have least impact on the community. If a particular location is suitable for all factors except for limited resettlement, necessary compensatory measures as per the resettlement framework needs to be worked out. Resettlement impacts due to these interventions would be managed through appropriate compensation and rehabilitation measures as per the entitlements of the PAP. A resettlement action plan to this effect would be prepared to address the impacts. Compensation and rehabilitation measures will be carried out in accordance with the entitlement framework for the sub-project activity.

It needs to be ensured that all R&R activities are to be completed before the construction activity starts. If any resettlement is required for project interventions, resettlement sites required are to be taken up for construction prior to the contractor mobilization at site. Suitable locations for resettlement sites are to be identified in consultation with the PAPs to be relocated.

The participating states have experience of implementing World Bank projects under different initiatives but a Resettlement policy is already in place along with an Entitlement Matrix. The entitlement matrix needs to be adapted to the project initiatives to arrive at appropriate entitlements for identified impacts. These entitlements should have special privileges to vulnerable people affected by the project. As resettlement impacts in the NCRMP may also be on encroachers and squatters, they need to be assisted following the entitlement matrix.

7.2.1.2 Eligibility for Benefits

Project Affected Persons (PAPs) are defined as persons whose livelihood or shelter is directly affected by the project activities due to acquisition of the land owned or used by them. PAPs deemed eligible for compensation are:

- Those who have formal legal rights to land, water resources or structures/buildings, including recognized customary and traditional rights;
- Those who do not have such formal legal rights but have a claim to usufruct rights rooted in customary law; and
- Those whose claim to land and water resources or building/structures do not fall within (a) and (b) above, are eligible to resettlement assistance to restore their livelihood.

7.2.1.3 Entitlement Matrix

Table below represents the Entitlement Framework for the proposed project. These entitlements do not apply for cases of voluntary donation (refer section 6.2.4.1). State level variations and details wherever, have been recorded in Annexure 4. In case of need of any particular reference, the annexure may be consulted.

	Category	Type of loss	Entitlement	Compensation
1A	Private property	Land and assets (non agricultural)	Compensation at "replacement cost" or "actual market value".	**Compensation** • Cash compensation for the land and structure at replacement cost shall be given to the titleholder as decided by the Competent Authority. • If the replacement cost is more than the compensation (as determined by the land acquisition authority), then the difference is to be paid by the *'requiring body'* in the form of "assistance". • Stamp duty and other fees payable for registration shall be borne by *'requiring body'* . • In the case of loss of house, a house may also be offered in lieu of the acquired house for vulnerable PAFs[9]. **Assistance** • Each PAF shall get financial assistance as transportation cost for shifting of building materials, belongings etc[10]. • For partially affected structures, compensation at replacement cost for loss of affected area shall be provided. PAF whose structures are partially affected shall be eligible for assistance for repairing/ strengthening cost of remaining structure. • A two months notice shall be given for the removal of structures. The owner/tenant (in cases where a tenant occupies the structure) shall be given the right to salvage material from the structure.
1B	Private property	Agricultural land and any standing crops/trees	Compensation at "replacement cost" or "actual market value".	**Compensation** • The compensation for the land shall be given to the titleholder as decided by the Competent Authority

[9] The decision for this will lie with the competent state authority. The area of land allotted for the house may not exceed 250 sq.mt. in rural area and 150 sq.mt. in urban area.
[10] For the amounts of assistance, please refer to the respective state policies or the National R&R Policy 2007, in case the state does not specify an R&R policy .

	Category	Type of loss	Entitlement	Compensation
		etc on it		• If the replacement cost is more than the compensation (as determined by the land acquisition authority), then the difference is to be paid by the project in the form of "assistance". • In case of partial acquisition of land or severance, where the farmer becomes a marginal or small farmer due to the acquisition, then an additional grant shall be given[11]. • Stamp duty and other fees payable for registration shall be borne by the *'requiring body'* . **Assistance** • Each PAF shall get financial assistance as transportation cost for shifting of building materials, belongings etc[12]. • A four months advance notice shall be given to salvage crops.
2A	Livelihood	Income/ losses	Income restoration	**Assistance** • Monthly subsistence allowance equivalent to 20 days minimum agricultural wages per month for a reasonable period not less than six months.
3A	Non title holders	Encroachers / squatters	Assistance/rehabilitation	• Will receive no compensation for land but replacement cost for structures to the vulnerable groups (SC, ST, Women Headed Households and poor). Such assistance shall be given only to residential and commercial properties; • Encroachers/squatters will be notified a time in which to remove their assets; • Right to salvage materials from the demolished structure.

[11] The amount of additional grant will be decided based on the state R&R policy / NPRR 2007 or by the competent authority in the respective state in consultation with the community.
[12] For the amounts of assistance, please refer to the respective state policies or the National R&R Policy 2007, in case the state does not specify an R&R policy .

	Category	Type of loss	Entitlement	Compensation
4C	Special category	Vulnerable/ SC/ST/Tribal communities	Assistance	• Additional assistance for vulnerable groups will be provided as per the provisions of State R&R policy or NPRR 2007.

For details on the National R&R policy and State specific R&R policy, refer Annexure 4.

7.2.2 Cultural Property Resources

All utilities and common property resources likely to be affected due to the project will be relocated with prior approval of the concerned agencies before start of construction. Similarly, cultural properties whose structure is likely to get affected, will be relocated at suitable locations, as desired by the community before construction starts. Local community need to be contacted and discuss relocation aspects, siting as well as their maintenance.

All necessary and adequate care shall be taken to minimize impact on cultural properties (which includes cultural sites and remains, places of worship including temples, mosques, churches and shrines, etc., graveyards, monuments and any other important structures as identified during design and all properties/sites/remains notified under the Ancient Sites and Remains Act. No work shall spillover to these properties, premises and precincts.

7.2.3 Indigenous People

"Indigenous Peoples" as defined for the purposes of the OP 4.10, are members of distinct indigenous cultural group, collective attachment to geographically distinct habitats or ancestral territories, customary cultural, economic, social or political institutions that are separate from those of dominant society and culture and have an indigenous language different from the official language of the country or the region. Under Article 342 of the Indian Constitution, the following characteristics define indigenous peoples [Scheduled Tribes (STs)], (i) tribes' primitive traits; (ii) distinctive culture; (iii) shyness with the public at large; (iv) geographical isolation; and (v) social and economic backwardness before notifying them as an ST. IPs have a social and cultural identity distinct from the 'mainstream' society that makes them vulnerable to being overlooked or marginalized in the development processes.

All sub-projects are being implemented in the rural areas which consist of SC / ST population. Impacts on these groups would be addressed through the entitlement framework specified for the project inline with the ESMF requirements.

7.2.4 Acquisition of land and payment of compensation

7.2.4.1 Voluntary land donation

Land acquisition is likely to take place through a combination of several methods. Identification of available vacant government lands will be the most preferred method. In addition, the lands belonging to temples trusts, Gram Panchayats, etc. will also be explored. In some cases the land owners or Gram Panchayats or temples may come forward for voluntary donation of lands.
Individuals may also elect to voluntarily contribute land or assets, provided the persons making such contributions do so willingly and are informed that they have the right to refuse such contributions. Procedures will be in place to ensure that all donations are voluntary and freely given; that the donor is the legitimate owner of the land; and that the donor is fully informed of the nature of the project, the implications of donating the property, and his entitlements as provided for in the land acquisition and resettlement policy being adopted by the project.. The following measures will have to be applied in dealing with land donations, based on their relevance to the cases being encountered:

i. Proof of meeting where the land acquisition and resettlement policy has been discussed with the affected person and acknowledgement by the affected person of his knowledge of the land acquisition and resettlement policy.

ii. Certification from the government body that the land is free of claims or encroachments from any third party;

iii. Deed of donation to the proponent concerned, as witnessed by the government officials, duly registered and Declaration of ownership with waiver of claims for affected assets;

iv. Waiver of rights/quit claim (for plants, trees, houses, structures claimed by tenants, informal settlers)

7.2.4.2 Land acquisition/private purchase

The private land acquisition will be made through private negotiations or using the land acquisition process. Based on the above support principles, the individual entitlements will be proposed and included in the RP. In case of acquisition of private lands, the compensation rates will be decided by the Land Acquisition Officer in accordance with the prevailing market rates.

In case of losses to structures, the compensation will be determined in accordance with the Public Works Department's current Schedule of Rates for new construction of similar quality without depreciation.

7.2.5 Consultation and information disclosure proposed

The ESMF envisages involvement of all the stakeholders' at each stage of the project planning, implementation and post construction phase. The PIU/state level nodal agency will be responsible for ensuring participation of the community at sub-project level. Involvement of the community includes interactions with the community and disclosing relevant information pertaining to the project tasks.

7.2.5.1 Planning

Dissemination of project information to the community and relevant stakeholders is to be carried out by the PIU at this stage of the project initiative.

Community and other stakeholders should be involved in the decision making to the extent possible. Consultation process shall be inclusive of all stakeholder groups including women, vulnerable groups etc

The community at large shall be made aware of the project alternatives and necessary feedback shall be obtained. This should include the process being followed for prioritisation of the identified sub-projects and the proposed benefits. The consultation process adopted shall ensure that the stakeholders / local community concerns about proposed location are adequately addressed along with other concerns if any.

The consultant/ SDMA / NDMA shall fill in the following details as per the template format. Specific details / minutes of the meetings conducted and action plans agreed upon may be supplemented in the Annex section of the report and provide a summary of the outcome of the consultations in the below mentioned table

Sr No.	stakeholder groups	Issues Raised by the stakeholders	Steps proposed for resolution of the issues / Reasons for No consideration	Responsible Agency / Person to implement corrective actions including timeline (if applicable)

7.2.5.2 Implementation stage (Pre-construction)

Consultation during this stage of the project shall be conducted with:

- Land-owners for obtaining their consent for:
  - land requirements if any
  - temporary use of additional land during construction for setting up workers camp, borrow areas, waste disposal sites
- The line departments; and
- Relevant research institutions working on similar components e.g. for the mangrove plantation, if any existing research institution has done any studies on the survival rate for the key species in the area. Consultation with such research organizations will help improve the project outcomes.

The consultant/ SDMA / NDMA shall fill in the following details as per the template format. Specific details / minutes of the meetings conducted and action plans agreed upon may be supplemented in the Annex section of the report and provide a summary of the outcome of the consultations in the below mentioned table

Sr No.	stakeholder groups	Issues Raised by the stakeholders	Steps proposed for resolution of the issues / Reasons for No consideration	Responsible Agency / Person to implement corrective actions including timeline (if applicable)

7.2.5.3 Implementation stage (construction)

Consultations shall be carried with the contractors / line departments for identifying any environmental and social issues arising during the implementation not envisaged in the DPR / EA-EMP/GEMP documents. In addition, the contractor in consultation with the Implementing agency & PIU shall settle any grievances raised by the local community during this stage

7.2.5.4 Implementation stage (construction)

Consultations shall be carried with the contractors / line departments for identifying any environmental and social issues arising during the implementation not envisaged in the DPR / EA-EMP/GEMP documents. In addition, the contractor in consultation with the Implementing agency & PIU shall settle any grievances raised by the local community during this stage

The consultant/ SDMA / NDMA shall fill in the following details as per the template format. Specific details / minutes of the meetings conducted and action plans agreed upon may be supplemented in the Annex section of the report and provide a summary of the outcome of the consultations in the below mentioned table

Sr No.	stakeholder groups	Issues Raised by the stakeholders	Steps proposed for resolution of the issues / Reasons for No consideration	Responsible Agency / Person to implement corrective actions including timeline (if applicable)

7.2.5.5 Post Construction

The PIU and the implementing agencies shall conduct post implementation consultations with the local community and stakeholders to ensure the operations and maintenance of the infrastructure assets created and the role of the local community in maintenance.

7.2.5.6 List of likely consultations

The table below provides an overview of the likely consultations to be carried out by the responsible agencies to ensure information disclosure and active involvement of the local community / stakeholders:

Activity	*Stakeholders to be involved*	*Agency Responsible*	*Techniques used*	*Results*
Project Prioritization				
Details of basic information about the project	Community, NGOs, local government	PIU, concerned govt agency	Distribution of brochure	Awareness amongst the stakeholders
Project Planning				
Dissemination of project information	Community, NGOs, local government	PIU, concerned govt agency	Meetings with concerned stakeholders	Increased awareness amongst the stakeholders about the project. Identification of vulnerable PAPs, identification of grievances, incorporation of suggestions provided by stakeholders in project planning
Consultation with PAPs	Community PAPs	PIU, concerned govt agency	Focus meeting with PAPs and group meeting	Sensitize PAPs on likely issues. Disseminate information on likely social issues Details / List of PAPs
Summary of affected persons	PAPs	PIU, concerned govt agency	Individual consultation with PAPs, Household survey	Assessment of socio economic profile of PAPs Understand the extend of impact Understand the vulnerability and extend of support to be provided
Dissemination of information on process of land transfer, entitlement provision and grievance mechanism	PAPs	PIU, concerned govt agency	Public meeting, distribution of notices to non title holders, brochures to PAPs	Awareness of process of land transfer Providing details on grievance mechanism Early signal to non titleholders for providing possession of assets.
Finalization of entitlement	PAPs	PIU, concerned govt agency	Individual discussion / meeting with PAPs	Ensure that eligible PAPs are included as per the eligibility to provide them necessary assistance.
Implementation				
Advance notice to encroachers, non title	PAPs	PIU, concerned govt	Public meeting	Clearance of land before start of project

holders, farmers with standing crops		agency		implementation
Relocation of common property resources	Community	PIU, concerned govt agency	Public meeting	Ensure that common property resources are relocated as per community needs.
Redressal of grievances	Community	PIU, concerned govt agency	Public meeting, meeting with PAPs	Grievance redressal during implementation of project
Disbursal of entitlements	PAPs	PIU, concerned govt agency	Meeting with PAPs	Support extended to eligible PAPs
Temporary impact during construction	Community	Contractor, PIU	Public meeting	Redressal of impact during implementation of project.
Health impacts of implementation of project	Community	PIU	Public meeting	Sensitizing concerned stakeholders on health related issues
Physical possession of land	PAPs, community	PIU	Meeting with PAPs and community	Identification of boundary of residual plots. Clearance of plot before start of the project
Monitoring & Evaluation	PAPs, community	PIU	Public meeting with PAPs and community	Provide information on progress of the project Grievance from stakeholders if any during project implementation Take inputs from stakeholders in effective implementation of project.

7.2.5.7 Information Disclosure

The mechanism of information dissemination should be simple and be accessible to all. The means that may be explored include briefing material and organization of community consultation sessions. The briefing material (to be prepared in local language) can be in the form of a) brochures (including project information, land acquisition and details of entitlements including compensation and assistance to be given to the PAPs) that can be kept in the local Government office; b) posters to be displayed at prominent locations and c) leaflets that can be distributed throughout the length of the project corridors. Consultation meetings should also be organized at regular intervals by the PIU to acquaint the PAPs of the following:

- Timeline and progress of the project;
- Information on compensation and entitlements;
- Information on land acquisition and market valuations of property;
- Time line for acquisition.

Also, opinion and consensus of the community needs to be sought for common and cultural property relocation.

The ESMF and subsequent implementation plans as well as studies for investments will be disclosed on the government websites and other public places accessible to the local people and NGOs in English and local language.

7.2.6 Grievance redressal

In the NCRM project all efforts will be made so that the compensation package for PAF's is decided in consultation with the community so as to avoid any dispute. In case of a potential dispute the matter will be brought to the notice of local tehsildar/Sub Divisional Magistrate (SDM). He shall hear the case in presence of (a) the affected party, (b) the incharge of line department who is acquiring the land/ incharge of the sub-project activity and (c) sarpanch of the village where the sub-project is being implemented. He will try to reach an amicable solution to the issue.

However, in case of non-satisfactory solution, the matter will be brought to the notice of the District Collector and he is the final authority to decide the case. The hearing will be attended by all members present for hearing with the SDM as well as the Social Management Specialist of the PIU. The Social Management Specialist will be responsible for maintaining a record of the proceedings and the final decisions.

7.2.7 Subproject approval

In the event that a subproject involves land acquisition against compensation or loss of livelihood or shelter, the implementing agency shall:

- Not approve the subproject until a satisfactory RP has been prepared and shared with the affected person and the local community; and
- Not allow works to start until the compensation and assistance has been made available in accordance with the framework.

7.3 Identification of impacts through social screening

Though it is envisaged that the subproject activities will have very generic social issues that are manageable through standards and codes of practice, there might be some sub-project activities proposed in due course, that carry a higher risk social disruptions and/or impacts. The possibility of such an issue arising in the sub-project site will be identified during the screening process. The screening check list for the NCRMP (Chapter 5) has been designed to identify sub-projects with potential social issues that may need to be addressed at the project planning stage.

7.4 Preparation of Resettlement Plans

Having identified the potential impacts of the relevant sub-projects, the next step is to develop action plans to mitigate the impacts. The RPs provides a link between the impacts identified and proposed mitigation measures to realize the objectives of involuntary resettlement. The RPs will take into account magnitude of impacts and accordingly prepare a resettlement plan that is consistent with this framework for Bank approval before the sub-project is accepted for Bank financing.

- Sub-projects that will affect more than 200 people due to land acquisition and/or physical relocation would require an SIA and a full Resettlement Plan (RP).
- Sub-projects that will affect less than 200 people will require an abbreviated RP;

Such plans will be prepared as soon as the sub-project is finalized and cleared prior to approval of the bid documents.

- Projects that are not expected to have any land acquisition or any other significant adverse social impacts are exempted from any further social intervention.

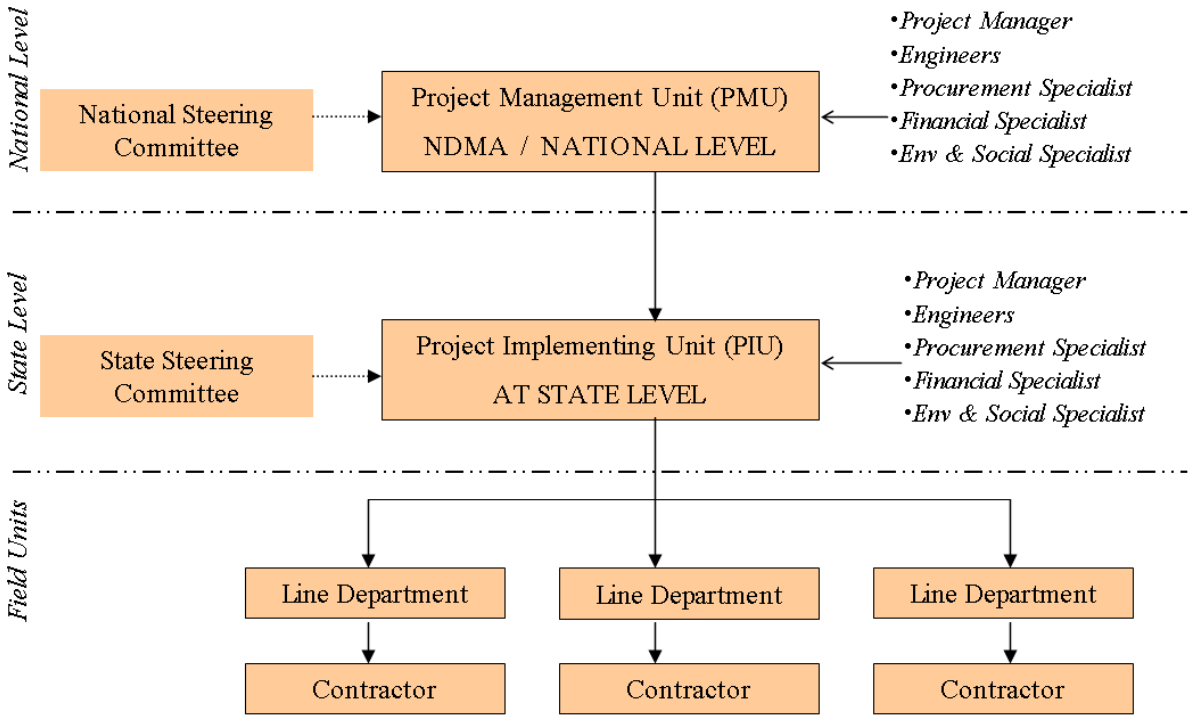
The terms of reference for conducting an SIA are indicated as Annexure 5. The indicative outline of Resettlement Plans is provided in Annexure 6

Chapter 8: ESMF Implementation and Management Arrangements

The ESMF needs to be applied and implemented at all project stages. .

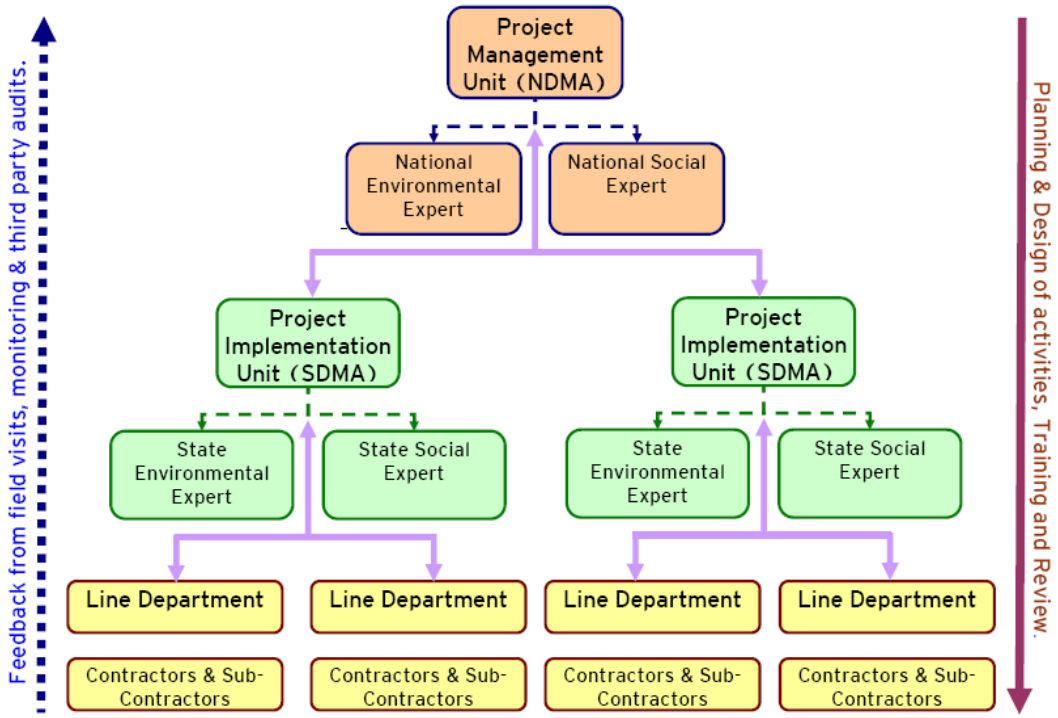
8.1 Institutional arrangements:

The Project Management Unit (PMU) at the national level will be the executing agency whereas the overall project delivery of the NCRMP will be overseen by a National Steering Committee. NDMA shall check, modify and align with the institutional arrangement proposed for the project. The PMU will be established at the NDMA for active oversight on the different components across the states. Each state in turn will have a Project Implementation Unit (PIU) for coordinating the day to day activities with the implementing agencies / line departments overseen by the State Steering Committee. The overall implementation structure is depicted below in Figure: xxxxx:



Both the PIU and the PMU have functional and management teams comprising of the Project Managers, Engineers, Procurement specialists, Financial specialists, Environment & Social specialists and support staff. The PIU shall implement the sub project activities through the relevant line departments.

The environment and social specialist at the state level shall provide feedback based on the field visits, monitoring activities undertaken and third party audits to the respective environmental and social experts at the national level. The environment and social specialists at the national level will in turn provide technical assistance in planning and design of the activities (including sample field visits), trainings and review where applicable as depicted in figure below:



8.1.1 *Project Management Unit (PMU)*

Towards the implementation of the ESMF, two officers for managing the environmental and social aspects will be designated as Environmental & Social specialist as well as any other environmental and social provisions as deemed fit for project implementation as per the regulations of the World Bank Operational policies and the Government of India regulations. The role and responsibilities of the environment and social specialists is indicated as follows:

8.1.1.1 PMU'S Environmental and Social Specialist

The roles & responsibilities shall include:

- Preparation and updating of the ESMF document.
- Training and orientation of the PIU teams on the requirement and application of the ESMF
- Reviewing the monitoring reports submitted by the States for compliance with the EMP and the RAP from the States
- Visit a sample of environmentally sensitive sites, across the implementing states, to review compliance with the EMP and the RAP
- Provide guidance and inputs to the State PIU on environment and social management aspects
- Act as a single point of contact for resolving queries related to environment and social issues.

Suggested qualifications and experience for Environment specialist: A Master's Degree in Environment/Natural Resources or related areas with experience on the environmental safeguard

policies of agencies like World Bank and Asian Development Bank. The candidate must possess good writing, reporting and communication skills.

Suggested qualification and experience (Social specialist): A Master's Degree in social sciences with experience of the social safeguard policies of multilateral aided projects. Should have good knowledge of the prevailing R&R regulations/laws of the country, States, and World Bank. The candidate must possess good writing, reporting and communication skills.

8.1.2 Project Implementation Unit

The two officers designated as Environmental & Social specialist shall oversee the implementation of ESMF as well as any other environmental and social provisions as deemed fit for project implementation as per the regulations of the World Bank and the Government of India.

8.1.2.1 PIU'S Environment Specialists– Roles & Responsibilities

The primary scope of work of the Environmental Specialist at PIU (Project Implementation Unit) is to assist in preparation and implementation of the sub project specific DPR documents in particular the screening formats, specific EMP where required and integration of GEMP for all sub project activities . Other duties/works include but not limited to the following

- Coordinate the preparation of environmental screening report of project sites assessments,
- Preparation of site specific environment management plans (EMP)for selected subprojects;
- Capacity building of staff, contractors, stakeholders and consultants (wherever detailed Environmental Impact Assessments (EIAs) are taken up) on environmental safeguard issues, practices and procedures to be followed;
- Organizing training for line departments on ESMF / EMP implementation
- Ensuring appropriate application of the ESMF to all components and sub-projects.
- Identifying and providing oversight to other consultants who may be deployed to carry out sub-project specific EAs and EMPs of sub-projects (wherever required);
- Prepare information, communication, and education strategy to enable proper conduct of stakeholder consultations and documenting the implementation of EMPs;
- Detailing all the environmental laws and regulations of the state and national government which will apply to specific sub project activities;
- Liaising with various State line departments & other implementing agencies to provide necessary advice on environmental matters;
- Coordinating with MoEF and State-level regulatory authorities for obtaining environment clearances in a timely manner;
- Periodic site visits to ensure that environmental requirements in the ESMF are being followed during implementation of projects activities by the Line departments and contractors, identification of shortcomings if any and advice on the remedial corrections.
- Preparing and / or providing necessary inputs to project quarterly progress reports on environmental matters pertaining to ESMF implementation;

- Supporting hiring of external environmental auditors where appointed by the PIU's and coordinating the conduct of these audits as per the ESMF requirements.
- Oversee the working of the third party auditors for social and environment compliance, including review of:
    - the audit plan,
    - the results and the exceptions of the audits and recommended corrective action

Qualification and Experience: A Master's Degree in Environment/Natural Resources or related areas. Good and demonstrated understanding of the environmental safeguard policies of agencies like World Bank and Asian Development Bank is a prerequisite for this position. The person shall have hands on experience in projects funded by the WB and/or other multilateral agencies in India and the State (preferably). Must possess good writing, reporting and communication skills.

8.1.2.2. PIU'S Social Expert – Roles & Responsibilities

The primary scope of work of the Social Development and Resettlement Specialist is to help the State Project Implementation Unit in preparing and implementing the approved social aspects of the Environmental and Social Management Framework (ESMF). Other duties/works include but not limited to the following:

- The consultant will assist the state level PIUs, their line departments, Implementing Agencies (IAs) and non governmental organizations (NGOs) engaged in the project in community mobilization, preparation, and implementation of resettlement plans in accordance with the agreed ESMF;
- Assist the above stakeholders in the preparation and implementation of RAP for sub-projects which trigger adverse social concerns for the Project Affected People (PAPs);
- Carry out wherever required an initial poverty and social assessment, sample socio-economic survey, and detailed inventory of affected assets and losses and disclosure of the sub-project Resettlement Plan to the affected persons;
- Provide guidance to line departments/implementing NGOs in preparation of information materials related to resettlement, consultation with PAPs on resettlement/relocation options and finalization of individual entitlements, verification, and delivery of compensation and allowances, house reconstruction (if required) prior to dispossession or displacement;
- Wherever land acquisition issues are involved, liaise with District Collectors and relevant authorities to expedite land acquisition process and assist in finalizing estimates of compensation, extend assistance to PIU and line departments in effectively addressing the grievances of the PAPs in consultation with Grievance Redressal mechanisms;
- Monitor all land acquisition and resettlement related activities;
- Prepare monthly progress reports highlighting implementation progress, issues/constraints that require decisions by the PIUs and other agencies involved.

Qualification and Experience: A Master's Degree in social sciences with good knowledge of the prevailing R&R regulations/laws of the country, state, and World Bank. The person shall have hands

on experience in projects funded by the WB and/or other multilateral agencies in India and the State (preferably). Must possess good writing, reporting and communication skills.

8.1.3 Line department / Implementing Agencies

The line department shall be responsible for the execution of the contracted work either through the contractors or internally by the department staff. The line department will ensure during the day to day functioning that the EMPs and the RAPs are implemented for their respective sub-projects. The line departments / implementing agencies shall carry out the following key tasks but not limited to:

- Leading the social and environment screening for the sub-project site
- Preparation of the EA / EMP documents along with DPR where applicable either internally or external consultants.
- Onsite review for compliance with the EMP and the RAP

8.1.4 Third Party Auditors

Third party auditors may be appointed by the PIU to provide independent assurance on compliance with the EMPs and the RAPs across project sites. The third party auditors shall:

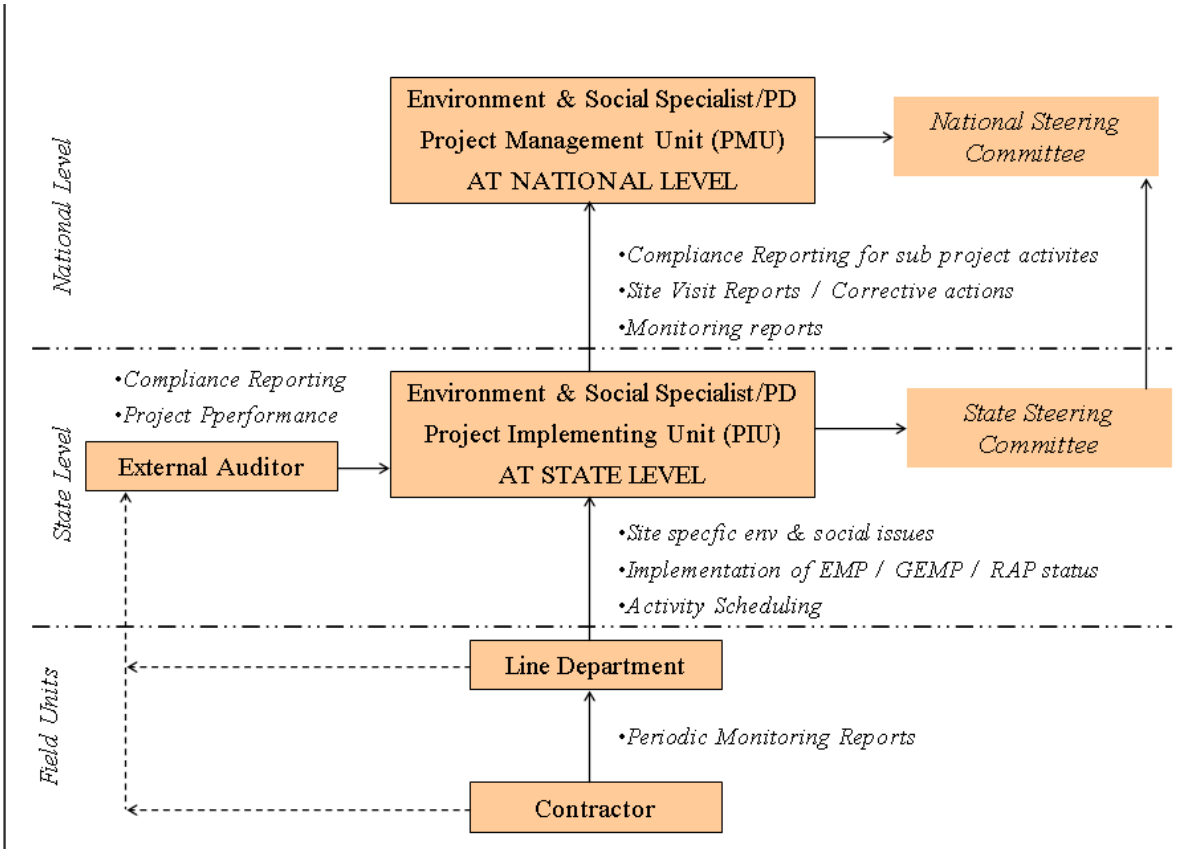
- Support the PIU in preparing the audit plan
- Prepare compliance report for sub-project activities with ESMF guidelines and other statutory requirements as applicable through scheduled or unscheduled audits
- Conducting random field visits especially at the environmentally or socially sensitive areas
- Review the performance of the project through an assessment of periodical monitoring reports submitted by the line department/PIUs.
- Share audit findings with the PIU to aid in timely decision making and adopting appropriate mitigation action if necessary.

8.2 Project Monitoring and reporting

Each state PIU cell with designated environment and social specialists shall be responsible for overseeing compliance of the sub-projects to Bank safeguards and GoI regulations & applicable guidelines as well as reviewing the timely implementation of environment and social provisions as per the ESMF, EMP and RAP where applicable. The monitoring & reporting will be done by line departments / implementing agency to PIU which in turn will be reporting to PMU cell. This shall help ensure:

- Successful completion of environmental management, R&R activities identified in the EMP and R&R plan as per the implementation schedule
- Compliance with the environmental policy, R&R policy and entitlement framework.

The overall reporting mechanism for the project is depicted below in figure: xxxx:



The following aspects shall be monitored and reported as per the frequency provided in table below. Corrective actions shall be initiated in a planned manner as appropriate to ensure compliance to the EMP / GEMP measures.

No	*Particulars*	*Frequency of updation*	*Reporting Responsibility*	*Monitoring responsibility*
1	Compliance Status report: *'Environmentally & socially sensitive sites, status of conduct of EIA/SIA, and status of compliance at these sites*	Monthly Quarterly	PIU – Environmental and Social Expert PIU – Environmental and Social Expert	PIU - Project Director PMU – Environmental and Social
2	Environment and social site visit report encapsulating– a. plan vs actual b. exceptions noted in visit	Quarterly	PIU – Environmental and Social Expert	PIU - Project Director PMU – Environmental and Social
3	Verification of land to be acquired and status of land acquisition	Monthly	PIU – Social Expert	PIU – Project Director
4	Distribution of entitlements and	Monthly	PIU – Social Expert	PIU – Social Expert

No	*Particulars*	*Frequency of updation*	*Reporting Responsibility*	*Monitoring responsibility*
	assistances			
5	Community consultations	Quarterly		PIU - Project Director
			PIU – Social Expert	PMU – Environmental and Social
6	Progress of grievance redressal	Monthly	PIU – Social Expert	PIU - Project Director
		Quarterly	PIU – Social Expert	PMU – Environmental and Social

8.3 Budget for the ESMF

To effectively implement the environmental and social management measures suggested as part of the ESMF, necessary budgetary provisions will be made in the DPRs for the individual sub-projects. Tentative budget for each of the project should include the environmental management costs along with the good engineering practices, cost of environmental and resettlement monitoring. All administrative costs for implementing the ESMF shall be budgeted for as part of the PIU and PMU costing.

ANNEXURES

Annex 1: References

Accessing Information

Baseline Data:

The baseline data for the different states can be obtained from various sources such as:

1. Official State Government Website
   a. www.aponline.gov.in
   b. www.gujaratindia.com
   c. www.maharashtra.gov.in
   d. www.orissa.gov.in
2. State of Environment Reports published by Environmental Information System (ENVIS) of Environment Protection Training and Research Institute (EPTRI)
3. State Disaster Management Authorities
4. Orissa Environmental Society – www.orissaenvironment.com/
5. Gujarat Ecology Commission – www.gec.gov.in/
6. Andhra Pradesh Information Commission – www.apic.gov.in/
7. Environmental Information System (ENVIS) Orissa – www.orienvis.nic.in
8. Building Materials & Technology Promotion Council – www.bmtpc.org
9. Maps of India – www.mapsofindia.com
10. National Disaster Management Authority: http://ndma.gov.in/wps/poratl/NDMAPortal
11. State disaster Management Authority Website
    a. www.disastermanagement.ap.gov.in
    b. www.gsdma.org
    c. www.mdmu.maharashtra.gov.in
    d. www.osdma.org

Legislations:

The legislations applicable to the different sub-project activities can be obtained from

1. Ministry of Environment & Forests - http://envfor.nic.in/legis/legis.html Contains legislations on:
   a. Water Pollution
   b. Air Pollution
   c. Environment Protection
   d. Coastal Regulation
   e. Environmental Clearance
   f. Hazardous Substances Management
   g. Loss of Ecology
   h. Noise Pollution
   i. Animal Welfare
   j. Wildlife
   k. Forest Conservation
   l. Biodiversity
2. Department of Environment & Forests – http://forest.and.nic.in/
   a. CRZ Notification
   b. Forest Conservation Act
3. Department of Land Resources, Ministry of Rural Development – http://dolr.nic.in/
   a. The Land Acquisition Act (LA)
   b. National Rehabilitation and Resettlement Policy, 2007
4. National Disaster Management, Ministry of Home Affairs – http://www.ndmindia.nic.in/

a. World Bank Guidelines for preparing Cyclone Risk Mitigation investments in States/UTs
5. World Bank Environmental Standards and Guidelines - http://www.worldbank.org/html/fpd/em/power/standards/standards.stm
6. India's international obligations - http://coe.mse.ac.in/iio.asp
7. Government of Orissa - www.orissa.gov.in/revenue/R&RPOLICIES/Relief%20and%20Rehabilitation/R&R,2006/r&R1.html

Environment Management Plan:

The environment management plan for the various sub-project activities is based on different standards laid down by the Government of India. They can be accessed from the following sources:

1. National Building Code of India 2005 – http://bis.org.in/sf/nbc.htm
2. Indian Standards on Earthquake Engineering – http://bis.org.in/other/quake.htm
3. Indian Road Congress – http://irc.org.in/
4. Mandate (Mangrove Database) – www.mangroveindia.org
5. Wildlife Institute of India – List of threatened plants
    a. http://www.wii.gov.in/nwdc/threatened_plants_andhra_pradesh.pdf
    b. http://www.wii.gov.in/nwdc/threatened_plants_gujarat.pdf
    c. http://www.wii.gov.in/nwdc/threatened_plants_maharashtra.pdf
    d. http://www.wii.gov.in/nwdc/threatened_plants_orisssa.pdf

Annex 2: Procedure for Conducting EA

The following process is to be followed for sub-project activities, wherein the requirement for an EIA has been determined,

1. As per The World Bank's operational policy OP.4.01, an Environmental Assessment study is required to be carried out for Category A and B projects only. However, if an EIA (which is same as 'EA' as per The World Bank's terminology) needs to be carried out as per the EIA Notification, 2006 of Government of India, the same needs to be carried out as per the requirements of the said notification and also complying to the requirements of OP 4.01. Both these documents are attached as **Appendix B and C** to this document.

2. An environmental assessment (EA) report should focus on the significant environmental issues of a project and should include an Executive summary concisely discussing significant findings and recommended actions. The other components of the EA report are indicated below.

Policy, legal, and administrative framework applicable for the project - Discuss the policy, legal, and administrative framework within which the EA is carried out such as applicable environmental regulations – EP Act, EIA Notification, Water Act, Air Act, CRZ Regulations, etc. and applicable World Bank policies such as OP 4.01, etc.

Project description - Concisely describe the proposed project (detailed description of the proposed components) and its geographic, ecological, social, and temporal context, including any offsite investments that may be required (e.g., dedicated pipelines, access roads, power plants, water supply, housing, and raw material and product storage facilities). Indicate the need for any resettlement plan or indigenous people's development plan. Also include a map showing the project site and the project's area of influence.

Baseline data - Assess the base line conditions of the study area and describe relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Also consider current and proposed development activities within the project area but not directly connected to the project. Since the proposed pilot studies are in coastal areas include necessary base line studies on ecology of the project area such as aquatic / estuarine/ marine ecology, flora/ fauna studies and benthal studies (depending on the project activities), migratory pattern of birds, nesting grounds of fish specific studies relevant to the coastal areas. Sampling and frequency of these studies should justify the reliability of the base line studies and associated impact predictions. Wherever, not feasible utilize available secondary data.

Environmental impacts - Predict and assess the likely positive and negative impacts of the project in quantitative terms to the extent possible with suitable modeling analysis. Identify mitigation measures and any residual negative impacts that cannot be mitigated. Explores opportunities for environmental enhancement. Identify and estimate the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specifies topics that do not require further attention.

Analysis of alternatives – Evaluate and compare feasible alternatives to the proposed project in terms of location, technology, design and operation--including the "without project" situation--in terms of their potential environmental impacts. The feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements should also be detailed out. For each of the alternatives, quantify the environmental impacts to the extent possible, and attach economic values where feasible. Justify the basis for selecting the particular project design recommended approaches to reduce possible environmental impacts. Since the projects are in coastal areas, the proposed projects should ensure

that no adverse impacts are expected on the coastal resources (environmental, ecological, social and cultural resources)

Environmental Management Plan (EMP) – The EMP should include a set of mitigation, monitoring, and institutional measures to eliminate adverse environmental impacts to offset or reduce them to acceptable levels. The plan also should include actions needed to implement these measures. Specifically, the EMP

- identifies and summarizes all anticipated significant adverse environmental impacts (including those involving indigenous people or involuntary resettlement);
- describes--with technical details--each mitigation measure, including the type of impact to which it relates and the conditions under which it is required, together with designs, equipment descriptions, and operating procedures, as appropriate;
- estimates any potential environmental impacts of these measures; and
- Provides linkage with any other mitigation plans (e.g., for involuntary resettlement, indigenous peoples, or cultural property) required for the project.
- Identifies **monitoring** objectives and specifies the type of monitoring, with linkages to the impacts assessed in the EA report and the mitigation measures described in the EMP.
- The recommended monitoring program should provide a specific description and technical details of monitoring measures including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions; and
- **Monitoring and reporting procedures** to (i) ensure early detection of conditions that necessitate particular mitigation measures, and (ii) furnish information on the progress and results of mitigation.
- The EMP should also provide a specific description of **institutional arrangements**--who is responsible for carrying out the mitigatory and monitoring measures (e.g., for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training). To strengthen environmental management capability in the agencies responsible for implementation, EMPs may suggest (a) technical assistance programs, (b) procurement of equipment and supplies, and (c) organizational changes.
- For all the above three aspects (mitigation, monitoring, and capacity development), the EMP should provide (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) capital and recurrent cost estimates (c) sources of funds for implementing the EMP. All these cost estimates should be integrated into the total project cost estimates.
- The EMP should be integrated into the project's overall planning, design, budget, and implementation by including the EMP project contracts and establishing the EMP within the project plan to receive funding and supervision along with the other components.

The **record of stake holder consultation** carried out during the EA process shall be provided in the report along with the minutes of these meetings, views of stake holder agencies, affected people and local nongovernmental organizations (NGOs).

Annex 3: Generic ToR for Environment Assessment

Environment Assessment (EA) is a decision support mechanism to ensure that the project design and implementation are environmentally sound and sustainable. During the preparation phase, the objective of the EA is to provide inputs to the selection of sub-projects, feasibility study; preliminary and detailed design as well as assist development of a holistic development of the project package. During the implementation phase, environmental management plans (developed as a part of the EA during the preparation phase) are used for executing the environmental mitigation, enhancement and monitoring measures.
In the preparation phase, the EA shall achieve the following objectives:

1. _ Identify and analyze upstream environmental issues that affect the entire development
2. package;
3. _ Establish the environmental baseline in the study area, and to identify any significant
4. environmental issue;
5. _ Assess impacts of the project, and provide for measures to address the adverse impacts by the provision of the requisite avoidance, mitigation and compensation measures;
6. _ Integrate the environmental issues in the project planning and design; and
7. _ Develop appropriate management plans for implementing, monitoring and reporting of the environmental mitigation and enhancement measures suggested

The environmental assessment studies and reporting requirements to be undertaken under these TOR must conform to the GOI and the Bank guidelines and regulations, which comprise of, inter alia: The Environmental Impact Assessment Notification, MOEF, 2006 with subsequent amendments; the operational policies, guidelines and the reference materials of the World Bank

Description of the Project

(Include description of the project; covering geographical location, type of development envisaged including a description of activities. Also include current status of the project. Provide brief information on any other study – already completed/ ongoing/ proposed.)

Scope of Work

The EA comprises the following 3 components – (i) environmental management framework (EMF) for the entire project; (ii) environmental assessments (EA) for the individual road subprojects, as required; and (c) environmental management plans (EMPs) for these individual sub-projects. The following section gives the detailed scope of work in each of these stages.

Inception

The Consultants shall use the inception period to familiarize with the project details. The Consultants shall recognize that the remaining aspects of the project, such as engineering and social, are being studied in parallel, and it is important for all these aspects to be integrated into the final project design to facilitate their successful implementation. The Consultants should also recognize that due care and diligence planned during the inception stage helps in improving the timing and quality of the EA reports.
During the inception period the Consultants shall (a) study the project information to appreciate the context within which the EA should be carried-out, (b) identify the sources of secondary information on the project, on similar projects and on the project area, (c) carry out a reconnaissance survey on a few sample road corridors, and (d) undertake preliminary consultations with selected stakeholders.

Following the site visits and stakeholder consultations, as well as a review of the conditions of contract between the consultant and the Client, the consultant shall analyse the adequacy of the allocated manpower, time and budgets and shall clearly bring out deviations, if any. The Consultants shall study

the various available surveys, techniques, models and software in order to determine what would be the most appropriate in the context of this project.
The Consultants shall interact with the engineering and social consultants to determine how the EA work fits into the overall project preparation cycle; how overlapping areas are to be jointly addressed; and to appropriately plan the timing of the deliverables of the EA process. These shall be succinctly documented in the Inception Report

Environmental Management Framework: The EMF will cover the entire project (inclusive of all phases of the project); shall identify all potential environmental issues in the project; and shall develop a management framework for addressing all these issues. To this end, the EMF shall consist of (i) overall environmental baseline; (ii) identified macro/regional level environmental issues that would need to be considered in the analysis of alternatives, planning and design of the sub-projects; (iii) a plan to address the identified macro/regional environmental issues; (iv) sub-project level environmental screening procedures, including exclusion criteria, if any; (v) procedure for environmental scoping; (vi) a framework to address environmental issues in the project, including procedures for undertaking detailed or limited EA for each subproject in Phase-II or in later phases; (vii) generic EMP for addressing known, common, or usual environmental impacts in the project; (viii) a plan for building adequate environmental management capacity in the implementing agency (or Client). Each of these is described below.
Overall Environmental Baseline: All regionally or nationally recognized environmental resources and features within the project's influence area shall be clearly identified, and studied in relation to activities proposed under the project. These will include all protected areas (national parks, wildlife sanctuaries, reserved forests, RAMSAR sites, biosphere reserves, wilderness zones), unprotected and community forests and forest patches, wetlands of local/regional importance not yet notified, rivers, rivulets and other surface water bodies. In the context of xxxxxx(add and remove locations from the indicative list that follows), sensitive environmental features will include wildlife corridors, biodiversity hotspots, meandering rivers, flood prone areas, areas of severe landslide and river erosion, flood embankments (some of which are also used as roads). Consultants shall consolidate all these information in a map of adequate scale.

Stakeholder Identification & Consultation: Consultation with the stakeholders shall be used to improve the plan and design of the project rather than as project information dissemination sessions. The consultants shall carry out consultations with Experts, NGOs, selected Government Agencies and other stakeholders to (a) collect baseline information, (b) obtain a better understanding of the potential impacts and (c) appreciate the perspectives/concerns of the stakeholders, and (c) secure their active involvement during subsequent stages of the project. Consultations shall be preceded by a systematic stakeholder analysis, which would (a) identify the individual or stakeholder groups relevant to the project and to environmental issues, (b) include expert opinion and inputs, (c) determine the nature and scope of consultation with each type of stakeholders, and (d) determine the tools to be used in contacting and consulting each type of stakeholders. A systematic consultation plan with attendant schedules will be prepared for subsequent stages of project preparation as well as implementation and operation, as required.

Identification of Relevant Macro/Regional Level Environmental Issues: Consultants shall determine the Valued Environment Components (VECs)1 considering the baseline information (from both secondary and primary sources), the preliminary understanding of the activities proposed in the project and, most importantly, the stakeholder (and expert) consultations, which would need to be carefully documented. Use of iterative Delphi techniques is recommended. Based on the identification of VECs, Consultants shall identify information gaps to be filled, and conduct additional baseline surveys, including primary surveys. The consultants shall conduct a preliminary analysis of the nature, scale and magnitude of the impacts that the project is likely to cause on the environment, especially on the identified VECs, and classify the same using established methods. For the negative impacts identified, alternative mitigation/management options shall be examined, and the most appropriate

ones suggested. The preliminary assessment should clearly identify aspects where the consultants shall also analyse indirect and cumulative impacts during all phases and activities of the project. For the positive measures identified, alternative and preferred enhancement measures shall be proposed.

Environmental Screening: Consultants shall summarise the known sub-projects (whether upgrading or maintenance) into different categories that relate to the magnitude potential environmental impacts. During such categorisation, consideration shall be paid to (i) location of the sub-project with respect to environmentally sensitive areas, and (ii) volume, nature and technology of construction. This screening framework should be able to categorise all future subprojects, based on a limited number of parameters. The parameters should be such that their identification and measurement is easy, and does not involve detailed studies. The screening criteria also shall contain exclusion criteria, for subprojects, which should not be taken up due to potential immitigable and significant environmental impacts (including but not limited to permanent obstruction to wildlife corridors, or opening up increased access to threatened biodiversity resource hotspots, or construction on top of eroded and vulnerable flood embankments).

Environmental Scoping: For each category of sub-project roads identified by the environmental screening, Consultants shall suggest the scope of environmental assessment to be undertaken. For higher impact category of sub-projects (located on or near environmentally sensitive areas and substantial volume of construction), the scope could be full and detailed EA (see Attachment III for details). For medium impact category of projects the scope of EA could be limited (focusing on pertinent issues); for lower impact category of projects, the scope could be implementing a simple set of environmental management practices.

The scoping shall include that which will be covered in the sub-project EA (or limited EA, as required), along with the "how, when and where" of each activity recommended. It shall include a listing of other environment issues that do not deserve a detailed examination in the project EA (covering, for example, induced impacts that may be outside the purview of the client) along with a justification. The scoping needs to identify and describe the specific deviations or inclusions vis-à-vis the EA ToR provided in Annexure III, if any, along with a justification; modify this ToR for the sub-project EA, if required; and recommend studies that need to be conducted in parallel but are outside the EA process. For medium impact category of sub-projects, Consultants shall prepare ToRs for Limited Environmental Assessments (LEA), depending on the environmental issues identified during environmental screening and identification of issues (paragraphs 13-14 above).

Implementation Framework: The above works (described in paragraphs 10-16) shall result in a framework, which describes how the potential environmental impacts of all sub-projects will be managed during preparation, implementation, and in the post-implementation periods. This framework shall include (a) description of how feasible and appropriate mitigation and environmental enhancement measures would be identified and implemented; (b) institutional, training and monitoring requirements associated with the environmental impacts, mitigation measures and enhancements; and (c) effective monitoring, inspection and environmental auditing measures to be followed by the borrower; and, (d) the estimated budget for all the above, sufficiently detailed

The framework for monitoring, inspection and environment audit shall specify parameters, the responsible agencies, reporting procedures, budget and financing, and what other inputs (for example: training) are necessary. In addition, the framework shall specify what action should be taken and by whom in the event that the proposed mitigation measures fail, either partially or totally, to achieve the level of environmental protection expected.

Mechanisms for improved co-ordination between Client and Line departments: Consultants shall examine the various options available for improved and timely co-ordination between various state government departments. These could take the form of written MoUs for specific activities, apex co-

ordination committee of top bureaucrats, or any such mechanism that can be effective in reducing delays in ancillary activities such as, but not limited to, tree cutting, shifting of utilities, etc.

Environmental inputs to feasibility study & preliminary project design: The EA consultants shall make design recommendations, related to alignment (major shifts, bypasses or different route alternative), road cross-sections, construction material use, and mitigation & enhancement measures. The EA consultants shall interact regularly with the Clients and familiarize themselves with the project's overall feasibility analyses models, so that the EA inputs are in conformity to the needs of the overall feasibility study (for all the different alternative improvement proposals under consideration).

In the cases of very significant environmental losses or benefits, the consultants shall estimate the economic/financial costs of environment damage and the economic/financial benefits the project is likely to cause. In the cases, the impacts or benefits are not too significant, qualitative methods could be used. In addition, wherever economic and financial costs of the environmental impacts cannot be satisfactorily estimated, or in the cases of significant irreversible environmental impacts, the consultants shall make recommendations to avoid generating such impacts.

Generic Environmental Management Plan (Generic EMP): It is recommended that for the low impact sub-projects separate environmental assessments and separate EMPs would not be required. Local, limited and construction level environmental issues in these sub-projects could be identified using standard or pre-defined environmental screening checklists3 , and these environmental issues could be addressed by implementing Generic EMPs.

Consultants shall identify, local and construction related issues, which are usually part of all infrastructure related projects. These could be based on a literature survey (including the EA documents of all recent Bank-supported projects in India). For each of these issues, Consultants shall prepare a menu of alternative avoidance, mitigation, compensation, enhancement and mitigation measures. This could also be done through a careful review of the environmental management plans (EMPs) of the recent Bank supported similar infrastructure related projects, and with an evaluation to the applicability to the context of (Name of state). Consultants shall organize consultations with line departments, and finalize this Generic EMP.

Consultants shall provide robust estimates of costs of generic environmental management measures like facilities required at campsite, cost of additional (to regulatory) monitoring of environmental components, etc. These costs shall be verified for common works items in line with the rate analysis for other works.

Building Environmental Management Capacity in the line department: Based on the preliminary findings of the environmental screening, stakeholder consultations, and institutional analysis of the implementing agency's capacity to manage environmental issues, consultants shall prepare a Capacity Building Plan to mainstream environmental management in the Implementing agency's activities by the end of project implementation period. Earmarking staff for environmental management and improving their skill-sets would be simultaneously pursued during project preparation and implementation. In addition, recommendations should be made concerning any changes to guidelines, standards and regulations, which would improve medium and long term environmental management in the Line Departments works.

Environmental Training Plan: A detailed training plan shall be prepared, (a) to ensure that the environmental management framework can be implemented; and (b) to develop and strengthen environmental capacities. The strategy should include a mix of hands-on training for key staff involved in project preparation, site visits to similar projects, and whenever required, full-fledged academic programs on environmental management at well-recognized institutions. The Consultants shall conduct orientation training for the key client as well as members of other consultant teams like

survey, design, etc., early in the assignment. Periodic training at various levels will continue during project preparation to ensure that the knowledge, skills and perspectives gained during the assignment are transferred to the Client and are utilized effectively during project implementation.

Recommendation for Further Work: The Consultant should make recommendations concerning any further studies of environmental issues, which should be undertaken during project implementation and financed under the project. Such studies could comprise, for example, the analysis of what action should be taken with regard to existing roads which traverse critical natural habitats and which have been excluded from improvement under the project due to potential significant environmental degradation.

Sub-Project Related Environmental Assessment

Consultants shall undertake necessary surveys, impact analyses, and prepare complete subproject EA (environmental assessment and environmental management plan) for all the subprojects included in the First Year Implementation Program. These would be prepared based on the environmental screening, environmental scoping and other relevant works described under EMF above.

If the relatively low impact sub-projects included in the First Year Implementation Program, necessary field-based screening shall be completed, issues identified, and a summary document shall be prepared describing how these issues would be addressed in these sub-projects, with reference to the Generic EMP, and other relevant applicable GOI specifications. For each of the medium and high impact sub-projects, Limited EA or detailed EA shall be prepared, respectively.

In the event that no "high impact" category subproject is included in the First Year Implementation Program, at least one such high impact sub-project (which would be implemented in later years) shall be selected by the Consultants, and detailed sub-project EA (environmental assessment and environmental management plan) should be prepared based on the terms of reference.

Public Disclosure

The Consultants are to provide support and assistance to the client in meeting the disclosure requirements, which at the minimum shall meet the World Bank's policy on public disclosure. The consultants will prepare a plan for in-country disclosure, specifying the timing and locations; translate the key documents, such as the EMF Summary in local language; draft the newspaper announcements for disclosure; and help the client to place all the EA reports in the client's website.

The consultants shall prepare a non-technical EA summary report for public disclosure.

Co-ordination among the Engineering, Social, Environmental & Other Studies

The consultants, with assistance from the Client, shall establish a strong co-ordination with the other project-preparation studies – engineering, social and/or institutional development. The consultants shall keep in mind the specific requirements of the project in general, and the engineering/design studies in particular, and shall plan their outputs accordingly. It is recommended that some of the consultation sessions may be organised in co-ordination with the social and engineering consultants, as feasible, and when the stakeholders consulted are the same.

The consultant shall review the contract documents – technical specifications, and rate analysis, to ensure that there are minimal conflicts between the EMP stipulations and specifications governing the execution of works under the project.

Consultants Inputs

The Consultants are free to employ resources as they see fit. Timing is an important essence for the study, which shall be closely co-ordinated with the works of the engineering and social teams,

simultaneously involved in preparation of the project. Table 1 gives an indicative allocation of manpower for the study. (Modify, as required given the context of the project.)

Additional expertise, such as on hill ecology or other, shall be provided as demanded by the context of the project. The consultants are encouraged to visit the project area and familiarize themselves, at their own cost, before submitting the proposal; and propose an adequate number and skill-set for the senior specialists and technical support staff for this assignment. Further, the consultant will allocate adequate number of field surveyors, distinct from the technical support staff, to complete the study in time.

The consultants shall provide for all tools, models, software, hardware and supplies, as required to complete the assignment satisfactorily. These should be widely recognized or accepted. Any new model or tool or software employed should be field-tested before use for the purpose of this EA.

The consultants shall make formal presentations, co-ordinated by the client, at key milestones on the (a) proposed work plan after submitting the Inception Report; (b) recommendations from the environmental screening; and (c) design recommendations and details of EMP. The consultants shall co-ordinate with the other consultants working on project preparation for each presentation.

All supporting information gathered by the consultant in undertaking these terms of reference would be made available to the client.

Outputs

The consultant is expected to provide the following outputs, as per the schedule given in table 2. The Consultants are expected to allocate resources, such as for surveys, keeping this output schedule in mind. (Modify based on the number specified in, and schedule of outputs of the Engineering ToR)

Inputs to be provided by the client

(The client can provide office space as necessary. The client will provide no other logistic support – Modify as deemed fit in the context of the project and the client.) It is expected that the Client and the field offices will provide all ready and available information as requested by the consultant. *[Note – Include the list of data Clients will procure for the Consultants.]*

Further, the Client will provide all necessary and reasonable support to the consultant to collect secondary data, such as issuing authorization letters. The Consultant will be responsible for any translation of documents and for processing of data. The Clients will designate an officer to act as the main liaison officer and participate as possible in the study.
(The client may designate/depute a team of professionals to work within the consultants' team for long term capacity building within the client's organization.)

The client will ensure the timely flow of information and documents from one consultant to other. The client will also help in organizing the formal presentations from all consultants engaged in project preparation.

Annexure 4: Resettlement & Rehabilitation Framework

Definitions of some of the key words used in the Social Entitlement Framework are as follows.

1. **PAP:** People who lose land, livelihood, homesteads, structures and access to resources as a result of project activities.
2. **PAF:** In relation to a affected person, means, such person and his or her spouse, minor sons, unmarried daughters, minor brothers or sisters, father and mother and other members residing with him and dependent on him for their livelihood. All adult married sons in respect of title holder shall be considered as a separate family for consideration/eligibility for rehabilitation assistance (Need based assistance to widow daughter separated from her family and living with parents and unmarried sons over the age of 40 may also be considered as special cases) having share in the acquired property. However, this will not apply to the category of big farmers who are left with sufficient land holding.
3. **Encroacher**: Persons who have no recognizable legal right or claim to the land they are occupying /using.
4. **Squatter**: A person who settles on public land without title or a person who takes unauthorized possession of unoccupied premises or person who gets right of pasturage from government on easy terms.

Category		Type of Loss	Entitlement as per National R&R Policy 2007
1A	Private Property	Land and assets (non agricultural)	***Entitlement for PAPs/PAFs belonging to General Categories*** • **The affected families would be allotted free of cost house site to the extent of the actual loss of area of the acquired house but not more than 250 square meter of land in rural area or 150 square meter of land in urban area** • **The land or house allotted to the affected families shall be free from all encumbrances.** • **The affected families which opt not to take the house offered shall get a suitable one time financial assistance for house construction** • **In case of linear acquisitions wherein only a narrow stretch of land is acquired for the purpose of the project or is utilized for right of way, the affected family shall be offered an ex gratia payment of not less than Rupees Twenty Thousand in addition to the compensation or any other benefits due under the programme** • **The land or house allotted to the affected families may be in the joint names of wife and husband of the affected family** • **The affected families that are displaced shall also get a one-time financial assistance of not less than Rupees Ten thousand for shifting of the family, building materials, belongings and cattle** • **The affected family may also opt to take a one time lump sum amount in lieu of one or more of the benefits specified herein** ***Entitlement for PAPs/PAFs belonging to Scheduled Tribe*** • **Members of the Scheduled Tribe would be**

Category		Type of Loss	Entitlement as per National R&R Policy 2007
			provided with the below mentioned additional details over and above the benefits specified for those belonging to the general category • The affected scheduled tribes families, who were in possession of forest/lands in the affected area prior to the 13th day of the December 2005 shall be eligible for the rehabilitation and resettlement benefits under this policy • Scheduled tribes affected families enjoying reservation benefits in the affected area shall be entitled to get reservation benefits at the resettlement areas • The Scheduled Tribes affected families will be re-settled, as far as possible, in the same Schedule Area in a compact block, so that they can retain their ethnic, linguistic and cultural identity. Exceptions would be allowed only in rare cases wherein such land cannot be offered due to reasons beyond the control of the requiring body • Affected Scheduled Tribe families would get preference in allotment of land-for-land • The resettlement areas predominantly inhabited by the Scheduled Tribes shall get land free of cost for community • The Scheduled Tribe families affected families resettled out of the district will get twenty five percent per higher rehabilitation and resettlement benefits as compared to those provided for the PAPs/PAFs belonging to the general category *Entitlement for PAPs/PAFs belonging to Scheduled Caste* • Scheduled caste affected families enjoying reservation benefits in the affected area shall be entitled to get the reservation benefits at the resettlement areas • Affected Scheduled Caste families would get preference in allotment of land-for-land after the Scheduled Tribe PAPs/PAFs
1B	Private Property	Agricultural Land	• Affected families whose entire land has been lost or acquired will be alloted agricultural land or cultivable waste land to the extent of actual land loss subject to a maximum of one hectare of irrigated land or two hectare of unirrigated or cultivable wasteland , • Affected families who have as a consequence of the acquisition or loss of land have been reduced to the status of marginal farmers would also be provided the benefits as stated above • In case of allotment of wasteland or degraded land in lieu of the acquired land, the affected family would also be provided a one time financial assistance of minimum Rupees Fifteen

Category	Type of Loss	Entitlement as per National R&R Policy 2007
		Thousand per hectare for land development • In case of allotment of agricultural land in lieu of the acquired land, the affected family shall be provided a one time assistance of not less than Rupees Ten Thousand for agricultural production • In cases where the acquisition of agricultural land or involuntary displacement takes place on account of land development projects, in lieu of land-for-land or employment, such affected families would be given site(s) or apartment(s) within the development project, in proportion to the land lost, but subject to such limits as may be defined by the appropriate Government *Entitlement for PAPs/PAFs belonging to Scheduled Tribe* • Members of the Scheduled Tribe would be provided with the below mentioned additional details over and above the benefits specified for those belonging to the general category • The affected scheduled tribes families, who were in possession of forest/lands in the affected area prior to the 13th day of the December 2005 shall be eligible for the rehabilitation and resettlement benefits under this policy • Scheduled tribes affected families enjoying reservation benefits in the affected area shall be entitled to get reservation benefits at the resettlement areas • The Scheduled Tribes affected families will be re-settled, as far as possible, in the same Schedule Area in a compact block, so that they can retain their ethnic, linguistic and cultural identity. Exceptions would be allowed only in rare cases wherein such land cannot be offered due to reasons beyond the control of the acquiring body • Affected Scheduled Tribe families would get preference in allotment of land-for-land • The resettlement areas predominantly inhabited by the Scheduled Tribes shall get land free of cost for community. • The Scheduled Tribe affected families resettled out of the district will get twenty five percent per higher rehabilitation and resettlement benefits as compared to those provided for the PAPs/PAFs belonging to the general category *Entitlement for PAPs/PAFs belonging to Scheduled Caste* • Affected Scheduled Caste families would get preference in allotment for land-for-land after the Scheduled Tribe PAPs/ PAFs • Scheduled caste affected families enjoying

Category		Type of Loss	Entitlement as per National R&R Policy 2007
			reservation benefits in the affected area shall be entitled to get the reservation benefits at the resettlement areas
1C	Landless	Not having homestead land, agricultural land or either of them	• A house shall be offered to the affected family in rural area or in urban area, as the case may be, in the resettlement area • Affected families which opt not to take the house offered, shall get a suitable one-time financial assistance for house construction, and the amount shall not be less than what is given under any programme of house construction by the Government of India
2A	Livelihood	Wage earning	*Entitlement for PAPs/PAFs belonging to General category* • A rural artisan, small trader or self-employed person who has been displaced shall get a one-time financial assistance of such amount as the appropriate Government may decide but not less than twenty-five thousand rupees, for construction of working shed or shop • Affected families which is displaced and has cattle will be provided with a minimum assistance of Rupees Fifteen Thousand for the construction of a cattle shed *Entitlement for PAPs/PAFs belonging to Scheduled Tribe* • Members of the Scheduled Tribe would be provided with the below mentioned additional details over and above the benefits specified for those belonging to the general category • Scheduled tribes affected families enjoying reservation benefits in the affected area shall be entitled to get reservation benefits at the resettlement areas • The Scheduled Tribe affected families/ persons will get twenty five percent per higher rehabilitation and resettlement benefits as compared to those provided for the PAPs/PAFs belonging to the general category *Entitlement for PAPs/PAFs belonging to Scheduled Caste* • Scheduled caste affected families enjoying reservation benefits in the affected area shall be entitled to get the reservation benefits at the resettlement areas • Affected Scheduled Caste families would get preference in allotment for land-for-land after the Scheduled Tribe PAPs/ PAFs
3A	Non title holders	Encroachers/squatters	• If the affected family is below the poverty line, is without homestead land and has been residing in

Category		Type of Loss	Entitlement as per National R&R Policy 2007
			the affected area for a continuous period of at least three years shall be entitled to a house of carpet area of minimum one hundred square metre in rural area or fifty square metre in urban area • If the affected family opts not to take the house, it shall get a one time financial assistance for house construction and the amount shall not be less than that given under any programme of house construction by the Government of India
4C	Special category	Vulnerable persons	• The project authorities shall, at their cost, arrange for annuity policies that will pay a pension for life as may be prescribed by the appropriate Government subject to a minimum of five hundred rupees per month

Category		Type of Loss	Entitlement as per Orissa R&R Policy
1A	Private Property	Land and assets (non agricultural)	• Homsetad Land @ 1/10th of an acre in rural area and @ 1/25th of an acre in urban area or cash equivalent of Rs.50,000/- preferably near growth centers like land by the side of roads and important junctions, land by the side of railway stations etc., subject to availability • Displaced families opting for self relocation elsewhere other than the identified resettlement area shall be given a one time cash grant of Rs 50,000/- • Provision of homestead land near growth centers like land by the side of roads and important junctions, land by the side of railway stations etc., subject to availability • House building assistance to each PAF will be admissible whether settling in a resettlement habitat or elsewhere • If house/homestead land of any landholder is acquired for linear project or if there is total displacement due to acquisition for such project, the project authority shall provide employment to one of the members of such displaced family in the project. Wherever Rehabilitation and Periphery Development Advisory Committee (RPDAC) decides that provision of such employment is not possible, one time cash assistance as decided by the Government will be paid by the project authority • In order to ensure timely vacation, an maintenance allowance per month per displaced family shall be provided on vacation of land/house for a period of one year from the date of vacation as determined by the Collector concerned • An assistance for temporary shed shall be

Category		Type of Loss	Entitlement as per Orissa R&R Policy
			provided to each displaced family • Transportation allowance or free transportation to the resettlement habitat or their new place of inhabitance shall be provided to each displaced family by the Project authority
1B	Private Property	Agricultural Land	• **National R&R Policy 2007 to be followed**
1C	Landless	Not having homestead land, agricultural land or either of them	• **National R&R Policy 2007 to be followed**
2A	Livelihood	Wage earning	• **Adequate arrangements are required to be made to provide vocational training to at least one member of each displaced family so as to equip him/her to start his/her own entrerprise and refine his skill to take advantage of new job opportunities** • **For those PAPs engaged in traditional occupations/handicrafts/handlooms, suitable training shall be organized at the cost of the project authority to upgrade their existing skills**
	Non title holders	Encroachers/squatters	• **An encroacher family, who is landless as defined in the Orissa Prevention of Land Encroachment Act, 1972, and is in possession of the encroached land at least for a period of ten years continuously will get ex-gratia equal to compensation admissible under the Land Acquisition Act, 1894 for a similar category of land as decided by the competent authority. While determining the extent of land for such compensation the land held by him/her is to be taken into account** • **An encroacher family, who is homestead less as defined in the Orissa Prevention of Land Encroachment Act, 1972 and is in possession of the encroached land at least for a period of ten years continuously, will get ex- gratia, if the encroachment is unobjectionable. While determining the extent of land for such compensation the homestead land held by him/her is to be taken into account. The ex-gratia will be in addition to the actual cost of structures thereon. If the encroachment is found to be objectionable, he/she will be entitled to the cost of structure only**
4A	Special category	Scheduled Tribe	• **Special benefits to displaced indigenous families and primitive tribal groups** • **While developing the resettlement plans, the socio-cultural norms of indigenous and primitive tribal groups will be respected** • **Each displaced family of indigenous category shall be given preferential allotment of land** • **As far as practicable, indigenous communities**

Category		Type of Loss	Entitlement as per Orissa R&R Policy
			should be resettled in a compact area close to their natural habitat • Indigenous displaced families resettled outside the district shall be given higher R&R benefits in monetary terms
4B	Special category	Scheduled caste	• **National R&R Policy 2007 to be followed**
4C	**Special category**	**Vulnerable persons**	• **National R&R Policy 2007 to be followed**

Category		Type of Loss	Entitlement as per Andhra Pradesh R&R Policy
1A	Private Property	Land and assets (non agricultural)	• **Free house site shall be provided to the Project Affected Family (PAF)** • **Grant for house construction shall be provided to each PAF as a one-time financial assistance to those who are allotted free house site** • **Each PAF having cattle, at the time of acquiring his house, shall get financial assistance as grant for cattle shed as fixed by Government from time to time for construction of cattle shed in new settlement** • **Each PAF shall get lump sum one time financial assistance as grant for transportation of materials as fixed by the Government from time to time for transportation/shifting of his building materials, belongings and cattle etc. from the affected zone to the resettlement zone.** • **Each PAF comprising of rural artisan/small trader and self employed person shall get onetime lump sum financial assistance as income generating scheme grant as fixed by the Government from time to time for construction of working shed/shop**
1B	Private Property	Agricultural Land	• **The compensation to the affected farmer is based on the land acquired and the status of the farmer after the land acquisition** • **The wages to PAF laborers shall be provided a one time financial assistance as decided by the competent authority** • **Each PAF who is also a project displaced family shall get a one time subsistence allowance in addition to any other benefit available as PAF** • **The PAF who were in possession of forest lands prior to 25th October 1980 shall get all the benefits of R&R as given in the policy**
1C	Landless	Not having homestead land, agricultural land or either of them	• **National R&R Policy 2007 to be followed**
2A	Livelihood	Wage earning	• **National R&R Policy 2007 to be followed**

Category		Type of Loss	Entitlement as per Andhra Pradesh R&R Policy
3A	Non title holders	Encroachers/squatters	• **National R&R Policy 2007 to be followed**
4A	Special category	Scheduled Tribe	• **In the allotment of acquired land by Government from the project benefited area to schedule tribe PAFs who become small, or marginal farmers or landless after acquisition, in lieu of acquired land from them, Government may acquire land with in the project benefited area, as per guidelines issued by the Government from time to time such that no person should become small or marginal farmer or land less due to such acquisition, for allotment of such land to ST PAFs.** • **Each PAF of ST category shall be given preference in allotment of land** • **Each tribal PAF shall get additional financial assistance for loss of customary rights/usages of forest produce** • **Tribal PAFs will be resettled close to their natural habitat of their choice to the extent possible, in a compact blocks so that they can retain their ethnic, linguistic and cultural identity** • **Tribal PAFs out of the district or out side tribal area will get higher R&R benefits in monetary terms** • **The tribal land alienated in violation of the laws and regulations in force on the subject would be treated as null and void and the R&R benefits would be available only to the original tribal landowner** • **The tribal families residing in the project affected areas having fishing rights in the river/pond/dam shall be given fishing rights in the reservoir area**
4B	Special category	Scheduled caste	• **National R&R Policy 2007 to be followed**
4C	**Special category**	**Vulnerable persons**	• **National R&R Policy 2007 to be followed**

Annexure 5- TOR/Scope for Social Impact Assessment

The social assessment document assists managers and leaders take conscious decisions to avoid social and resettlement impacts. SA in this context is seen as an impact assessment tool where the concerns to be addressed would go far beyond only social and resettlement issues. SA so prepared would take into account the policy implications of the central and state governments apart from the resettlement policies and regulation of the World Bank.

Objectives

The main objective of Social Assessment (SA) is to ensure that the project design and implementation are socially acceptable. Further, the objective of SA shall be to provide inputs for selection of sub-projects, preliminary and detailed design of the project. The Resettlement Action Plans to be developed as part of the SA are to be used during the implementation of the project for executing the resettlement and rehabilitation activities and monitoring measures. In the preparation phase, the SA shall achieve the following objectives:

- Establish the Socio-economic conditions in the study area, and to identify any significant social issues;
- Assess impacts of the project, and provide for measures to address the adverse impacts by the provision of the requisite avoidance and/or compensation measures;
- Integrate the social and resettlement issues in the project planning and design; and
- Develop Resettlement Action Plan for implementing, monitoring and reporting of the social and resettlement compensation measures suggested.

Scope of Work

The SA shall identify all potential social issues in the project; and shall develop management measures for addressing all these issues. To this end, the SA shall consist of

(i) Socio economic baseline established through census surveys;

(ii) Stakeholder Identification & Consultation

(iii) project and regional level social issues that would need to be considered in the analysis of alternatives, planning and design of the sub-projects and establish their criticality in the context of the proposed project;

(iv) A Resettlement Action Plan to address the project and regional social issues;

(v) A training plan for building adequate capacity in the implementing agency (or Client) towards implementation of the plans produced.

(vi) A Monitoring Plan encompassing the monitoring parameters and schedule for monitoring

Key tasks in this part of the assignment include:

Define likely project impact zone (direct/indirect) based on project proposal

- Collect information through desk review and field visits on existing baseline conditions, include all land uses, structures and people (e.g., demography, socio-economic status, vulnerability, status of infrastructure and access to people, livelihood programs, market rate of assets, medical support for sexually transmitted diseases, its prevalence, awareness on HIV/AIDS, legal status of land through revenue records.) within the likely project impact zone.
- Identification of key stakeholders involved in various aspects of the project (project implementing and executing agencies and groups from civil society; description of socio-economic organizations of local communities that may affect project outcomes; carry out public consultation with the likely affected groups, NGOs, district administration and other stakeholders and document the issues raised and outcomes; and assessment of local capacities in terms of participation in planning, implementation and supervision, and evaluation
- Explore viable alternative project designs to avoid, where feasible, or minimize social impacts (displacement, impact on vulnerable community, cultural properties etc.)
- Identify major and minor social impact issues including loss of assets, livelihood, poverty, gender and health issues and estimate the economic and social impacts on people and land.
- A resettlement plan would be drafted based on the outcome of the SIA to aid minimize, mitigate, or compensate for adverse impacts on the affected communities. The mitigation or management plans developed should be consistent with the nature of the development and the nature of the impacts

Annexure 6 - Format for Resettlement Action Plan

7A. Abbreviated Resettlement Action Plan

(Population affected is < 200)

An abbreviated plan covers the following minimum elements

a. a census survey of displaced persons and valuation of assets;
b. description of compensation and other resettlement assistance to be provided;
c. consultations with displaced people about acceptable alternatives;
d. institutional responsibility for implementation and procedures for grievance redress;
e. arrangements for monitoring and implementation; and
f. a timetable and budget.

7B (Complete) Resettlement Action Plan

(Population affected is > 200)

The scope and level of detail of the resettlement plan vary with the magnitude of land acquisition and complexity of resettlement. The plan is based on up-to-date and reliable information about (a) the proposed compensation payment and resettlement of adversely affected groups, and (b) the legal issues involved in resettlement. The resettlement plan covers the elements below, as relevant. When any element is not relevant to project circumstances, it should be noted in the resettlement plan.

i. **Description of the sub- project**. General description of the project and identification of the project area.

ii. **Potential impacts**. Identification of: **(**a) the project component or activities that give rise to land acquisition and resettlement (b) the alternatives considered avoiding or minimizing land acquisition and resettlement; and (c) the mechanisms established to minimize resettlement, to the extent possible, during project implementation.

iii. **Objectives.** The main objectives of the resettlement program.

iv. **Results of census socioeconomic surveys.** The findings of surveys to be conducted in the early stages of project preparation and with the involvement of potentially affected people, including:(a) the results of a census survey covering; (b)current occupants of the affected area to establish a basis for the design of the compensation payment and resettlement program and to exclude subsequent inflows of people from eligibility for compensation and resettlement assistance;(c)standard demographic and socio-economic characteristics of affected households,(d) the magnitude of the expected loss—total or partial—of assets, and the extent of impacts, physical or economic;(e) public infrastructure and social services that will be affected; and(f)social and cultural characteristics of affected communities, including a description of formal and informal institutions (e.g., community organizations, ritual groups, nongovernmental organizations (NGOs) that may be relevant to the consultation strategy and to designing and implementing the resettlement activities.

v. **Eligibility.** Definition of affected persons and criteria for determining their eligibility for compensation and other resettlement assistance, including relevant cut-off dates.

vi. **Valuation of and compensation for losses.** The methodology to be used in valuing losses to determine their replacement cost; and a description of the proposed types and levels of compensation under local law and such supplementary measures as are necessary to achieve replacement cost for lost assets

vii. **Resettlement measures.** A description of the packages of compensation and other resettlement measures that will assist each category of eligible affected persons to achieve the objectives of the policy. In addition to being technically and economically feasible, the resettlement packages should be compatible with the cultural preferences of the displaced persons, and prepared in consultation with them. Any measures necessary to prevent land speculation or influx of ineligible persons at the selected sites. The provisions of housing, infrastructure (e.g., water supply, feeder roads), and social services (e.g., schools, health services); plans to ensure comparable services to host populations. Additional measures to ensure that such vulnerable groups as indigenous people, ethnic minorities, the landless, and women are adequately represented.

viii. **Income Restoration Measures.** Wherever the livelihoods are affected, appropriate measure for improvement or restoring of livelihoods including assistance during the transition period will be proposed which should be compatible with the cultural preference and skill of the affected people.

ix. **Community participation**. Involvement of affected people for consultation with and participation in the preparation and implementation;(b)a summary of the views expressed and how these views were taken into account in preparing the resettlement plan;(c) a review of the alternatives presented and the choices made by affected persons wherever options available to them, including choices related to forms of compensation and resettlement assistance.

x. **Integration with host populations.** Measures to mitigate the impact of resettlement on any host communities, including: (a)consultations with host communities and local governments;(b)arrangements for prompt tendering of any payment due the hosts for land or other assets provided to resettlers;(c)arrangements for addressing any conflict that may arise between resettlers and host communities; and (d) any measures necessary to augment services (e.g., education, water, health, and production services) in host communities to make them at least comparable to services available to resettlers.

xi. **Implementation Arrangements:** The description of agencies responsible for implementation of compensation payment and resettlement activities should be outlined and an assessment of the institutional capacity of such agencies and NGOs; and any steps that are proposed to enhance the institutional capacity of agencies and NGOs responsible for resettlement implementation.

xii. **Grievance procedures.** Affordable and accessible procedures for redressal of disputes arising from resettlement; such grievance mechanisms should take into account the availability of judicial recourse.

xiii. **Implementation schedule.** An implementation schedule covering all payments of compensation and other applicable resettlement activities from preparation through implementation, including target dates for the achievement of expected benefits to resettlers and hosts and terminating the various forms of assistance. The schedule should indicate how the resettlement activities are linked to the implementation of the overall project.

xiv. **Costs and budget.** Tables showing itemized cost estimates for all compensation payments and associated resettlement activities other contingencies; timetables for expenditures; sources of funds; and arrangements for timely flow of funds, and funding for land acquisition and resettlement should be described.

xv. **Monitoring and evaluation**. Arrangements for monitoring of compensation payments and resettlement activities by the implementing agency, supplemented by independent monitors as considered appropriate by the Bank, to ensure complete and objective information; performance monitoring indicators to measure inputs, outputs, and outcomes for resettlement activities; evaluation of the impact of resettlement for a reasonable period after all resettlement and related development activities have been completed; using the results of resettlement monitoring to guide subsequent implementation

Annexure 7 – Supervision Protocol for implementing EMP/ESMF

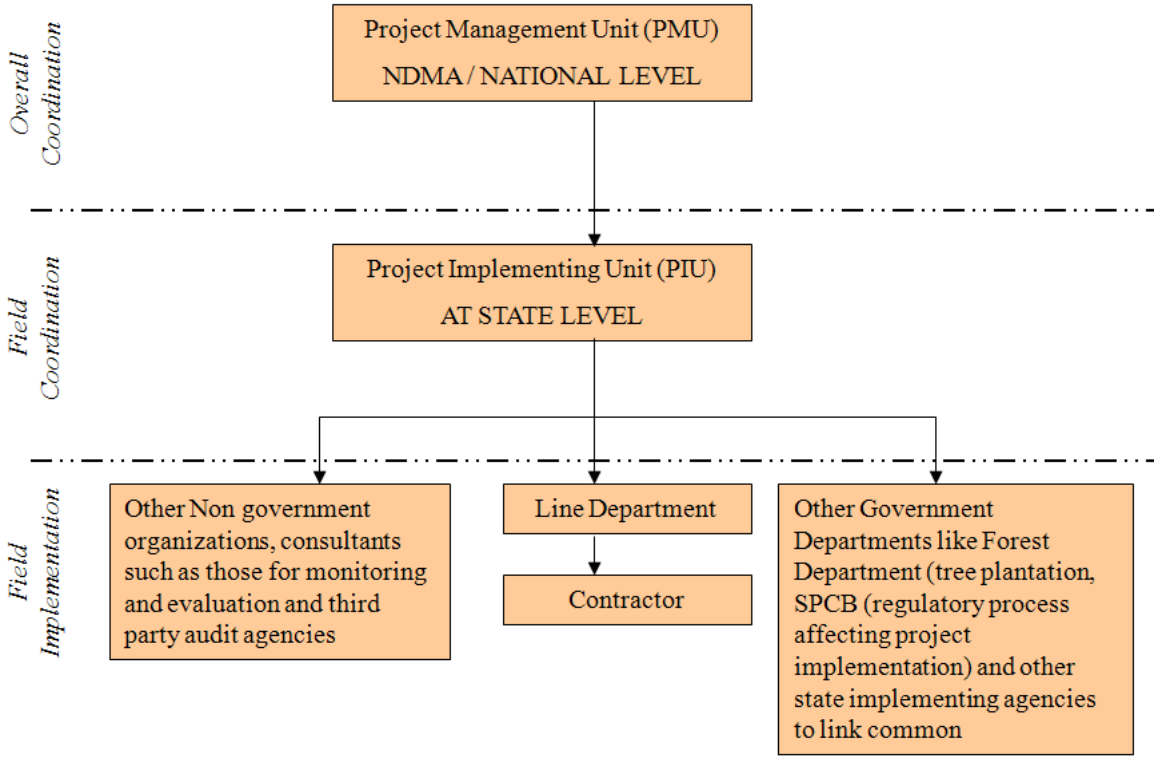
The purpose of this annex is to assist the implementing agency in establishing a mechanism for effective implementing environmental management tools for the project such as ESMF and EMP

Objectives

- Establish a system for environment management within the implementing agency.
- To ensure implementation of Environmental Management Plans (EMPs), judge effectiveness of EMPs, identify modifications required and implications such as variation orders on the Contractors agreements
- To ensure compliance of Bank's Safeguard Policies
- To ensure complaince of Government of India (GoI)'s regulatory conditions
- To identify other environment issues that may indirectly have arisen which may affect the project implementation or overall environment performance in the area. In this context, to explore the possibilities of sub-projects and to establish the institutional linkages with the primary implementing agency.
- To gather and document information on practices / issues that could provide feedback into project design for future projects.
- To help the implementing agency in developing strategies for improved environment management by:
    - Facilitating improved coordination with other GoI departments,
    - Facilitating better coordination between Supervision Consultants and Contractors teams
    - Facilitating coordination between Non-Governmental Organizations (NGOs) implementing the RAP and the environment teams, especially in the case of identifying opportunities for enhancements and other environment management aspects of resettlement sites that may be created on relocation of displaced people, market / vendor areas, temples, ponds etc.
    - Facilitating coordination with the engineering teams on ensuring the implementation of EMPs on aspects such as road safety, construction management at work site, construction management at contract camp and labor sites including gender and child labor issues.
    - Facilitating better monitoring of EMPs
    - Facilitating improved reporting systems by helping to develop formats for better coordination of corporate or head quarters (Project Implementation Units / PIUs or Environmental & Social Management Units / ESMUs) and field offices, suggesting internationally accepted systems on environment management such as ISO 14001.
    - Facilitating and providing resource information on training and capacity building programmes on environment management.

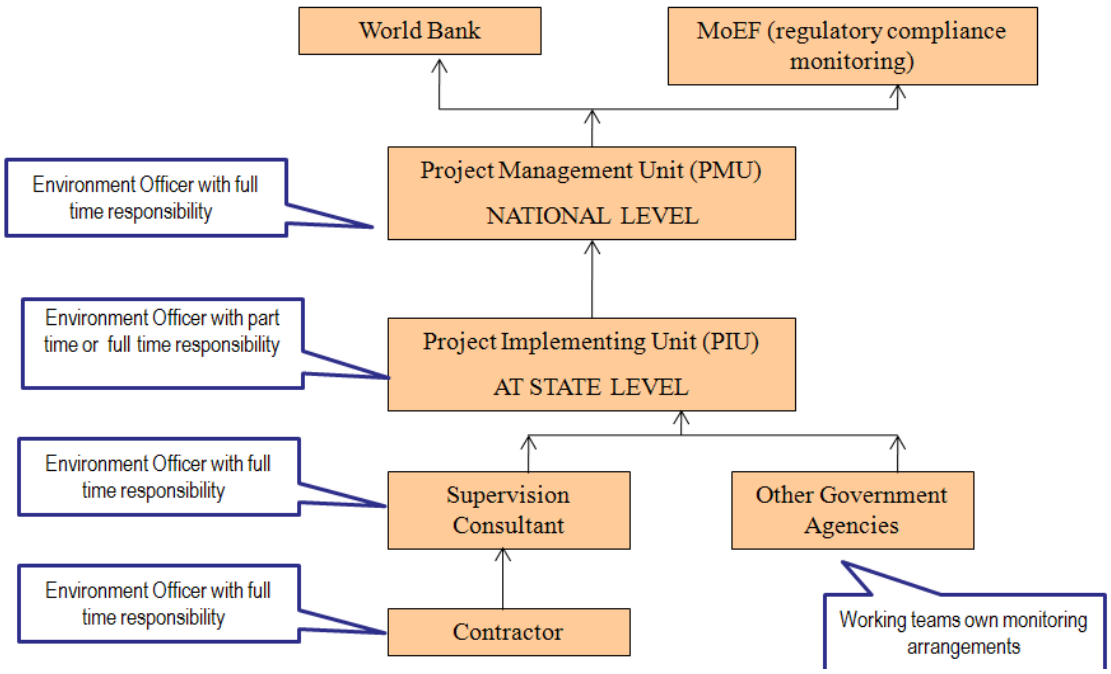
Implementation Arrangements – Environment Issues

Generally, the implementation arrangements adopted in the Bank's infrastructure related projects are as follows:



Monitoring & Evaluation Arrangements – Environment Issues

The implementation arrangements adopted in the Bank's roads and highways projects are as follows


World Bank
MoEF (regulatory compliance monitoring)
Environment Officer with full time responsibility
Project Management Unit (PMU)
NATIONAL LEVEL
Environment Officer with part time or full time responsibility
Project Implementing Unit (PIU)
AT STATE LEVEL
Environment Officer with full time responsibility
Supervision Consultant
Other Government Agencies
Environment Officer with full time responsibility
Contractor
Working teams own monitoring arrangements

Annexure 8 – Incorporating EMP/GEMP into Contract Documents

The purpose of the annex is to provide guidelines on the integration of the EMP / GEMP documents into the contract documents

Environment requirements in the pre-bid documents

1. The project implementing agency, i.e. PIU / the Line Departments issue the pre-bid documents to shortlist a few (usually six) contractors, based on their expression of interest and capability. While details on environmental requirements are really not required in the pre-bid stage, it is useful to mention that the contractor's environmental management capability or experience/is expected to be good.

Incorporating EMP in the bid document

2. The project implementing agency (Line Department) issues the bid documents to the pre-qualified contractors. There are two kinds of bid documents, for International Competitive Bids (ICB) and National Competitive Bids (NCB). In Bank projects, these documents are prepared based on templates (separate for ICB and NCB) provided by the Bank. The ICB documents are based on the FIDIC (i.e., an acronym for the International Institute of Consulting Engineers) guidelines, while the NCB is closer to the national contracting procedures, i.e. the Central PWD contract documents in India. The bid documents contain separate volumes. For instance, a typical ICB document contains – (i) General Conditions of Contract, which is based on the FIDIC; (ii) Technical Specifications, which is based on the applicable specifications in India for similar infrastructure related works; (iii) Bill of Quantities and (iv) Drawings. The parts of the EMP should be included in the relevant locations of the bid documents in the following way:

    - Mitigation/enhancement measures & monitoring requirements tables: The cross-reference to these tables should be included in the "conditions of particular application (COPA)", which is a part of the General Conditions of Contract (e.g. Section IV, Item 19.1 of the ICB). As a standard practice, there is an overall reference to the laws that have to be followed in this section/item. The relevant laws need to be mentioned here. In addition, the adherence to the mitigation/enhancement measures and monitoring requirements tables should be included. The two tables will have to be added as Annexes or the EMP (without cost) as a whole should be attached. Either the Annexes or the appropriate section in the EMP should be cross-referred in the description of this item.
    - Modifications/additions to the technical specifications: Due to the mitigation/enhancement measures included in the EMP, there may be (a) additions/alterations required to the applicable specifications and (b) some new specifications. These are to be referred in the section on "Supplementary Specifications" in the Technical Specifications Volume of the bid documents. Generally, the GoI applicable specifications are taken as followed and are not repeated in the bid documents. Changes and additions to these specifications are made through the inclusion of a section "Supplementary Specifications." This

section should also include additional technical specifications related to the EMP or should provide a cross-reference to the specific section of the EMP.

- Cost table: All the items in the EMP cost table relevant to the contractor have to be referred in the Bill of Quantities (BoQ) table, which is a separate volume of the bid documents. It is to be noted that the BoQ table in the bid documents includes the various tasks to be done by the contractor under different categories. Against each task, the contractor will have to indicate a unit rate while completing the bid documents.
- Drawings: Due to the mitigation / enhancement measures included in the EMP, there may be (a) changes required to the drawings and (b) new drawings. All of these drawings are to be reflected in the Bid documents under the separate Drawings Volume. If the drawings are included in the EMP, then a cross-reference should be provided in the Drawings Volume.

Developing the EMP to suit the bid / contract documents

3. As one of the intentions is to integrate the EMP requirements into the bid documents/contract Agreement, the EMP should be developed keeping the following in mind:

1. Mitigation / enhancement measures table – description: In the Mitigation/Enhancement Measure table, the text describing each measure should not include/repeat what is already covered under the technical specification, which is being cross-referred. The text should be short, clear and succinct. The description should focus on "what" and "where" of the mitigation / enhancement measure as the "how" of the measure is covered under the specification.
2. Monitoring requirements table: There are certain monitoring requirements for the contractor. While developing the Monitoring Requirements table, those that pertain to the contractor should be clearly separated.
3. Technical specifications: The modifications to the specifications and the additional specifications should be separately listed. These should be included as Annexes in the EMP. The (added or modified) technical specifications should be adequately detailed to avoid problems (including that of interpretations) at site.
4. Drawings: The modifications to the drawings and the additional drawings should be included as Annexes in the EMP. It is important to note that all drawings included / added should be "execution drawings" detailed as per requirement of the particular item so as to execute at site with adequate quality control and workmanship. (Also, it is important to note that the quality of BoQ [or cost estimate] and technical specifications part of the contract document depends on the degree of detailing in the drawings).
5. Cost table: The items pertaining to the contractor should be clearly separated from those that are to be incurred by the project implementing agency, supervision consultant or any other agency organization. The contractor's cost table should also not be attached to the bid / contract documents.
6. Timing for finalizing EMP: It is best to finalize the EMP before the finalizing the bid documents. This is required to fully reflect the sections of the EMP relevant to the contractor in the bid documents and to ensure full integration.

Other notes

Variation orders: Once the completed bids have been received from prospective contractors, the project implementing agency takes a decision based on the costs and the technical merit of the bids. Following the decision, the implementing agency and the chosen contractor sign and counter-sign the completed bid documents. It becomes the contract agreement thereafter. If issues have been missed in the bid documents, it cannot be amended at the time of signing the contract agreement stage unless there is a really strong justification for the same. If there is an EMP cost item that is not reflected in the BoQ of the signed contract agreement, the supervision consultant may issue a variation order. Contractor will quote a rate and the task gets done. This issue of variation orders is a standard practice and is generally used. However, the intent of the good contracting practices is to minimize variation orders.

Annexure 9 – List of protected areas

List of Wild Life Sanctuaries

Andhra Pradesh

Coringa WLS	East Godavari
Eturnagaram WLS	Warangal/ Karimnagar West
Gundla Brahmeswaram WLS	Kurnool, Prakasam
Kambalakonda WLS	Visakhapatnam
Kaundinya WLS	Chittoor
Kawal WLS	Adilabad
Kinnersani WLS	Khammam
Kolleru WLS	West Godavari, Krishna
Krishna WLS	Krishna,Guntur
Lanja Madugu Sivaram WLS	Adilabad, Karimnagar
Manjira WLS	Medak
Nagarjunsagar-Srisailam WLS	Guntur,Prakasam,Kurnool, Nalgonda & Mahaboobnagar
Nellapattu WLS	Nellore
Pakhal WLS	Warangal
Papikonda WLS	East & West Godavari, Khammam
Pocharam WLS	Medak, Nizamabad
Pranahita WLS	Adilabad
Pulicat Lake WLS	Nellore
Rollapadu WLS	Kurnool
Sri Lankamalleswaram WLS	Cuddapah
Sri Penusila Narasimha WLS	Nellore, Cuddapah
Sri Venkateswara WLS	Chittoot, Cuddapah

Gujarat

Balaram Ambaji WLS	Banas Kantha
Barda WLS	Jamnagar, Porbandar
Gaga Great Indian Bustard WLS	Jamnagar
Gir WLS	Junagadh, Amreli
Hingolgadh Nature Reserve WLS	Rajkot
Jambugodha WLS	Godhra
Jessore WLS	Banas Kantha
Lala Great Indian Bustard WLS	Kachchh
Kachchh Desert WLS	Kachchh
Khijadiya WLS	Jamnagar
Marine (Gulf of Kachchh) WLS	Jamnagar
Mitiyala WLS	Amreli
Nal Sarovar WLS	Ahmadabad, Surendrnagar
Narayan Sarovar WLS	Kachchh
Paniya WLS	Amreli
Porbandar Lake WLS	Porbander
Purna WLS	Dangs
Rampura Vidi WLS	Rajkot
Ratanmahal WLS	Dahod
Shoolpaneswar (Dhumkhal) WLS	Bharuch
Thol Lake WLS	Mahesana
Wild Ass WLS	Kachchh, Rajkot, Mahesana, Banas Kantha

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Maharashtra

Amba Barwa WLS	Buldhana
Andhari WLS	Chandrapur
Aner Dam WLS	Dhule
Bhamragarh WLS	Gadchiroli
Bhimashankar WLS	Pune,Thane
Bor WLS	Wardha, Nagpur
Chaprala WLS	Gadchiroli
Deolgaon-Rehkuri WLS	Ahmednagar
Dhyanganga WLS	Buldhana
Gautala WLS	Aurangabad, Jalgaon
Great Indian Bustard WLS	Solapur, Ahmednagar
Jaikwadi WLS	Aurangabad, Ahmednagar
Kalsubai WLS	Ahmednagar
Karnala WLS	Raigad
Karanjasohol WLS	Akola
Katepurna WLS	Akola, Washim
Koyana WLS	Satara
Lonar WLS	Buldhana
Malvan Marine WLS	Sindhudurg
Mayureswar Supe WLS	Pune
Melghat WLS	Amravati
Nagzira WLS	Bhandara
Naigaon Mayur WLS	Beed
Nandur Madhameshwar WLS	Nashik
Narnala WLS	Akola
Painganga WLS	Yeotmal, Nanded
Phansad WLS	Raigad
Radhanagari WLS	Kolhapur
Sagareshwar WLS	Sangali
Tansa WLS	Thane
Tipeshwar WLS	Yeotmal
Tungareshwar WLS	Thane
Yawal WLS	Jalgaon
Yedsi Ramlinghat WLS	Osmanabad
Wan WLS	Amravati

Orissa

Badrama WLS	Sambalpur
Baisipalli WLS	Nayagarh
Balukhand KonarkWLS	Puri
Bhitarkanika WLS	Kendrapara
Chandaka Dampara WLS	Khurda, Cuttack
Chilika (Nalaban) WLS	Khurda, Puri, Ganjam
Debrigarh WLS	Sambalpur
Gahirmatha (Marine) WLS	Kendrapara
Hadgarh WLS	Keonjhar, Mayurbhanj
Karlapat WLS	Kalahandi
Khalasuni WLS	Sambalpur
Kotagarh WLS	Phulbani
Kuldiha WLS	Balesore
Lakhari Valley WLS	Gajapati
Nandankanan WLS	Khurda
Satkosia Gorge WLS	Angul, Boudh, Cuttack
Simlipal WLS	Mayurbhanj
Sunabeda WLS	Nuapada

West Bengal

Ballavpur WLS	Birbhum
Bethuadahari WLS	Nadia
Bibhutibhusan WLS	North 24-Paraganas
Buxa WLS	Jalpaiguri
Chapramari WLS	Jalpaiguri
Haliday Island WLS	South 24-Paraganas
Jaldapara WLS	Jalpaiguri & Cooch Behar
Jorepokhri WLS	Darjeeling
Lothian Island WLS	South 24-Paraganas
Mahananda WLS	Darjeeling
Narendrapur WLS	South 24-Paraganas
Raiganj WLS	North Dinajpur
Ramnabagan WLS	Burdwan
Sajnekhali WLS	South 24-Paraganas
Senchal WLS	Darjeeling

List of National Parks

Andhra Pradesh

Kasu Brahmananda Reddy NP	Hyderabad
Mahaveer Harina Vanasthali NP	Hyderabad
Mrugavani NP	Hyderabad
Sri Venkateswara NP	Chittoor,Cuddapah

Gujarat

Bansda NP	Valsad
Blackbuck NP	Bhavnagar
Gir NP	Junagadh
Marine (Gulf of Kachchh) NP	Jamnagar

Maharashtra

Chandoli NP	Ratnagiri, Sangli, Satara, Kolhapur
Gugamal NP	Amravati
Nawegaon NP	Gondia
Pench NP	Nagpur
Sanjay Gandhi (Borivilli) NP	Thane, Mumbai
Tadoba NP	Chandrapur

Orissa

Bhitarkanika NP	Kendrapara
Simlipal NP	Mayurbhanj

West Bengal

Buxa NP	Jalpaiguri
Gorumara NP	Jalpaiguri
Neora Valley NP	Darjeeling
Singhalila NP	Darjeeling
Sunderbans NP	North & South 24-Paraganas

List of Conservation Reserve

Bhorkada (Bhorgad)	Nasik, Maharashtra

List of Biosphere Reserve

Simplipal	Mayurbhanj district, Orissa
Sunderban Biosphere Reserve	South 24 Paragana District, West Bengal

Critically Polluted Areas

Chembur	Maharashtra
Talcher	Orissa
Vapi	Gujarat
Visakhapatnam	Andhra Pradesh
Patancheru Bollaram	Andhra Pradesh
Ankleshwar	Gujarat
Tarapur	Maharashtra
Durgapur	West Bengal
Howrah	West Bengal

Notified Eco-Sensitive Areas

Dahanu Taluka	Thane District of Maharashtra
Murud-Janjira	Raigadh District of Maharashtra
Mahableshwar Panchgani Region	Satara District of Maharashtra

Wet Lands of National and International Importance

Wetland	**State**	**Area (sq km)**
Chilka	Orissa	1165
Kolleru	Andhra Pradesh	901
Nalsarovar	Gujarat	184
Ujni	Maharashtra	357
East Calcutta Wetlands	West Bengal	125

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Annexure 10 – List of field visits conducted

District	Site	Status
Orissa		
Kendrapada	Aul Embankment Division/Rajnagar Gopal	Proposed site for saline embankment
Kendrapada	Aul Embankment Division/Satavaya	Proposed site for saline embankment
Kendrapada	Khursiapat	Existing cyclone shelter
Jagatsinghpur	Kankan	Proposed site for road
Jagatsinghpur	Sahabedi	Proposed site for road
Puri	Chotiapada	Proposed site for cyclone shelter
Puri	Kendrapati	Proposed site for road
Puri	Kaliakana	Proposed site for road
Puri	Nimapara Irrigation Department	Nagar embankment
Andhra Pradesh		
Krishna	Bandar Mandal	Cyclone Shelter
Krishna	Bandar Mandal	Saline Embankment
Srikakulum	Padapatnam	Cyclone Shelter
Krishna	Talepalem	Bridge
Krishna	Kanurupallipalam	Cyclone Shelter
Maharastra		
Thane	Vasai /Gokhiwarae	Cyclone Shelter
Thane	Palghar /Wadrai	Sea Bund
Thane	Dedade	Saline Embankment
Thane	Vadhiv	Saline Embankment
Thane	Deokhar	Saline Embankment
West Bengal		
South 24 Paraganas	Fulmalancha, near Basanti	Site for proposed cyclone shelter. It is proposed to be built in the compound of an existing school
South 24 Paraganas	Manmatha Nagar	Site for proposed jetty
South 24 Paraganas	Pakhi Dahla	Site for proposed jetty
South 24 Paraganas	Although the proposed roads under the project could not be inspected, during the surface journey to Gosaba and return (by foot and cycle rickshaw) unsurfaced roads were inspected	Existing roads
Gujarat		
Jamnagar	Salaiya Parodia Road upto Salt work	Proposed site under roads and bridges component
Junagadh	Approach to Adri village and cyclone shelter	Proposed site under roads and bridges component
Junagadh	Adri	Proposed site under MPCS
Junagadh	Dabhor	Proposed site under MPCS
Junagadh	Kajli	Proposed site under MPCS

District	Site	Status
Jamnagar	Mota Madha	Proposed site under MPCS
Jamnagar	Nana Madha	Proposed site under MPCS
Jamnagar	Salaya	Proposed site under MPCS
Jamnagar	Marine National park	Proposed site for Mangrove
Junagadh	Veraval Taluk	Proposed site for Mangrove and shelter belt
Jamnagar	Jamnagar Maliya Embankment	Proposed site for canals and embankment