

CHAPTER-7
RISK ASSESSMENT AND DISASTER
MANAGEMENT PLAN

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7.1 GENERAL

The purpose of this chapter is to offer guidance to NIOT or the Contractor and their personnel, during construction phase to help ensure that HSE (Health, Safety and Environment) risks to personnel or assets are minimized. This section should be considered to provide assurance that the HSE risks associated with working in the project site are mitigated to a level commensurate with a low probability of incident or accident. The proposed project is located in Nellore district, which is classified as very high cyclone prone area district of India. Hence, it is recommended that project proponent shall implement the disaster management plan in a close co-ordination with district administration.

7.2 RISK ASSESSMENT

Risk Assessment (RA) study considers probability of occurrence of an accident and magnitude of its consequence. The term, 'hazard' refers to sources of potential harms, whereas risk considers frequency and severity of damage from hazards. Hazard denotes a property or a situation that in particular circumstances could lead to harm. Risk on other hand, is a function of the probability of a hazard occurring and the magnitude of the consequences. Risk therefore, represents the likelihood of a potential hazard being realized Risk Estimation involves identifying the probability of harm occurring from an intended action or accidental event. Risk Evaluation determines the significance of estimated risks, including risk perception. The Risk Analysis study is a combination of risk estimation and risk evaluation.

In order to minimize damages in case of accident or likely failure cases, a risk analysis study has been carried out to quantify zone of influence and a disaster management plan has been prepared to control the spread of incident effectively. The risk associated due to natural hazard is expected in the establishment of seafront facilities at Nellore are only Cyclones. The detail analysis of cyclones in the Nellore district is as given in the subsequent paragraphs.

7.2.1 Cyclonic Disturbances

Cyclones are one of the natural hazards that affect India almost every year causing large loss of

lives and properties. Tropical Cyclone (TC), 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). These are intense low pressure areas of the earth atmosphere coupled system and are extreme weather events of the tropics. Hazards associated with tropical cyclones are long duration rotatory high velocity winds, very heavy rain and storm tide (the combined effect of storm-surge and astronomical tide). Out of these, the storm surge is the greatest killer hazard associated with cyclone.

India has a coastline of about 7,516 km of which 5,400 km is along the mainland. The entire coast is affected by cyclones with varying frequency and intensity. Although the North Indian Ocean (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, especially when they strike the coasts bordering the North Bay of Bengal.

Cyclones are known by many names the world over like tropical cyclones, typhoons, hurricanes etc. Though TCs differ by name across regions, they are classified according to their wind speed. The classification, however, varies from region to region. The Indian classification of these intense low pressure systems (cyclonic disturbances) are given in Table-7.1.

**Table-7.1: Indian Classification of Cyclonic Disturbances in the North Indian Ocean
(The Bay of Bengal and Arabian Sea)**

Type	Wind Speed (km/h)	Wind Speed (knot)
Low pressure are(L)	Less than 31	Less than 17
Depression (D)	31-49	17-27
Deep Depression(DD)	50-61	28-33
Cyclonic Storm(CS)	62-88	34-47
Severe Cyclonic Storm(SCS)	89-118	48-63
Very Severe Cyclonic Storm(VSCS)	119-221	64-119
Super Cyclonic Storm (Sup. CS)	222 or more	120 or more

Based on the India Meteorology Department (IMD), e-Atlas of period 1891-2015 the tracks of cyclones and depression crossing the Nellore project area district is shown in Figure-7.1. Likewise the frequency of Cyclones and Depression is shown in Figure-7.2.



Figure-7.1 Tracks of cyclones and depression crossing the Nellore district

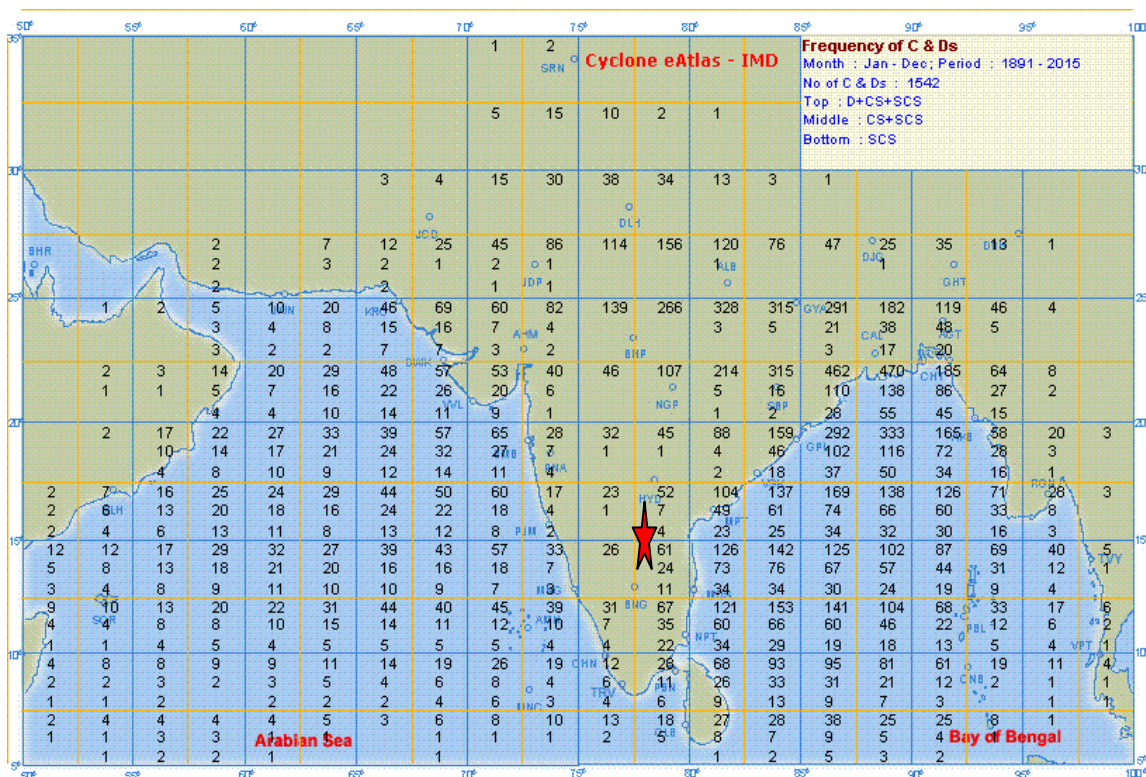


Figure-7.2: Frequency of Cyclones and Depression

Total 23 numbers of cyclones crossed the Nellore District from 1891; also the cyclone hazard prone district of India is shown in Figure-7.3.

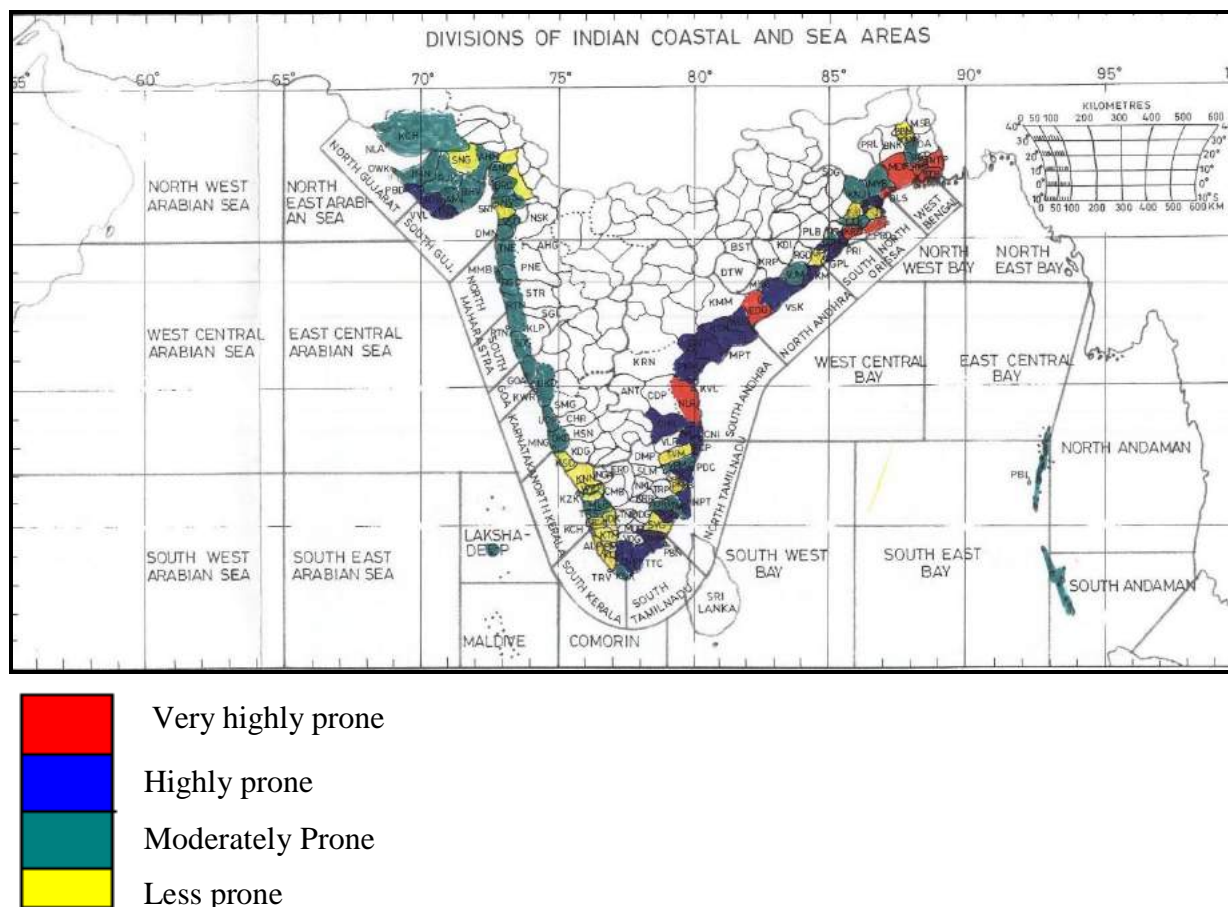


Figure-7.3: cyclone hazard prone district of India

Figure-7.3 shows that Nellore is very highly prone to the cyclones ha; hence site specific disaster management plan in co-ordination with district administration needs to be prepared.

7.3 DISASTER MANAGEMENT PLAN

The main objectives of District Disaster Management Plan are as follows:

- To improve preparedness at the District level through risk, vulnerability & preparedness analysis to disasters and to minimize the impact of disasters in terms of human, physical and material loss.

- To ascertain the status of existing resources and facilities available with various agencies involved in Disaster Management in the District and improve the capacity building of the District to enable the District to manage disasters in more effective way.
- To develop a framework for proper documentation of future disasters in the District, to have an update on critical information essential for plan, to critically analyze and appraise responses and to recommend appropriate strategies.

7.3.1 Important Provisions relating to District Disaster Plan in DM Act-2005

Disaster (Sec.2 (d))

“Disaster” means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or manmade causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of environment, and is of such a nature of magnitude as to be beyond the coping capacity of the community of the affected area.

Disaster Management (Sec.2 (e)):

Disaster Management means a continuous and integrated process of planning organizing, coordinating and implementing measures, which are necessary or expedient for

- i. Prevention of danger or threat of any disaster,
- ii. Mitigation or reducing the risk of disasters
- iii. Capacity –building
- iv. Emergency preparedness
- v. Assessing the effects of disasters
- vi. Providing emergency relief and rescue: and
- vii. Post-disaster rehabilitation and reconstruction;

Constitution of District Disaster Management Authority (Sec.25)

- State Government shall establish a District Disaster management Authority with the District Collector as Chairperson.
- It Shall meet as and when necessary and at such time and place as the Chairperson may think fit. (Sec.27)
- As and when it considers necessary, the Chairperson may constitute one or more advisory committees and other committees for the efficient discharge of the functions (Sec.28)

District Plan (Sec.31)

- There shall be a plan for disaster management for the district.
- It shall be prepared by District Authority after consultation with local authorities, having regard to the National Plan & State Plan.
- It has to be approved by State Authority

The District plan shall include:

- a) The areas in the district vulnerable to different forms of disasters:
- b) The measures to be taken, for prevention and mitigation of disaster, by the Departments of the Government at the district level and local authorities in the district.
- c) The capacity- building and preparedness measures required to be taken by the Departments of the government at the district level and the local authorities in the district to respond to any threatening disaster situation or disaster.
- d) The response plans and procedures in the event of a disaster providing for.
 - i. Allocation of responsibilities to the Departments of the Government at the district level and the local authorities in the district.
 - ii. Prompt response to disaster and relief thereof
 - iii . Procurement of essential resources;
 - iv . Establishment of communication links ; and
 - v . The dissemination of information to the public

7.4 PREPAREDNESS PLAN

The preparedness plan includes the following:

- a) Institutional Setup
- b) Warning System
- c) Communication System
- d) Control Rooms
- e) Assessment of Materials, Equipment & Resources
- f) Training& Capacity Building of Stake holders
- g) Mock Drills
- h) Community Based Disaster Management
- i) Name and Address of Principal Functionaries

j) Longitudes and Latitudes

k) Public & Private Resource Inventory

All precautionary activities and measures which enable rapid and effective response to hazard events constitute preparedness plan.

a) Institutional Setup

As per DM Act -2005, State Government shall establish District Disaster Management Authority for every District with District Collector as ex-officio chairperson of the Authority and 6 others as members of the authority. District Authority shall act as the district planning, coordinating and implementing body for disaster management and take all measures for the purpose of disaster management in the district in accordance with guidelines laid down by the State Authority.

District Authority may constitute advisory committee at district level for the efficient discharge of its functions. After taking approval from the District Authority present District level advisory committee comprising functionaries from various line departments, public representatives, PRI representatives, NGOs, representatives of CBOs in the district with District Collector as Chairman can continue performing advisory role.

Similarly, there shall be Divisional level Advisory Committee with Sub-Collector/ RDO as Chairpersons along with official and non-official at division level as member.

There shall be similar committee at Mandal and Gram Panchayat level. Further, to help mandal level committee in preparedness and response operations there shall be one District level officer for every vulnerable mandal.

b) Warning System

Loss of life and property is significantly reduced because of preparedness measures and appropriate warning systems. Indiscriminate warning may result in non responsiveness of the community. From District control room the warning will be disseminated to the Mandals and from Mandals to the Village Panchayat. Within the Panchayat limits, warning will be disseminated by local means through beat of drums, tom-tom, ringing of bells, hosting of flags etc.

The Warnings are disseminated to the following by means of message through. VHF/Wireless Sets/Ham Sets/Telephone/Telegram/DD/AIR/Satellite based disaster warning systems (for cyclones.)

1) Collector, SPS Nellore District

- 2) S.P., SPS, Nellore District.
- 3) Sub-Collector/ Revenue Divisional Officers in the District.
- 4) SDPO's in Nellore District
- 5) Tahsildars of affected Mandals
- 6) Special Officers in the District.
- 7) District Public Relations Officer, Nellore
- 8) Joint Director, Fisheries.
- 9) SI of Police of all vulnerable mandals
- 10) All control rooms, Sub-control Rooms.

C) Communication System :

Communication systems for dissemination of warnings include-Radio, TV, Ham Radio, Satellite Telephones, Wireless Systems and Telephones/Cell phones. During Natural calamities wireless systems and Ham radio systems are last to fail. In Nellore district, for disseminating flood/cyclone warnings communication systems are positioned as mentioned below.

- i. **Revenue Wireless Sets:** All Tahsildar offices are having wireless base sets as well as Hand sets besides Divisional Offices.
- ii. **Police Wireless Sets :** Besides revenue Wireless Sets, police Wireless sets are also to be installed at the Collectorate and places where necessary.
- iii. **HAM sets :** To ensure flashing of messages specially, Ham sets are very useful. Ham sets are established at Collectorate and wherever the necessity arises.

It is to be ensured that all these sets are in functional condition during disasters times. Sufficient number of backup batteries also to be kept ready. All the messages communicated should be clear, easily understandable, direct and immediately relevant indicating possible damages. Repeated messages could be more effective.

d) Control Rooms :

District, Divisional, Mandal and other Control Rooms. Control room is the nodal centre for collecting and transmitting information to the appropriate places and persons. Every information of the District should be available in the District control room.

District control room shall be under the overall control of ;the Collector, District revenue officer shall be in charge of District control room assisted by staff round the clock.

In case of Somasila floods in Nellore District, immediately after, flashing of 1st warning that main control room is established in the office of the District Collector, Nellore and information will be flashed to all Divisional Offices to alert Mandals nearby Pennar River.

Besides above control rooms, control rooms are opened at various places after the issue of first warning as mentioned below:

e) Assessment of materials/Equipments/Resources required by various Departments.

Preparedness of various Departments in terms of assessment and making available at requisite places in the district before incidence of disasters is very essential for responding to disasters in rapid and effective manner.

Revenue and Civil Supplies :

- i). Positioning of buffer stock in advance stock at F.P. Shops in the vulnerable mandals. This is to be ensured by conduct of meeting at district level by District Collector every year in the month of may and Sub-Collectors and RDOs to follow up to ensure stocks are lifted to the identified places.
- ii) **POL to be stocked by bunk owners:** Diesel and Petrol required for vehicles engaged for disaster response is to be stocked.
- iii) **Boats Requirement :** Boats required are to be positioned at the identified points by requisitioning for delivery of Boats when water outflow exceeds 150000 cusecs at Somasila Dam and during cyclone.

DM & HO:

Drugs and Disinfectants required are to be stocked at identified place by June of every year. Drugs and Disinfectants requirement for Cyclone/Flood affected villages and emergency drug storage centres.

Animal Husbandry ::

Veterinary Medicines, Vaccine and equipment required during Floods/ Cyclone.

District Panchayat Officer

In order to prevent outbreak of epidemics in the flood affected villages proper sanitation and water control measures in removal of garbage, draining out of stagnated water, cleaning of

choked drains, spraying of baytex in drains and stagnated water area, distribution of Gambusia fish in large scale, and chlorination of all drinking water sources need to be taken up.

f) Training and Capacity Building of all Stake holders:

One of the important measures of preparedness is to build the capacities of, members of disaster management committees at various levels, functionaries of departments relating to DM at various levels and members of task force teams at village level so as to bring in clarity about roles and responsibilities and to equip them to manage the calamities effectively. In this regard, District administration has to work out proper capacity building strategy for managing disasters effectively.

g) Mock Drills

Basing on the plans prepared at respective levels, mock drills are to be conducted twice in a year in the month of May and September. Proper mock drill helps evaluating practicability of the plan, adequacy of resources and communication, and in updating the Disaster management plans. It is the responsibility of respective committees to ensure conduct of mock drills.

h) Community Based Disaster Management

CBDM eschews the top down approach where committees are reduced to passive recipients of govt. benefits with no say in decision making, implementation and monitoring. It recognizes that local communities have the ability to plan for themselves on a sustainable basis as they know what is best for them and envisages proactive partnership between the Government the community and other stakeholders like NGO's, CBO's etc.,

CBDM strategy envisages setting up of committees from village level to district level comprising local elected representatives, respective govt. functionaries, NGO's CBO's etc. Institutions/ Committees created at various levels are responsible for preparation, implementation, monitoring, evaluation of plans. Plans prepared at village level are to be integrated to mandal plans and mandal plans to district plan.

7.5 PREVENTION PLAN

All activities and measures in advance of a hazard event designed to reduce hazards and their effects and provide protection from their impacts. Prevention plans are hazard specific and deal with both structural and non-structural measures.

Structural Measures:

Construction of infrastructural facilities like dams/ embankments, tanks, reservoirs, restoration of vulnerable points on roads, high level bridges, etc., could provide protection from the impacts of floods/cyclones. These structural measures are costly and mostly need one time heavy investment but provide more or less permanent solution.

Non-Structural measures:

These are cost effective, time tested and mostly evolved by the community in a gradual manner with local vision, traditional knowledge.

7.6 RESPONSE PLAN

All the activities and measures taken immediately prior to and following a hazard event to reduce impacts and to recover and reconstruct an area affected by hazard event.

Response plan includes emergency warning and dissemination; evacuation; search and rescue; shelter management; medical aid and health; water and sanitation; carcass disposal; infrastructure restoration; etc. and allocation of responsibilities to departments at the district level for performing above response activities.

Crisis Response Structure

A) Early Warning Dissemination Response Apsdms

Normal times:

- APSDMS will Process information about an actual or potential Disaster/situation to facilitate connected Departments for preparing the community for initiating advance mitigation actions.

Pre disaster:

- Maintain effective communication of the data/advisory/warning to appropriate levels for Disaster Mitigation.

During Disaster:

- Maintain effective study of the data/advisory /warning to appropriate levels for Disaster Mitigation.

Post Disaster:

- The APSDMS will be responsible for carrying out all hazard mitigation studies, developing action plans, mobilizing community involvement in hazard reduction,

and developing the institutional and regulatory framework for long term hazard reduction.

7.7 COST ESTIMATE

The budget for different activities required to be carried out to implement the site specific disaster management plan in co-ordination with district administration is Rs.50 lakh as per details given in **Table-7.2**.

Table-7.2: Cost Estimate for Implementing DMP

S. No.	Particulars	Amount (Rs. In Lakhs)
1.	Installation of alert system, setting up of communication system etc at project site	35.00
2.	Public Information System	5.00
3.	Training and miscellaneous	10.00
	TOTAL	50.00