



NATIONAL CYCLONE RISK MITIGATION PROJECT- KERALA

DRAFT ENVIRONMENT & SOCIAL MANAGEMENT FRAMEWORK REPORT

Volume I

**State Project Implementation Unit
Department of Disaster
Management
Government of Kerala**

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Acronyms

<i>ASI</i>	Archaeological Survey Of India
<i>CRZ</i>	Coastal Regulation Zone
<i>DPIU</i>	District Project Implementation Unit
<i>EA</i>	Environmental Assessment
<i>EAC</i>	Expert Appraisal Committee
<i>EIA</i>	Environmental Impact Assessment
<i>EMP</i>	Environmental Management Plan
<i>ESMF</i>	Environmental And Social Management Framework
<i>GOI</i>	Government Of India
<i>GOK</i>	Government Of Kerala
<i>GPS</i>	Global Positioning System
<i>HTL</i>	High Tide Line
<i>LTL</i>	Low Tide Line
<i>MOEFCC</i>	Ministry Of Environment, Forest and Climate Change
<i>MPCS</i>	Mutli Purpose Cyclone Shelter
<i>NCRMP</i>	National Cyclone Risk Mitigation Project
<i>NDMA</i>	National Disaster Management Authority
<i>PMU</i>	Project Management Unit
<i>SPIU</i>	State Project Implementation Unit

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Abstract

Environmental and Social management measures are an integral part of project execution. The Environment and Social Management Framework (ESMF) Report reflects the methodology adopted in the process, procedures related to screening the site, documentation and environment management plan. This report provides guidance for planning, designing and implementing the construction activities.

The report details out the various policies, guidelines and procedures that need to be integrated during the planning, design and implementation cycle of the project. The framework describes the principles, objectives and approach to be followed for selecting, avoiding, minimizing and mitigating the adverse environmental and social impacts that are likely to arise due to the project.

It also outlines the indicative management measures required to effectively address the key issues in all phases of the project.

| Chapter 1: Introduction

Cyclones are one of the natural hazards that affect India almost every year causing large loss of lives and properties. Tropical Cyclone, also known as 'Cyclone', is the term used globally to cover tropical weather systems in which winds equal or exceed the minimum of 34 knot (62 kmph). Hazards associated with tropical cyclones are long duration high velocity winds, very heavy rain, storm surge and flooding. Although, The North Indian Ocean generates only 7% of the world's cyclones (5 to 6 cyclones per year), their impact is comparatively high and devastating. Tropical cyclones affect the Indian Coast during pre-monsoon and post-monsoon. Severe cyclonic storms are prevalent during pre-monsoon months ie, October and November.

India has a coastline of about 7,516 km and the entire coast is affected by cyclones with varying frequency and intensity. Although the Bay of Bengal and Arabian Sea generates only about 7% of the World's cyclones (5 to 6 TC's per year) their impact is comparatively high and devastating. An estimated 40% of the total population of the country lives within 100 km of the coast.

The National Cyclone Risk Mitigation Project [NCRMP] is a project drawn up by Ministry of Home Affairs, Government of India with the purpose of creating suitable infrastructure to mitigate the effects of cyclones

and other hydro meteorological hazards in the coastal states of India in a sustainable way. Kerala is included in category II of cyclone vulnerable states and features in Phase II of the project. One of the vital components of the project which focuses on the structural measures of mitigation, is the construction of Multi Purpose Cyclone Shelters (MPCS) and approach roads across the nine coastal districts of Kerala.

Project Outline

Project	National Cyclone Risk Mitigation Project (NCRMP) Phase II
Description	The objective of the project is to reduce vulnerability to cyclone and other hydro meteorological hazards that affect the coastal community and to increase the capacity of state to effectively plan for and respond to disasters.
Funding Agency	World Bank and State Government
Project Management Unit	National disaster Management Authority
Project Implementation Unit	Revenue and Disaster Management Department, Government of Kerala
Project components	Component A: Early warning Dissemination Systems Component B: Cyclone Risk Mitigation Infrastructure Component C: Capacity building and training Component D: Project Implementation Support
Type of proposed sub-project activity under Component B	Construction of MPCS and approach roads.
Location of the sub project activity	Thiruvananthapuram, Kollam, Alappuzha, Ernakulam, Thrissur, Malappuram, Kozhikode, Kannur and Kasargod
Technical Monitoring Agency	Kerala Public Works Departments of nine coastal districts
Project period	2015-2020

Chapter 2: Hazard Profile of Kerala

Kerala is a multi-hazard prone state and disasters of varying nature and intensity that occur recurrently causes devastation. Natural and Anthropogenic hazards have the potential to cause disaster poses threat to life, property and socio economic advancement of the state. The State identifies 39 phenomena that has the potential to cause disaster of which Flood (Riverine, Urban and Flash Floods), Landslides, Drought, Coastal hazards (High waves, Storm surges, Kallakadal, Tsunami, Salt Water Intrusion, Coastal erosion), Cyclone, Gustnados, Gusty winds), Lightning, Earthquakes and Human epidemic tops the list. (Multi Hazard Zonation map Fig 4).

2.1 Cyclones

Kerala experiences wind speeds often exceeding 50 km/hr along the coast. Exceedingly intense winds, and heavy rains that causes floods and storm tides that leads to coastal and inland inundation during an event of cyclone are primarily responsible for loss of life and property. Due to the geographical conditions, an average of less than only one cyclone per decade crosses the state. Out of the recorded 52 historical cyclonic disturbances that occurred during 1877-2016, 11 cyclonic events and 2 very severe cyclonic storms crossed the state. A list of the various disastrous cyclone events that crossed the Kerala is detailed below.

Sl. No.	Month & Year of occurrence	District
1	Dec, 1908	Thrissur
2	Nov, 1919	Kannur
3	Nov, 1925	Kozhikode
4	May, 1932	Malappuram
5	Nov, 1935	Thrissur
6	Nov, 1940	Thrissur
7	May, 1941	Thrissur
8	May, 1962	Kasaragod
9	Dec, 1964	Malappuram
10	Dec, 1972	Kozhikode
11	Nov, 1977	Malappuram
12	Nov, 1978	Kozhikode, Ernakulam
14	Nov, 1984	Kozhikode
15	Nov, 1992	Alappuzha
16	Dec, 2000	Kollam, Trivandrum
18	Oct, 2014	Alappuzha
19	Jun, 2016	Kollam, Idukki



Fig.1: Cyclone track of the year 1992

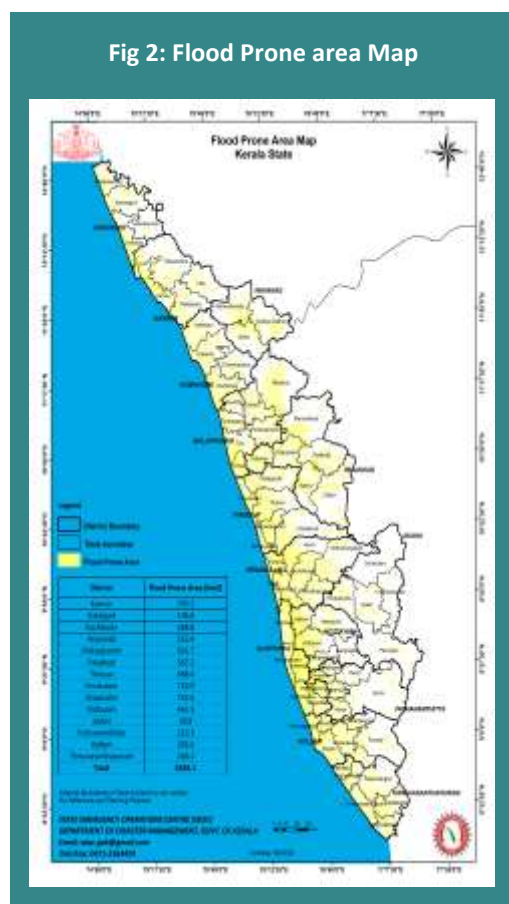
The Severe Cyclone storm of year 1992 crossed caused extensive damage to coastal districts of the state. During 1877-2016, Northern Coastal belt of the state have been struck by cyclone the maximum number of times. There have been cases when Bay of Bengal cyclones crossed the east coast of India, crossing Kerala coast and finally emerging to Arabian Sea. Although Kerala falls in the category II of cyclone vulnerable states, the tidal waves associated with Cyclones can enter land up to 10km and cause massive damage to life and infrastructure. Exceptional rains, storm surges and strong winds with speeds exceeding 50km/h that follow such cyclonic events cause vast destruction in the coastal areas. In certain instances, cyclonic storms accompanied by heavy downpour and rise in the sea level cause floods in inland region. People residing within a distance of 5 km from the sea coast are generally the worst affected with the inundation varying between 2.5 to 5m and lasting for 5-6 days.

As per the HRVA report by RMSI on Cyclones, Kollam, Kottayam, and Thiruvananthapuram districts of Kerala are more vulnerable to cyclonic wind hazard for 100-year return period event where higher wind speeds of about 85-89 km/h cover a large extent of these districts. Among these districts, Kollam and Thiruvananthapuram are most vulnerable to strong winds of about 89 km/h. The report infers that surge heights are higher along the northern parts of Kerala coast as compared to those of the southern part.

2.2 Floods

Bestowed with 44 rivers and backwaters, the lowlands of Kerala is the most fertile and suitable land for cultivation. However, heavy or continuous rainfall results in overflow of water course to the banks of rivers and streams thereby causing Riverine flooding. Flood is the most common of natural hazards that damages infrastructure and affect livelihood of people. The abundance of backwaters and low-lying areas makes Alappuzha the most affected district during floods and the impact worsens when land remains waterlogged for several days. Frequency and magnitude of floods in the state have risen in the past years. Increase in settlement area, Reclamation of wetlands and water bodies, unplanned development in floodplains, increase in roads with impervious surfaces and deforestation in the upper catchments have contributed to increase in the occurrence and impact of floods. The major cities that frequently experience urban flooding are Thiruvananthapuram, Kochi and Kozhikode.

More than 14% of the state's total area is flood prone. The frequency of floods and its impacts on life and property has increased in the recent years primarily owing to the occurrence of high intensity rainfall that lasts for few days. The state receives an average annual rainfall of 3100mm during seasonal monsoon and 120-140 rainy days per year. Torrential rainfall during monsoon or Cyclones, which continues for few days brings heavy water discharge from the Rivers and streams to the low lying regions of the district. The water discharge overflows the water bodies and submerges the lowland adjacent to its banks. Thrissur, Ernakulam, Kottayam, Alappuzha, and Malappuram are highly vulnerable to cyclone-induced flood. For 100-year return period scenario, the average depth of flooding in the flood- affected region of districts is expected to vary from 2.0 to 3.0 m



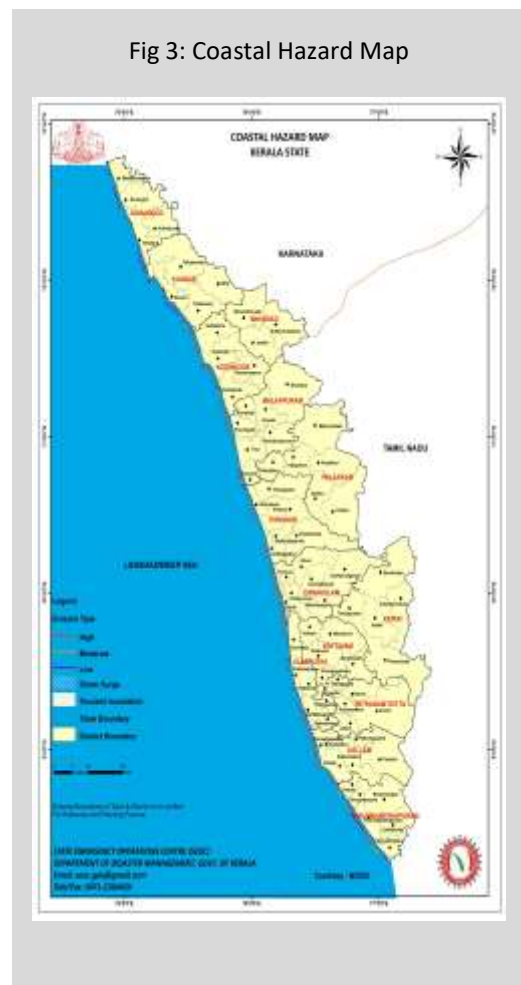
Wetlands in certain regions of the state, promotes stagnation of water for several weeks. Kuttanad region in Alappuzha, Kole lands in Thrissur district are major flood prone areas. Coastal tracts of Ernakulam and Malappuram districts and regions flanking the Vembanad Lake are other major flood prone regions of the state. In the coastal areas, the tide levels and the land characteristics will determine the submergence area

2.3 Coastal Hazard

The 590 km long coast of Kerala is one of the most densely populated land where much of socio economic development has happened over a century is frequently disturbed by high waves, storm surges, near shore currents and rough sea. The Tsunami of 2004 brought with it substantial loss of life and property to coastal community. Kalla kadal is a phenomenon where sea creeps into coast because of swells generated by storms formed near Antarctica. This phenomenon that occurs mostly during pre-monsoon season inundates low lying coasts for several days. These natural phenomena in turn results in widespread coastal erosion and resultant loss of land.

The 'Fact sheet of shoreline changes – Kerala, National Assessment of Shoreline Change' published by the Ministry of Environment and Forests, Govt. of India (NCSCM et al., 2011) shows that a major stretch of Kerala's coastline is eroding rapidly. The coastal stretch of Poovar-Vizhinjam, Kovalam-Valiathura, Perunnathuruthu to Neendakara, Kayamkulam, Ambalappuzha, Thumboli, Chellanam, Cochin Harbour, Azikkode, Kozhipram, Chavakkad, Ponnani, Kadalundi, Elathur, Tikkodi, Murad, Puthiyappa Angadi, Neelaswaram and Manjeswaram, spread along the nine coastal districts have been identified as erosion prone areas.

In addition to the natural phenomenon causes coastal erosion, human activities such as the construction of harbours, jetties and groynes, mining and dredging can also lead to erosion of certain regions. Some of the coastal stretches in Kerala have shown long-term erosion with net loss of land. The rocky coasts with pocket beaches exhibit minimum erosion levels. In areas with laterite cliffs, under cutting of the softer clay layers lead to a net landward migration of the shoreline. In the sandy areas some of the segments show long term erosion while others with either accretion or stable condition. The coastline of Trivandrum district is the most prone to erosion with 23% of Trivandrum coastline affected by erosion. About 310 km of the coastal stretch of Kerala has seawalls, revetments, groynes etc. These artificial coasts are principally eroding coasts. The other districts that are highly prone to erosion, but are partly protected by artificial means are Kollam and Ernakulam.

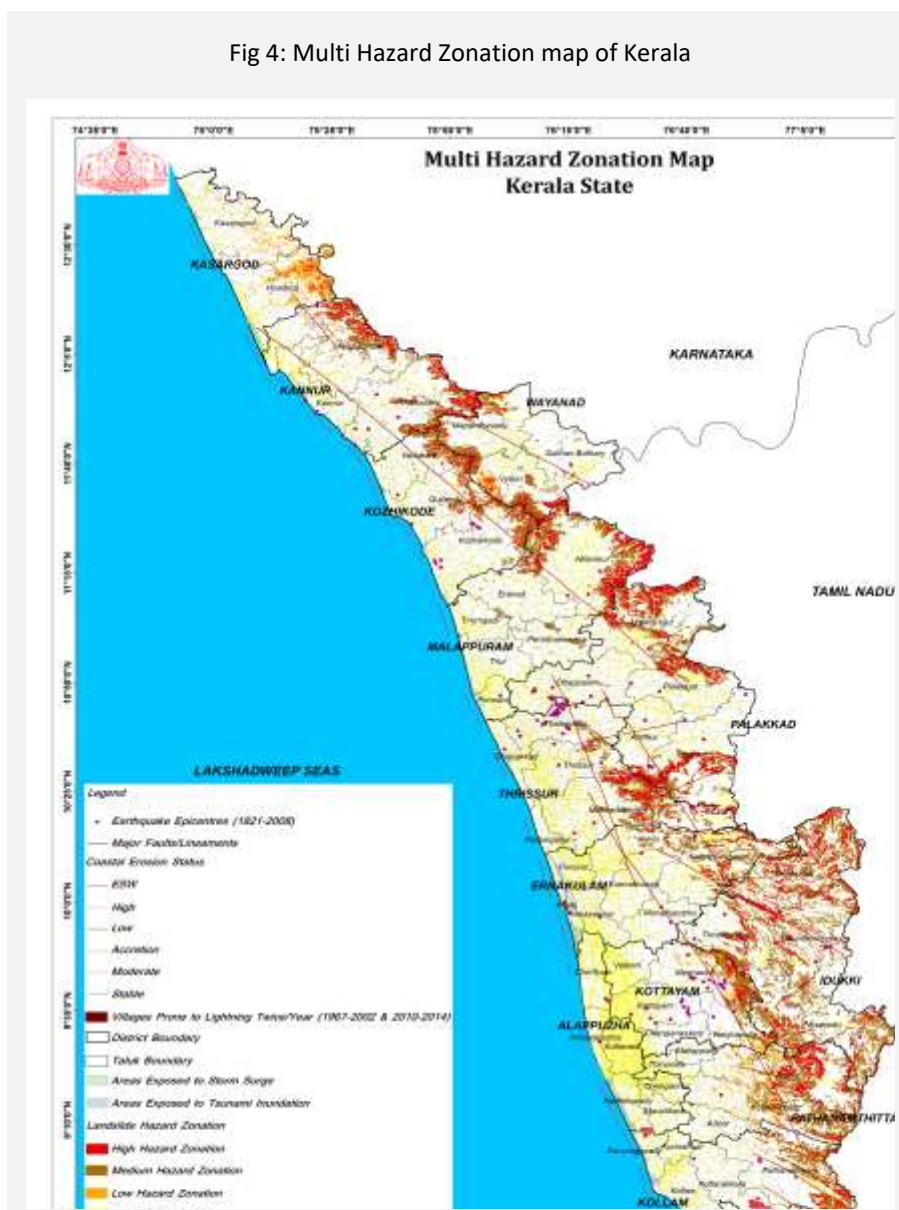


High erosion prone coast	215.5 km
Low erosion prone coast	97 km
Storm surge/ Tsunami prone coast	263.7 km

2.4 Tsunami

The Kerala coast encountered significant devastation by Tsunami in 2004. Maximum devastation was reported in the low coastal plains of Kollam, Alappuzha and Ernakulam districts, particularly the 10km coastline of Azhikkal in Kollam district. Since the down slope of the region increases towards the backwater side, during high tides and strong waves, sea water can enter into land easily. Tsunami waves attained a run-up height of 3 to 5 meters and inundated a major portion of coastal area. The event pounded 187 villages affecting nearly 25 lakh persons and claiming 176 lives and injuring 1600 people. Around 6,280 dwelling units were completely destroyed, 11,175 damaged and nearly 84,773 persons were evacuated from the coastal areas and accommodated in 142 relief camps after Tsunami.

Fig 4: Multi Hazard Zonation map of Kerala



Chapter 3: Vulnerability and Need for Multi-Purpose Cyclone/Flood Shelters

National Cyclone Risk Mitigation Project Phase II focuses on both structural and non-structural measures of Cyclone and other Hydro meteorological hazard risk mitigation. Strengthening Early Warning Dissemination Systems, enhancing Capacity and capability of local communities to respond to disasters being the non-structural measures and construction of Multi-Purpose Cyclone/Flood shelters (MPCS) being the Structural measures are of prime emphasis in the project.

3.1 Vulnerability

As per census 2011, the state has a coastal population of nearly 42.29 lakh with coastal urban density of 4228 persons per sq.km. Most of this population categorize as coastal community which primarily depends on sea for livelihood. Storm surges, strong winds, coastal erosion, heavy rains and allied floods frequently disrupt the social and economic structure of coastal community.

Table 1: Estimate Vulnerable coastal population

District	Coastline (km)	No. of coastal villages	Vulnerable Population
Trivandrum	78	17	58851
Kollam	37	12	19536
Alappuzha	82	35	123081
Ernakulam	46	23	49174
Thrissur	54	18	27702
Malappuram	70	22	40530
Kozhikode	71	30	46789
Kannur	82	26	34932
Kasargod	70	42	22890

Source: *Census 2011*.

*Population living 0.5km from coastline is considered vulnerable except in Alappuzha and Ernakulam where 1km from coastline is taken as vulnerable as some regions of the districts are below sea level.

Storms and flooding for up to 4 weeks during monsoon season, necessitates the state to shelter families to safe locations during this period. Flood can reach up to height of 2-3 feet in certain regions of the district flooding almost all households, whether pucca or kutcha, roads and bridges. Every year during the monsoon, many lives are lost in events associated with flooding and people have to be evacuated and sheltered for several weeks until the flood waters retreated. The District Administrations have to evacuate and shelter coastal community for several weeks from regions highly prone to coastal erosion. The fact that a large section of the population lives in jerry-built houses of substandard quality, increases the risk of human impact, in case of any disaster.

3.2 Need for MPCs

It is essential to provide safe places to stay to the vulnerable population during cyclones, associated tidal waves, storm surges, floods and other hydro meteorological hazards. The lack of adequate facilities to shelter vulnerable population in safe locations, affects the actual number of vulnerable population addressed during this period. Schools, community halls and other infrastructure are presently used as shelters to accommodate the vulnerable population during floods associated with heavy rainfall in monsoons. In extreme cases, the need to shelter the population may run up to 2-3 weeks. In such instances, the facilities in these shelters are inadequate to satisfy the basic needs of the population. In certain instances temporary sheds had to be erected to accommodate and facilitate cooking for the sheltered, during the camp days.

Table 2: Need Gap Analysis

District	Vulnerable Population*	Available shelters		GAP (Vulnerable population- without access to shelter)
		Number [Schools and others]	Population that can be sheltered*	
Trivandrum	58851	63	31500	27351
Kollam	19536	16	8000	11536
Alappuzha	123081	134	67000	56081
Ernakulam	49174	75	37500	11674
Thrissur	27702	32	16000	11702
Malappuram	40530	55	27500	13030

Kozhikode	46789	47	23500	23289
Kannur	34932	51	25500	9432
Kasargod	22890	22	11000	11890

**Approximate number*

3.3 Multipurpose Cyclone shelters

Multi-purpose Cyclone Shelters (MPCS) that are linked to major roads via all-weather approach roads will be constructed in the nine coastal districts through this project. The designs of the buildings will be customised depending on the population that has to be sheltered and the purpose for which the MPCS will be put into use during normal situations. Provisions for ramps and other disable friendly aspects will be integrated to the building design. Since, shelters will remain camped by population for continuous periods, provision for kitchen, generator room and other sanitation facilities will be incorporated to design. Maintenance and functioning of these MPCS in normal situations will be vested with the community itself. These shelters will serve as major assets for the coastal community during the hour of emergencies thus reducing the risk of exposure and vulnerability.

Salient features of MPCS:

- Minimization of loss of lives, property and livestock.
- Nodal point for receipt and dissemination of cyclone/other hydro meteorological hazard warnings
- Safe keeping of essential stocks/items for post disaster usage.
- Nodal point for carrying outpost disaster response and relief activities
- Provides temporary protection from the monsoon to the vulnerable population

| Chapter 4: Legal Framework

The implementation of the Construction activities proposed under the NCRMP-Kerala must be consistent with all applicable laws, regulations and notifications of National, State and Local authorities. Additionally, it is also to be ensured that activities are consistent with World Bank policies and guidelines. This section includes legislation and policy guidelines identified as pertinent to environmental and social management framework for NCRMP-Kerala.

4.1 National Policy and Regulatory Framework

Various policies, acts, rules and regulations promulgated by the central and state governments related to environment and relevant to the project, the scope of key relevant environment regulations and their relevance is presented in the table below:

| 4.1.1 Environment (Protection) Act, 1986 & EIA Notification S.O. 1533 dated Sep, 14, 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.

Under this Act, the Central Government is empowered to take measures necessary to protect and improve the quality of the environment by setting standards for emissions and discharges; regulating the location of industries; management of hazardous wastes, and protection of public health and welfare. This encompasses all legislations providing for the protection of environment in the country.

Relevance:

The proposed project intervention involves construction activities that will have indirect or direct impact on the overall quality of the environment.

4.1.2 EIA Notification, 2006

The objective of the EIA Notification, 2006 is to set procedures of environmental clearance before establishment of identified nature and size. The suitability of site for a proposed development is one of primary concerns in according environmental clearance to a project. As per the Notification and subsequent amendments, projects have been grouped under Category 'A' requiring clearance from Expert Appraisal Committee (EAC) of MoEF&CC, GoI and Category 'B' requiring clearance from the State Expert Appraisal Committee (SEAC).

Projects in hilly terrain (above 1,000 m AMSL) and or Ecologically Sensitive areas is categorized as 'B' and Environmental Clearance is to be obtained from SEAC. Building and construction projects with $\geq 20,000$ sq. m and $< 1, 50,000$ sq. m of built up area is categorized as 'B' and Environmental Clearance is to be obtained from SEAC. As per EIA notification, 2006 environmental clearance is mandatory for projects with built up area more than 20,000 sq mt.

Relevance:

Cyclone shelters being built under this project are less than 20,000 sq.mt in size and hence do not require Environmental Clearance. If there is a Cyclone shelter/ building or a construction projects with $\geq 20,000$ sq.

m and $< 150,000$ sq. m of built-up area, it will require prior Environmental Clearance as per the EIA notification of 2006. Any of the proposed 21 MPCS does not falls with $\geq 20,000$ sq. m and $< 150,000$ sq. m of built-up area and it does not require any clearance under EIA Notification, 2006.

4.1.3 Coastal Regulation Zone Notification (CRZ), 2011 and its amendments

In exercise of the powers conferred by sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government, with a view to ensure livelihood security to the fisher communities and other local communities, living in the coastal areas, to conserve and protect coastal stretches, its unique environment and its marine area and to promote development through sustainable

manner based on scientific principles taking into account the dangers of natural hazards in the coastal areas, sea level rise due to global warming, does hereby, declare the coastal stretches of the country and the water area upto its territorial water limit, excluding the islands of Andaman and Nicobar and Lakshadweep and the marine areas surrounding these islands upto its territorial limit, as Coastal Regulation Zone (hereinafter referred to as the CRZ).

The Central Government has constituted the Coastal Zone Management Authority (CZMA) of Kerala to take measures for protecting and improving the quality of the coastal environment and preventing, abating and controlling environmental pollution in the coastal areas of Kerala. A Coastal Zone Management Plan (CZMP) has to be prepared by the Authority, identifying and classifying the CRZ areas in accordance with the guidelines given in the Notification and approval has to be obtained from the Ministry of Environment, Forests & Climate Change, Government of India. According to this, areas covered under CRZ-I, CRZ-II, CRZ-III and CRZ IV will be identified using satellite imagery and maps in the scale 1:25,000 will be prepared.

The CRZ has been classified as CRZ-I, CRZ-II, CRZ-III and CRZ IV in the State for the purpose of regulation of the permitted activities based on the ecological sensitivity and development status of the area.

Classification of the CRZ – For the purpose of conserving and protecting the coastal areas and marine waters, the CRZ area shall be classified as follows, namely:-

(i) CRZ-I–

A. The areas that are ecologically sensitive and the geomorphological features which play a role in the maintaining the integrity of the coast,-

- (a) Mangroves, in case mangrove area is more than 1000 sq mts, a buffer of 50meters along the mangroves shall be provided;
- (b) Corals and coral reefs and associated biodiversity;
- (c) Sand Dunes;
- (d) Mudflats which are biologically active;
- (e) National parks, marine parks, sanctuaries, reserve forests, wildlife habitats and other protected areas under the provisions of Wild Life (Protection) Act, 1972 (53 of 1972),

the Forest (Conservation) Act, 1980 (69 of 1980) or Environment (Protection) Act, 1986 (29 of 1986); including Biosphere Reserves;

(f) Salt Marshes;

(g) Turtle nesting grounds;

(h) Horse shoe crabs habitats;

(i) Sea grass beds;

(j) Nesting grounds of birds;

(k) Areas or structures of archaeological importance and heritage sites.

B. The area between Low Tide Line and High Tide Line;

(ii) CRZ-II-

The areas that have been developed upto or close to the shoreline.

(iii) CRZ-III-

Areas that are relatively undisturbed and those do not belong to either CRZ-I or II which 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.

(iv.) CRZ-IV-

A. the water area from the Low Tide Line to twelve nautical miles on the seaward side;
B. shall include the water area of the tidal influenced water body from the mouth of the water body at the sea upto the influence of tide which is measured as five parts per thousand during the driest season of the year..

Relevance

The proposed sub-projects under NCRMP are not permissible in CRZ areas, hence the project does not come under the purview of this notification

4.1.4 Forest (Conservation) Act, 1980 and its amendment

This Act provides for the conservation of forests and regulating diversion of forestlands for non-forestry purposes. When projects fall within forestlands, prior clearance is required from relevant authorities under the Forest (Conservation) Act, 1980. For diversion of forestland, the project proponent needs to apply to the State Government. Depending on the area required to be diverted, the proposals are cleared by MoEF Regional or Central Offices provided that the cost of compensatory afforestation, cost of rehabilitation of endangered/rare species of flora/fauna, and the net present value of the forest resources are deposited upfront with the state Forest Department.

Relevance

- If the area of forests to be diverted exceeds 20 Ha (or 10 Ha in hilly area), prior permission of Central Government is required;
- If the area of forest to be 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 diverted is below or equal to 5 HA, the State Government can give permission

4.1.5 Water (Prevention & Control of Pollution) Act, 1974 & Air (Prevention & Control of Pollution) Act, 1981

These two laws are in force to prevent and control land-based pollution. These laws prescribe the standards for effluent discharge and air emissions and established the State Pollution Control Board to enforce the provisions of the Acts.

Relevance

The requirement is to obtain a No Objection Certificate i.e., Consent to Establish and Consent to Operate from State Pollution Control Board.

4.1.6 Ancient Monuments and Archaeological Sites and Remains Act, 1958

The act prohibits construction of building within the protected area or carry on any mining, quarrying, excavating, blasting or any operation of a like nature in such area, or utilise such area or any part thereof in any other manner without the permission of the Central Government.

Relevance

The legal requirement is to obtain from ASI a no-objection certificate if any protected cultural property is within 10km of the project.

4.1.7 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.

Relevance

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.

4.1.8 The Land Acquisition Act (LA) of 1894

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.

Relevance

The act is applicable in cases where land acquisition is required for construction of Cyclone Shelters.

4.1.8 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.

Relevance

The act is applicable in cases where resettlement or rehabilitation due to the project is required.

4.2 World Bank Policies

The objective of World Bank 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. NCRMP has been designed to ensure total compliance to the requirement of World Bank safeguard policies. The following policies are relevant for the project. The proposed project has been screened against the requirements of the following World Bank Policies:

4.2.1 Environmental Assessment (OP/BP 4.01)

Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental impacts associated with 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.

4.2.2 Involuntary Resettlement (OP/BP 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.

4.2.3 Indigenous Peoples (OP/BP 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.

4.2.4 Cultural Property (OP/BP 4.11)

The policy 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.

4.2.5 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.

| Chapter 5: Environment And Social Screening

The screening process forms the first step in the environment management process for the construction activity which aids in early identification of key environmental and social issues at the implementation level and is carried out in parallel with the Project Engineering feasibility study. This process helps in identification sites located fully or partially within setback boundaries of environmentally sensitive areas such as presence of National Parks/Sanctuaries, Wildlife Sanctuaries, Reserved/Protected forests, Cultural Properties and Coastal Regulation zones. Similarly, the sites requiring private lands or sites with displacement issues or sites with impacts on vulnerable people will be identified through this screening process.

The screening process will help to:

- (i) Finalize the sites for construction of MPCs
- (ii) Identify the need to obtain any regulatory clearances
- (iii) Establish the need to carry out any further assessment
- (iv) Prioritize and phase the civil work program/procurement plan
- (v) Categorize construction activities

5.1 Screening Approach

The screening approach adopted for selection of suitable sites for construction of MPCs are in line with the guidelines laid down in Environment and Social Management Framework for states included in Phase II of NCRMP. Since, the primary target group of NCRMP is coastal community which is the most vulnerable to coastal hazards, the screening exercise focused on identifying the most apt location for MPCs that would advantage be of the target group. The methodology followed for screening helped to determine the nature and magnitude of the issues to be tackled at different stages of construction and project implementation. The steps followed for Environmental and social screening is diagrammatically represented in Figure 5.

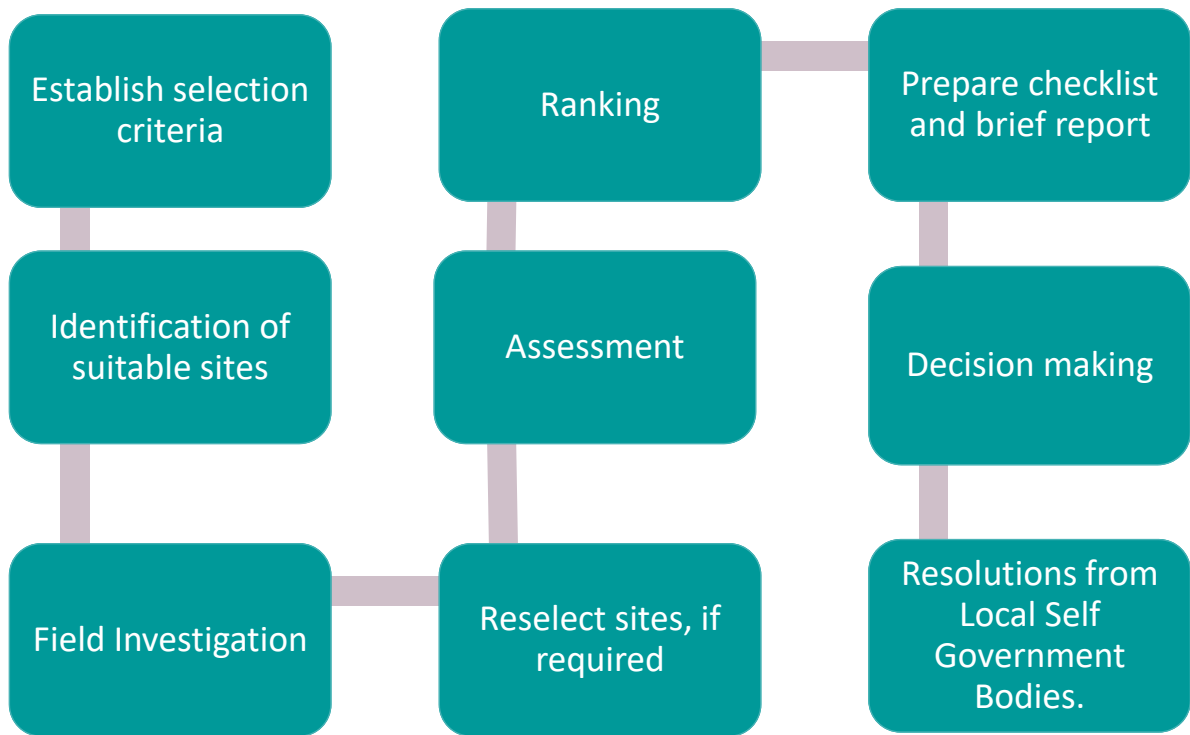


Diagram 1: Outline of Environment and Social Screening approach

a. Establish Selection criteria

Prior to identifying a suitable location, detailed assessment criteria were established which aided in identifying the apt location for construction of MPCs. These criteria formed the basis on which sites would be selected, reselected, categorised and excluded. While developing the criteria for selection of sites, the guidelines laid down in ESMF report for phase II and aspects such as availability of land, ownership of land, geographical location and various other factors that would influence the long term functioning and maintenance of the MPCs were given due regard.

Assessment Criteria

The following criteria were considered in assessing the suitability of proposed site for construction of MPCs:

- **Necessity for MPCs:** Aspects such as vulnerable population near to the proposed site, Availability of shelters within 1km radius of the site, Capacity and condition of such shelters, Population that will have access to the MPCs during an event of emergency, History of relief camps in the area etc were considered. Sites near to

regions where camps/shelters were conducted/ required during flood, heavy rain, storm surge, coastal erosion, cyclone etc were preferred.

- **Area available for construction:** Sites which have atleast 15 cents of land available for construction were considered. The effective area available for construction after provision for setbacks applicable as per existing Building rules was only taken into consideration.
- **Accessibility to basic amenities:** The accessibility of site from nearby main roads, proximity of site to water supply, power, sewer etc were considered in selecting the site.
- **Ownership of land:** Land in possession with Revenue Department was preferred to that in possession other departments. The project did not acquire any private land for construction of MPCs.
- **Landscape:** Terrain of land, bearing capacity of soil on visual observation, drainage pattern in the region, maximum flood line etc was considered. Sites that are not flooded during high tide or that remain waterlogged for major part of year were not selected.
- **Requirement for demolition:** Sites that did not require any demolition to facilitate construction of MPCs were given priority. However, in sites that required demolition, the condition of existing building, ownership of the building etc were taken into account.
- **Proximity to sea:** As the project targets only coastal community primarily, sites within 10km distance from coastline were only considered. Those sites which fall beyond 500m from High Tide Line were preferred. The sites within 200m from the coastline were not preferred and sites that do not require CRZ clearance were given priority. Sites in extreme proximity to kayals, lakes, streams and other water bodies were not preferred.
- **Clearances required for social/archaeological/environmental issues:** Sites adjacent to archaeologically, religiously important structures were avoided. Sites with issues of Illegal tenants and any social concerns particular to the region were also avoided. Sites in extreme proximity to rivers, streams and other water bodies were not preferred. Sites located partly or wholly in wetland, mangrove area,

reserved area, archeologically important or any other environmentally sensitive area.

- **Legal issues:** Sites with legal issues regarding ownership, extent and boundaries of land and sites committed and finalized for other project etc were given less priority in the assessment.

b. Identification of suitable sites

The next step in the screening process was to identify suitable sites in the nine coastal districts of Kerala that meets the assessment criteria. The Principal Secretary, Revenue and Disaster Management and Project Director of NCRMP-Kerala briefed the District Collectors regarding the project and the site assessment criteria in the District Collectors Conference held on 18th September 2015.

Subsequent to the briefing, a proforma, which was prepared for collection of details regarding suitable sites, was circulated to District Administration of nine coastal districts for furnishing the details (Annexure 1). The proforma was structured depending on the assessment criteria for selection of suitable sites and provided guidance to the District Administration in identifying the appropriate location for MPCs in the respective districts (Annexure 1). Upon receiving the details of sites suitable for construction of MPCs, the information was recorded in spreadsheet format for further assessment.

c. Field Investigation

Field Investigation was done in sites around 80 sites, identified and proposed by District Administration of nine coastal Districts by the team from State Project Implementation Unit of the project. During the field investigation, the details furnished in the proforma were verified and more information was collected from the respective Village officials, representatives of the local body, School authorities (wherever the site was within the compound of school) and locals regarding the site. The possible use of the MPCs during normal times was discussed, suggestion and need of the area was noted.

Measurements and dimensions of the site, soil bearing capacity on visual observation, existing town planning rules in the region, requirement for demolition and access road dimensions were verified to check the engineering feasibility in the proposed site. In sites proposed within the school compound, the scope for campus planning was discussed in detail with the school authorities for incorporating design parameters that would complement the functions of the school. The flood level and drainage pattern of the

area was recorded and the coordinates of the location was recorded using GPS tracker for assessment in GIS platform. Photographs of the site, access roads, nearby structures etc were documented. All requisite and ancillary information supporting the assessment criteria were collected during field investigation (Annexure 2).

d. Reselection of site

Certain sites which were found inapt for construction of MPCS, as per the assessment guidelines laid down and thus alternate sites had to be chosen for construction of MPCS. The District Administration suggested alternative sites in the same region and the field investigation was performed in the similar manner.

e. Assessment

The information learnt and collected during site investigation was added in the spreadsheet for further assessment. Attributes on basic information of the site, access roads, Environmental and Social features, Flooding/Inundation and Cyclone parameters were documented (Annexure 5). These attributes provided the inputs for assessment against the established criteria. Each criterion was given a score depending on the importance of the criteria in screening exercise. Given below is the score assigned to each criteria:

Criteria	Score
Necessity for MPCS	15
Area available for construction	15
Proximity to sea/water bodies	15
Landscape	15
Accessibility to basic amenities	10
Ownership of land	10
Clearances required for social/archaeological/environmental issues	10
Requirement for demolition	05
Legal issues	05
Total Score	100

f. Ranking

According to the total score attained against assessment criteria, Sites were then ranked into three major categories. Each rank was associated with a specific recommendation status which would help in decision making, selection/rejection of sites, preparation of procurement plan, phasing the construction activities etc (Table 3).

Table 3: Ranks and Status of recommendation

Total Score	Rank	Status of Recommendation
71-100	1	Highly recommended for construction of MPCS
41-70	2	Recommended for construction of MPCS
Below 40	3	May not be considered for construction of MPCS

g. Preparation of screening checklist and brief report

Following to the categorisation of sites, screening checklists, as per guidelines in ESMF for Phase II states, were prepared. Brief report on each site detailing general and specific characteristics of the site and locality was prepared with the help of field photographs, google earth images and maps prepared on GIS platform. The outcome of screening is shown in Table4, 5 and 6.

h. Decision making

The spreadsheets, assessment report, ranking report, checklists and brief reports were analysed for preparing the final list of sites selected for construction of MPCS. While finalising the sites, significance was given to geographic and spatial distribution of MPCS along the entire coastline and the requirement to conduct. The screening and assessment reports were submitted to GoK for approval and necessary concurrences.

Vide G.O (Rt) No: 641/DMD/2016 dated 28.01.2016, GoK issued orders giving *in principle* sanction to construct MPCS in 27 sites across the nine coastal districts of Kerala (Annexure 4). Out of these, 21 sites were finalised based on the viability to implement. The reports were documented for references required during various stages of the project

implementation and monitoring. Consolidated screening and assessment report of selected sites are given in Table 7 and 8 respectively.

i. Resolutions from Local Self-Government Bodies

As the next step of ESMF, procedures for obtaining Resolution from the local self-government bodies of the selected sites was initiated. The Local Self Government bodies, ie, Panchayath, Municipal Corporation and City Corporation of the concerned sites were briefed regarding the objectives and implementation strategy of the project through the District Project Implementation Units in the nine Coastal Districts. The Local Community Mobilisers in the districts (wherever their service was available at the time) and Officials from district Administration did the follow up of activities at the local body level. Brochures, brief reports and checklists were used as medium to convey information to stakeholders at all levels.

Any issues regarding availability of land, design of the MPCS, use of MPCs during normal times etc was resolved at this stage. After the ward/council/committee level meetings a resolution was approved by the concerned local body stating there is no objection in constructing the MPCS at the particular location and no environmental or social issues related to construction is seen. The suggestions towards designs of building and other concerns were also include in the resolution.

Table 4: Scores and Ranks obtained by selected sites against assessment criteria

Sl no	Site Details		Necessity for MPCs	Area available for construction	Proximity to sea/ Water bodies	Landscape	Accessibility	Ownership of land	Clearances required	Requirement for demolition	Legal issues	TOTAL SCORE	RANK
			Score										
	Site Identification number	Place	15	15	15	15	10	10	10	5	5	100	
District: KASARGODE													
1	NCRMP/KER/KSD/KAS/KUDLU-1	Revenue land, Uliyathaduka	15	15	12	13	9	9	5	5	3	86	1
2	NCRMP/KER/KSD/HOS/PULLUR-1	Revenue Land, Pullur	12	15	12	10	8	9	8	5	4	83	1
3	NCRMP/KER/KSD/MAJ/KUMBLA-1	Government Senior Basic School, Kumbla	12	8	10	12	9	5	8	5	3	72	1
District: KANNUR													
4	NCRMP/KER/KNR/KAN/KANNUR2-1	Town Higher Secondary school, SN Park-Chalad	12	10	10	9	10	5	8	4	3	71	1

5	NCRMP/KER/KNR/THA/ KATHIRUR-1	Revenue land, Ponniam	10	10	10	10	9	9	6	5	2	71	1
District: KOZHIKODE													
6	NCRMP/ KER/ KZK/ QUI/ THIKKODI-2	Ground of G.V.H.S.S, Payyoli	10	15	10	10	10	8	10	5	5	83	1
7	NCRMP/ KER/ KZK/ KOZ/ KASABA-1	Revenue land near Kasaba Village office	15	15	10	10	10	10	5	2	4	81	1
District: MALAPPURAM													
8	NCRMP/KER/MAL/TIR/ VETOM-1	G.M.U.P.S, Paravanna	11	10	10	9	9	5	8	5	4	71	1
9	NCRMP/KER/MAL/PON/ PERUMBADAPPU-1	G.H.S.S, Palappetty	10	8	10	10	9	6	9	5	4	71	1
District: THRISSUR													
10	NCRMP/KER/TSR/ CHA/ KADAPPURAM-1	Revenue land near Village Office, Kadappuram	10	10	8	7	7	8	7	4	3	64	2
11	NCRMP/KER/TSR/KOD/ AZHIKODE-1	Revenue land near Village Office, Azhikode	2	2	4	7	8	8	4	2	4	41	2

District: ERNAKULAM													
12	NCRMP/KER/EKM/KOC/ PALLIPURAM-1	Revenue land near Village office of Pallipuram	8	4	10	7	5	9	2	3	2	50	2
13	NCRMP/KER/EKM/PAR/ MOOTHAKUNNAM-1	Sarva shiksha Abhiyan School	9	8	7	6	5	5	3	3	3	49	2
District: ALAPPUZHA													
14	NCRMP/KER/ALP/ KAR/CHERUTHANA-1	Government Higher Secondary School, Ayamparambu	13	12	10	8	9	5	7	3	4	71	1
15	NCRMP/KER/ALP/ KAR/KUMARAPURAM-1	G.L.P.S, Karuvatta	8	10	9	7	10	5	7	2	4	62	2
16	NCRMP/KER/ALP/ CHER/MARARIKULAM NORTH-1	Revenue land, Janakshemam Colony	10	7	6	5	7	9	7	4	4	59	2
17	NCRMP/KER/ALP/ AMB/PURAKKAD-1	Government High school, Purakkad	9	6	4	4	8	5	7	2	4	49	2
18	NCRMP/KER/ALP/KUT/KAIN AKARI NORTH-1	Government Schhol, Kainakari North	14	9	2	1	1	5	2	3	4	41	2

District: KOLLAM													
19	NCRMP/KER/KLM/KAR/THAZHAVA-1	Revenue land in Thazhava Village office compound	10	10	12	5	8	9	9	4	5	72	1
20	NCRMP/KER/KLM/KAR/KAR UNAGAPPALLY-1	Kallada Irrigation Project land	13	11	10	8	9	5	8	3	4	71	1
District: THIRUVANANTHAPURAM													
21	NCRMP/KER/TVM/THI/MUT TATHARA-2	Revenue land near sewage farm, Muttathara	13	10	8	5	8	8	7	3	3	65	2

Table 5: Screening Outcome

Sl no	Identification number Project/State/District/ Taluk/ Village	Ownership of land	Target Vulnerable Population	Distance from sea/water body (m)	Proposed use in normal tine	CRZ Clearance	Environment Clearance	Forest Clearance
1	NCRMP/KER/KSD/KAS/ KUDLU-1	Revenue Department	1075	<2000	Community Hall	Nil	Nil	Nil
2	NCRMP/KER/KSD/HOS/ PULLUR-1	Revenue Department	2464	760-770	Community Hall	Nil	Nil	Nil
3	NCRMP/KER/KSD/MAJ/ KOIPADY-1	Education Department	1600	550	Community Hall	Nil	Nil	Nil
4	NCRMP/KER/KNR/KAN/ KANNUR2-1	Education Department	Not available	320	School classroom/ activities	Nil	Nil	Nil
5	NCRMP/KER/KNR/THA/ KATHIRUR-1	Revenue Department	Not available	<1500	Community Hall	Nil	Nil	Nil
6	NCRMP/ KER/ KZK/ QUI/ THIKKODI-2	Education department	1500	<1500	School classroom/ activities	Nil	Nil	Nil
7	NCRMP/ KER/ KZK/ KOZ/ KASABA-1	Revenue Department	2500	200	Community Hall/Training centre	Nil	Nil	Nil
8	NCRMP/KER/MAL/TIR/ VETOM-1	Education department	2800	150	School classroom/ activities	Nil	Nil	Nil
9	NCRMP/KER/MAL/PON/ PERUMBADAPPU-1	Education Department	2000	500	School classroom/ activities	Nil	Nil	Nil

10	NCRMP/KER/TSR/CHA/ KADAPPURAM-1	Revenue Department	400	245	Community Hall	Nil	Nil	Nil
11	NCRMP/KER/TSR/KOD/ AZHIKODE-1	Revenue Department	1500	630	Community Hall	Nil	Nil	Nil
12	NCRMP/KER/EKM/KOC/ PALLIPURAM-1	Revenue Department	1650	Canal and lake: 230, 200	Community Hall	Nil	Nil	Nil
13	NCRMP/KER/EKM/PAR/ MOOTHAKUNNAM-1	Education Department	1200	230-320	School classroom/ activities	Nil	Nil	Nil
14	NCRMP/KER/ALP/ KAR/CHERUTHANA-1	Education Department	2992	930	School classroom/ activities	Nil	Nil	Nil
15	NCRMP/KER/ALP/ KAR/KUMARAPURAM-1	Education Department	6400	620	School classroom/ activities	Nil	Nil	Nil
16	NCRMP/KER/ALP/ CHER/MARARIKULAM NORTH-1	Revenue Department	1822	500	Community Hall	Nil	Nil	Nil
17	NCRMP/KER/ALP/ AMB/PURAKKAD-1	Education department	1200	Thottapally lake and Sea: 125, 550	School classroom/ activities	Nil	Nil	Nil
18	NCRMP/KER/ALP/KUT/KAI NAKARI NORTH-1	Education Department	2896	55	School classroom/ activities	Nil	Nil	Nil
19	NCRMP/KER/KLM/KAR/TH AZHAVA-1	Revenue Department	Not Available	560	Community Hall	Nil	Nil	Nil

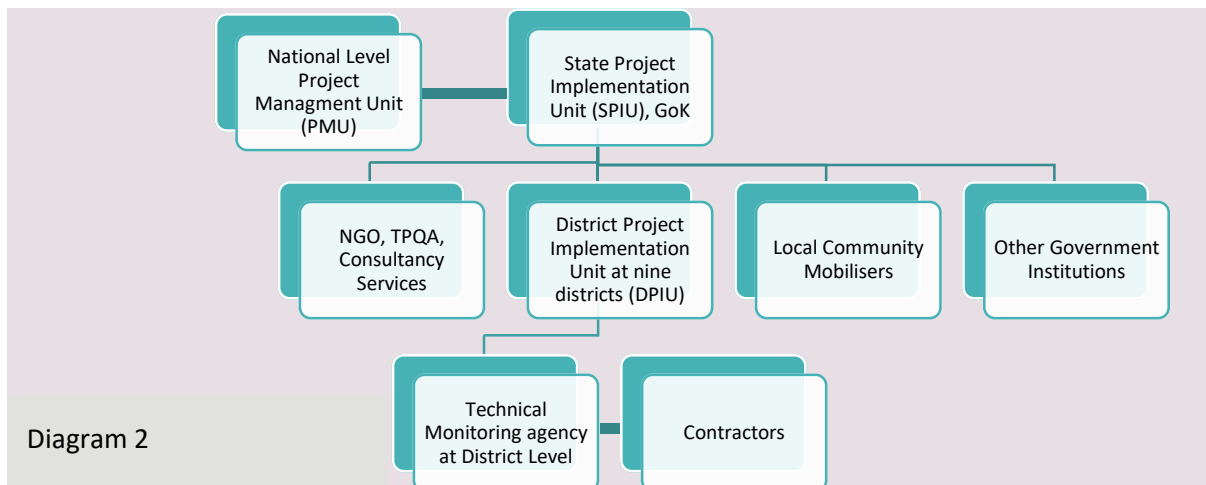
20	NCRMP/KER/KLM/KAR/KA RUNAGAPPALLY-1	Irrigation Department	8900	<400	Community Hall/Training centre	Nil	Nil	Nil
21	NCRMP/KER/TVM/THI/MU TTATHARA-2	Revenue Department	5735	600	Community Hall/Training centre	Nil	Nil	Nil

Chapter 6: Environment Management Plan

Environmental Management Plan (EMP) envisages the plans for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities. The goals of the environment and social mitigation measures is achieved through proper implementation of management plan. It is necessary to have an institutional arrangement and continuously develop the capacity at all levels of the system to attain the results of the EMP.

6.1 Institutional arrangements

The institutional arrangement for Implementation of ESMF is depicted below.



6.2 Environment/ Social Impacts and Mitigation Measures

The proposed project has less environmental & social impacts because activities such as diversion of forest land, destruction of ecological resources, displacement of people, large scale change in land use and acquisition of private land is not involved.

Though the impacts would be localized due to the relatively small scale of construction activities, certain concern that cut across the different phases of construction. The negative impacts would be avoided by designing and implementing appropriate mitigation and enhancement measures. A list of potential environmental impacts corresponding mitigation measures and institutional arrangements for EMP is given in Table 6.

Table 6: Impacts and Mitigation measures

	<i>Interventions</i>	<i>Impacts</i>	<i>Mitigation measures</i>	<i>Responsibility (R)</i>
				<i>Supervision (S)</i>
<i>Planning Phase</i>	Legal Compliance	<ul style="list-style-type: none"> ▪ Legal Non compliance ▪ Time delay 	<ul style="list-style-type: none"> ▪ All clearance / approvals required for Environmental aspects during construction shall be ensured and made available before start of work. 	SPIU
	Site Selection and Building Design	<ul style="list-style-type: none"> ▪ Use of unapproved site ▪ Land acquisition ▪ Destruction of disturbance to wildlife habitat ▪ Flooding and water logging ▪ Tree felling 	<ul style="list-style-type: none"> ▪ Ensure necessary approvals have been sanctioned from respective authorities prior to construction. ▪ Apply siting criteria: ✓ Avoid unfavourable geologic conditions. A site above the likely inundation level should be preferred. ✓ In case of non-availability of high elevation natural ground, construction should be done on stilts with no masonry or bracings up to maximum surge level, or raised earthen mounds to avoid flooding/ inundation. ✓ To avoid floods, build at least 500m away from the sea coast. ▪ Avoid construction of sites within forests, wild life parks/habitats, breeding grounds, wetlands, common properties and within or adjacent to archaeological sites or monuments. ▪ Special engineering/design considerations should be followed to make MPCS earthquake, lightning and cyclone 	SPIU and DPIU

			<p>resistant and options for making MPCCS a green building should be considered.</p> <ul style="list-style-type: none"> ▪ Location of the shelter considering storm tide heights, river or creek flood levels, access and the location of existing significant hazards. ▪ Site should be selected in consultation with local communities to check for socially sensitive, conflict prone areas and usage of such sites for construction should be avoided. ▪ Avoid/minimize tree felling. 	
Construction phases	<p>Site Preparation</p> <ul style="list-style-type: none"> ▪ Demolition of existing poor infrastructure ▪ Cutting trees and site clearance ▪ Transportation of debris ▪ Land filling/ raising land level 	<ul style="list-style-type: none"> ▪ Destruction of, or disturbance to habitat ▪ Loss of canopy ▪ Physical or social disruption to the existing and nearby communities ▪ Unhygienic/unsanitary environment due to demolition of old/ poor latrines and construction of camps in development site ▪ Soil erosion/ dust pollution/siltation/water pollution ▪ Loss of vegetation 	<ul style="list-style-type: none"> ▪ Cutting of trees with specific medicinal, religious, archaeological, environmental importance should be avoided. ▪ Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area. ▪ Engage the community members in the construction work ▪ Transport/handle debris from toilet in a hygienic manner ▪ Compaction of developed or raised land, watering land to reduce aerosols in air. ▪ Placement of construction equipment in a proper place to avoid traffic congestion and compaction of soils. ▪ Collection and disposal of construction debris in a designated dumping place. 	<p>R: Contractor S: SPIU and DPIU, Technical Monitoring Agency</p>

		<ul style="list-style-type: none"> ▪ Traffic congestion due to transportation of debris. ▪ Uneven land filling causing soil erosion 		
	<p>Construction activities</p> <ul style="list-style-type: none"> ▪ Use of Ground water ▪ Working of machines ▪ Piling ▪ Drainage block 	<ul style="list-style-type: none"> ▪ Top soil erosion ▪ Dust during construction, and due to transport ▪ Noise pollution ▪ Clogging of drainage by soil run-off, increasing the chances of flooding Water-logging and creation of mosquito breeding grounds ▪ Possible ground water contamination ▪ Air pollution ▪ Exploitation of potable water sources due to construction activities ▪ Uncollected wastes blocked the drainage and sewage system ▪ Non-compliance with regulations 	<ul style="list-style-type: none"> ▪ Prior to ground breaking, authorization from the designated authorities has to be got approved. The activities of construction shall be scheduled taking into consideration factors such as sowing of crops, harvesting, availability of labour, School days and hours (in case site is within school) during particular periods and other site specific conditions. ▪ Temporary and permanent drainage systems should be designed to minimize the soil erosion and adverse impact. ▪ Deploy silt fences to avoid/reduce soil erosion and run-off. ▪ Vehicles delivering materials should be covered to reduce spills. ▪ Local available materials should be used as much as possible so as to avoid long distance transportation, especially that of earth and stone. ▪ Mixing equipment should be well sealed, and vibrating equipment should be equipped with dust-remove device. ▪ Maintenance of machinery and vehicles should be enhanced to keep their noise at a minimum. It shall be ensured that all machinery, equipment and vehicles comply with existing Central Pollution Control Board emission norms. ▪ Water should be sprayed during construction phase, at the mixing sites, and temporary roads. 	<p>R: Contractor</p> <p>S: SPIU, DPIU and Technical Monitoring Agency</p>

			<ul style="list-style-type: none"> ▪ Storage of petrol/oil/lubricants – brick on edge flooring or sand flooring should be provided at the storage sites to avoid soil and/or water contamination due to spillage ▪ Proper waste management and disposal of oil and other hazardous wastes as per Hazardous Wastes (Management and Handling) Rules, 1989. ▪ Encourage 3R (reduce, reuse, and recycle) ▪ Construct/supply garbage bin. Collect and segregate waste at source. ▪ Adequate distance between waste bin and water body. ▪ Adequate distance should be maintained between the waste collection point and house ▪ Coordinate with the municipality for collection of domestic waste and disposal at the designated site ▪ Use brackish water for construction activities wherever possible. ▪ Use water resources without conflict. 	
	Labour camps	<ul style="list-style-type: none"> ▪ Pollution of drinking water sources and Stress on water sources ▪ Surface water contamination from washing, bathing, and waste disposal ▪ Likely sanitation & health hazards & other impacts on 	<ul style="list-style-type: none"> ▪ Temporary construction camps at designated & demarcated sites with adequate sanitation, drinking water supply & primary health facilities. ▪ Most of the construction work is labour intensive. As most of the job will be done by contractors, it will be ensured that the contractor's workers are provided with adequate amenities, health & sanitation facilities in the camp by the contractor. Such facilities shall include potable water supply, sanitary facilities (such as dry pit latrines), solid waste 	R: Contractor

		<p>the surrounding environment due to inflow of construction labourers</p>	<p>collection & disposal system and primary health facilities (such as first aid facilities) etc.</p> <ul style="list-style-type: none"> ▪ Domestic as well as the sanitary wastes from construction camp will be cleared regularly ▪ The contractor shall also guarantee the following: <ul style="list-style-type: none"> ✓ The location, layout and basic facility provision of each labour camp will be submitted to Engineer prior to their construction. ✓ The construction will commence only upon the written approval of the Engineer. ✓ The Contractor shall construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. ✓ Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities. ✓ The sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place. ✓ Separate latrines and urinals with roof and proper door and fastenings should be provided for male & female workers. Signboard displays outside latrines and urinals reading “For Men Only” and “For Women Only” as the case may be. 	<p>S: Technical Monitoring Agency</p>
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			<ul style="list-style-type: none"> ✓ Latrines and urinals shall be adequately lighted and shall be maintained in a clean sanitary condition at all times with adequate water supply. ✓ Regular collection and proper disposal of Municipal Solid Waste (MSW) (according to MSW Rules 2000). ✓ Toxic materials like tyres and plastic are not burnt by the labour for any purpose. 	
Occupational safety	<ul style="list-style-type: none"> ▪ Impact on workers' health and safety ▪ Impact on public safety 	<ul style="list-style-type: none"> ▪ The contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to. ▪ The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract. ▪ All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer. ▪ Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil. ▪ The contractor shall supply all necessary Personal Protective Equipment (PPE) such as safety goggles, helmets, safety belts, ear plugs, mask etc to workers and staffs. 	<p>R: Contractor</p> <p>S: SPIU, DPIU and Technical Monitoring Agency</p>	

			<ul style="list-style-type: none">▪ The contractor shall arrange for:<ul style="list-style-type: none">✓ A readily available first aid unit with a person adequately trained in administering first aid in every work zone.✓ The first aid unit must have an adequate supply of sterilized dressing materials and appliances as per the Factories Rules.✓ Availability of suitable transport at all times to take injured or sick person (s) to the nearest hospital▪ Firefighting arrangement:<ul style="list-style-type: none">✓ Demarcation of area susceptible to fires should be provided, along with cautionary signage✓ Portable fire exchangers and/or sand baskets shall be provided at easily accessible locations in the event of fire✓ The workers should be educated on the usage of these equipment in case of emergency✓ Use barricades and sign boards to ensure safety in and around construction area.✓ The contractor shall not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.✓ No material will be so stacked or placed as to cause danger or inconvenience to any person or the public.▪ All necessary fencing and lights will be provided to protect the public in construction zones.	
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<i>Post construction Phase</i>	Site restoration	<ul style="list-style-type: none"> ▪ Exposed burrows gets water logged ▪ Soil erosion due to loss of vegetative cover ▪ Solid wastes polluting the site 	<ul style="list-style-type: none"> ▪ All the construction camps and facilities shall be dismantled and removed from the site, unless otherwise desired by the local community/Panchayats. The site shall be restored to a condition in no way inferior to the condition prior to the commencement of work. ▪ The following activities may be carried out for restoration <ul style="list-style-type: none"> ✓ Oil, fuel or paint contaminated soil shall be removed, transported and buried in properly identified waste disposal areas ✓ At the construction camp site, saplings of plants similar to that of cut trees shall be planted. The maintenance of these saplings should be delegated to the local community or the land owner ✓ Soak pits and septic tanks should be covered and effectively sealed off ✓ Follow safety measures while disposing wastes. ✓ Deploy silt fences to avoid/reduce soil erosion and run-off. ✓ Restoration of vegetative cover in the area. 	<p>R: Contractor</p> <p>S: SPIU,DPIU and Technical Monitoring Agency</p>
	Maintenance and long term use of MPCS	<ul style="list-style-type: none"> ▪ Dilapidation of building due to poor maintenance 	<ul style="list-style-type: none"> ▪ A shelter Management Committee may be formed for the maintenance of cyclone shelters and regular maintenance of the site. 	<p>R: DPIU</p> <p>S: SPIU</p>

6.3 Project monitoring

The Environment & Social Sector Specialists at SPIU shall be responsible for overseeing compliance of the construction activities with the safeguards as well as reviewing the timely implementation of environment and social provisions as per the ESMF. The Environment and Social Sector specialists shall report the progress of implementation as well as compliance to the PIU, PMU and the World Bank. Compliance status reports, Site investigation reports, Occupational safety status reports will be provided on monthly and quarterly basis at different phases of construction.

6.4 Financial plan for the ESMF

Necessary budgetary provisions shall be made in the Detailed Project Reports of each MPCS for implementation of the environmental and social management measures suggested as part of the ESMF. The cost estimate for each of the project shall include the environmental management costs and monitoring and compliance costs.

6.5 Update and revisions to the ESMF

The ESMF will be utilized for screening of projects as well as the implementation of the specified environmental and social management plans in the sub-project activities. The ESMF report is a “live document”, which will be updated and modified from time to time in accordance with the regulations and corrective measures suggested in project monitoring reports. The ESMF will be revised and appropriate management measures will be taken regarding issues that were not anticipated during the planning phase.

Annexure 1: Format for furnishing details of sites

District Name:	
Basic details	
Place	
Village	
Taluk	
Survey number Old and new	
Ownership of land	
Land available for construction (in cents or sq.m)	
Need Analysis	
Vulnerable population near the proposed site that will have to be accommodated during emergency	Male: Female: Total:
Details of shelters/ schools used as camps in the village during emergency	Sl no: Name: Capacity:
Is demolition of any building required to facilitate the new construction? Yes/ No	If yes, number of building, ownership, any other details
Environmental and Social assessment	
Distance of proposed site from coastline. Is the site in Coastal Regulation Zone?	
If yes details Is the proposed site partly/ wholly within wetland/forest/ environmentally sensitive area? If yes details	
Distance of the proposed site from any water bodies	
Number of trees that will have to be felled from for construction Number: Species:	

Is the area waterlogged during rain? If yes, the maximum height to which the water rises	
Current use of land	
Road	
Main road near to the site	Name:
Length and ROW (Width) of the approach road connecting main road and site	
Is there a need to upgrade the existing approach road to all weather road	
Details of screening exercise Name	
Designation	
Date	

Annexure 2: Format for collecting and verifying details during field investigation

Village	
Total village area	
Village Population	
Coastal Length of Village	
Survey Number of plot	Block no, Survey number old and new
Ownership of land	
Land available for construction of MPCS	Approximate area available for new building
High flood level in site	
Number of trees in site that has to be felled for construction	
Is the site in Coastal regulation Zone?	
Distance From coastline to proposed site	
Distance from Environmentally sensitive regions*/Archaeological monuments that are within 5 km radius of the proposed site	
Distance from water bodies that are within 5 km radius of the proposed site	
Approach roads	Name of road, length, width, type
Land use	
Texture of land Drainage	

* Environmentally sensitive regions: Forests, Reserves, Wetlands, Important Bird areas, Mangrove area, Estuary with mangrove, Natural Lakes, Swamps, mudflats.

Details of shelters within the village and in neighbouring villages				
Village	Name of shelter	Capacity	Present condition	Distance between the shelter and proposed site

Details of relief camps during monsoon season within the village and in neighbouring villages*			
Name of shelter	Number of people sheltered	Number of camp days	Year

Notes

- Note down the buildings in the vicinity of the proposed site
- Draw a rough sketch of the place showing access roads, buildings, trees and other relevant details
- Enquire whether any other proposals exists in the site
- Collect copy of Basic Tax Register, toposketch from village.
- Mark GPS location, take photos
- Collect details of the school, student strength, number of class, whether they require any more buildings? Shelter can be put to what use during normal times?
- Collect contact details of Head Master, Village Officer, Panchayath representative and others.

Outcomes and benefits

- Minimization of loss of lives and property.
- Nodal point for receipt and dissemination of cyclone/flood warnings.
- Safe keeping of essential stocks/items for post disaster usage.
- Nodal point for carrying outpost disaster response and relief activities.
- Provides temporary protection to the shelter-less people during an event of disaster.
- Serve as major assets for the coastal community during the hour of emergencies.
- Reduce the risk of exposure and vulnerability.

Contact

Company Name

Telephone: 04712365494

Email: ncrmp.kerala@gmail.com

Website: www.disasterlesskeral.org

Annexure 3: Brochure designed for the Project

NATIONAL CYCLONE RISK MITIGATION PROJECT





NCRMP

National Disaster Management Authority, Government of India with support from World Bank is implementing National Cyclone Risk Mitigation Project [NCRMP] Phase II in the coastal states of India. One of the major Components of the project is to build suitable infrastructure to mitigate the effects of cyclones and other hydro meteorological hazards. The project intends to construct Multi-purpose Cyclone Shelters in coastal districts of the state to improve the disaster risk management infrastructure in the state.

*NCRMP:
Strengthening structural
and nonstructural
measures and making
coastal communities safe*

Salient features of the MPCS

- MPCS will be designed in such a manner to function as community halls, school classrooms, or vocational training centers etc during normal times.
- Lofts for keeping the minimum belongings of the occupants.
- Provision for Heli-drop will be provided
- The shelters will have kitchen area, generator rooms and toilet/wash area.
- Ramps and other facilities for differently-abled.
- Maintenance and functioning of these MPCS in normal times will be vested with a shelter management committee.

Project Description

The objective of the project is to reduce vulnerability to Cyclone and other hydro-meteorological hazards of coastal communities and to increase the capacity of the state to effectively plan for and respond to disasters.

Funding Agency: World Bank and State Government

Project Management Unit: NDMA

Project Implementation Unit: Revenue and Disaster Management Department, Government of Kerala

Technical Monitoring agency: PWD (Building) Division of respective district

Project period: 2015-2020

Project Components:

- Component A: Early Warning Dissemination systems
- Component B: Cyclone Risk Mitigation Infrastructure
- Component C: Technical assistance for hazard risk management
- Component D: Project Implementation Support

Annexure 4: Government Order: G.O (Rt) no.641/DMD/2016 dated 28.01.2016 regarding selection of sites for construction of MPCs.

Annexure
[G.O.(Rt) No.641/2016/DMD, dt. 28th January, 2016]
Selected and Prioritised list of sites for the construction of Multi-purpose Cyclone Shelters under National Cyclone Risk Mitigation Project

	Taluk, Village, Survey number, Place	Ownership
Kasargod		
1	Kasargod, Kudlu (Shiribagilu) Block: 58, Re-survey number: 232, Revenue land, Uliyathaduka	Revenue
2	Hosdurg, Pullur, Survey number: 110/1A3A, Revenue Land, Pullur	Revenue
3	Manjeshwar, Koipady, Block: 37, Old survey number: 120/1, Re-survey number: 168/1pt, Government Senior Basic School, Kumbha	Education
Kannur		
4	Kannur, Kannur-2, Ward 3: Block: 1, Survey number TS 44, Town Higher Secondary school, SN Park-Chalad	Education
5	Thalassery, Kathiroor, Survey number: 89/3, Revenue land, Ponniam	Revenue
Kozhikode		
6	Quilandy, Thilkodi, Survey number: 82/4C2, Ground of G.V.H.S.S, Payyoli	Education
7	Kozhikode, Kasaba, Survey Number: T.S 17-17-737/3, Revenue land near Kasaba Village office	Revenue
Malappuram		
8	Tiroor, Vettom, Survey number: 23/6, G.H.U.P.S, Paravanna	Education
9	Ponnani, Perumbadappu, Survey number: 108/7, G.H.S.S, Palappetty	Education
Thrissur		
10	Chavakkad, Kadapuram, Survey number: 101/4B, Revenue land near Village Office, Kadappuram	Revenue
11	Kodungalloor, Azhikode, Survey number: 298/2, Revenue land near Village Office, Azhikode	Revenue
Ernakulam		
12	Kochi, Njarakkal, Block: 8, Survey number: 45/1, Revenue land near Njarakkal Village Office	Revenue
13	Paravoor, Puthenvelikara, Survey number: 330/1, Puthenvelikara	Panchayath

14	Kochi, Pallipuram, Block: 2, Survey number: 196/5, Revenue land near Village office of Pallipuram	Revenue
15	Paravoor, Moothakunnam, Survey number: 252/3A,B, 252/2-3, 252/1-2, Near Sarva Shiksha Abhiyan, Thuruthipuram	Panchayathi/ Education
16	Kochi, Kumbalanghi, Survey number: 290, G.H.S.S, Puthenthode	Education
Alappuzha		
17	Karthikappally, Cheruthana, Block: 5, Survey number: 371/1, Government Higher Secondary School, Ayamparambu	Education
18	Karthikappally, Kumarapuram, Block :2, Survey number: 529/13, G.L.P.S, Karuvatta	Education
19	Cherthala, Mararikulam North, Block: 30, Survey number: 322/6, Revenue land, Janakshemam Colony	Revenue
20	Karthikapally, Pallipad, Block: 11, Survey number:131/5,131/6, Government Upper Primary School, Vazhuthanam	Education
21	Ambalappuzha, Purakkad, Bock: 21, Survey number: 50/5, Government High school, Naluchira	Education
22	Muttanad, Kainakari North, Block 7, Survey number:65/5, Government High School, Kuppapuram	Education
Kollam		
23	Karunagappally, Thazhava, Block: 11, Survey number: 706/5, Revenue land in Thazhava Village office compound	Revenue
24	Karunagappally, Karunagappally, Block: 10, Survey number:582/11, Kallada Irrigation Project land	Irrigation Department
25	Kollam, Vadakkevila, Block: 85 Survey number: 4, Revenue land, S.N College junction	Revenue
Thiruvananthapuram		
26	Thiruvananthapuram, Muttathara, Survey number: 2798, Revenue land near sewage farm, Muttathara	Revenue
27	Thiruvananthapuram, Muttathara, Survey School land	Revenue

ACW
Section Officer

Annexure 5

Link: [ESMF sheet.xlsx](#)

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