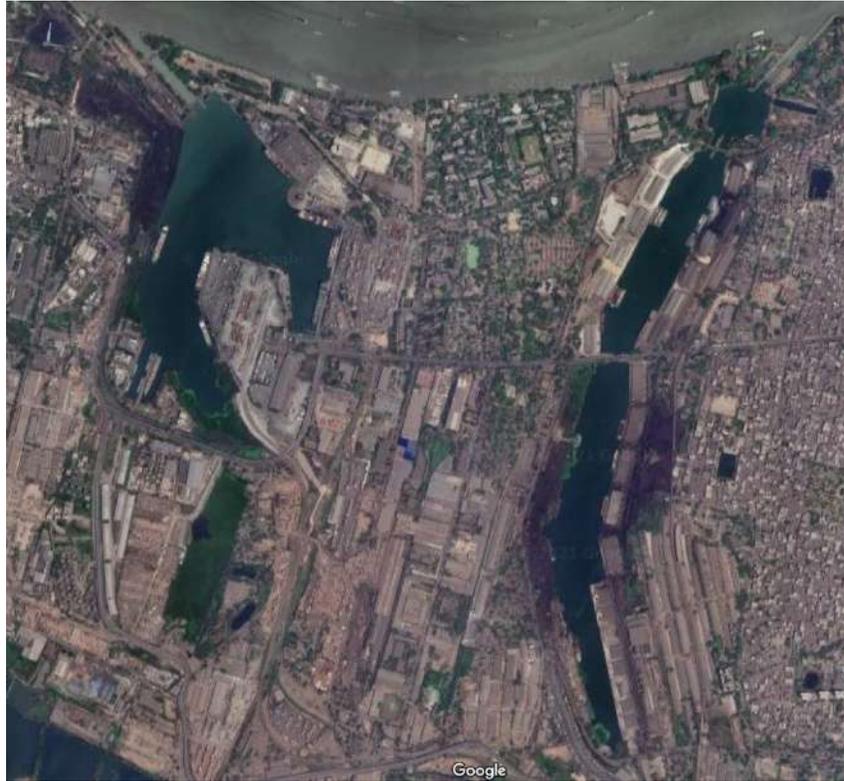


# **SYAMA PRASAD MOOKERJEE PORT – KOLKATA DOCK SYSTEM**



## ***DISASTER MANAGEMENT PLAN (DMP)***

**By**

**IRCLASS**  
Indian Register of Shipping

**December - 2021**

*Disaster Management Plan*

**This is to state** that at the request of Syama Prasad Mookerjee Port (SMP), the undersigned surveyors have prepared Disaster Management Plan.

This work has been carried out for Kolkata Dock System (KDS) as per their work order dated 29<sup>th</sup> July, 2021 and is confidential. No part of this report may be released to any outside organization unless explicitly advised by the owners in writing.

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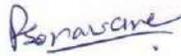


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**REPORT REVISION RECORD**

Revision No.	Revision Details	Date
Draft	Draft report issued for review and comment to SMP-KDS.	30-11-2021
Final	Final report issued to SMP-KDS.	27-12-2021

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**The tasks of preparation of Disaster Management Plan have been executed by IRS as a consulting service at the request of Syama Prasad Mookerjee Port. Conclusions and recommendations resulting from the consulting services have been formed in good faith and on the basis of the best information available from sources believed by IRS to be reliable.**

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## **IMPORTANT NOTE**

The Disaster Management Plan (DMP) outlines the steps required for the management of responses to Natural and Man-Made disasters that are the responsibility of the KDS and companies within port estate.

The DMP of KDS is a comprehensive document covering all identified Hazards, Risk and Vulnerability analysis, Elements at risk and Level of impact. The plan provides clarity on the roles, delegation of authority and responsibility of each involved staff member in the organization.

It is intended that this plan would provide guidance for quick response in case of an emergency and help in realizing sustainable Disaster Risk Reduction for the Port.

This plan has been prepared as per the template issued by National Disaster Management Authority (NDMA), National Disaster Management Plan (NDMP) 2019 and NDMA guidelines.

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## ABBREVIATIONS

ATI	Advanced Training Institute
BARC	Bhabha Atomic Research Centre
CBRN	Chemical, Biological, Radiological and Nuclear
CCA	Central Coordinating Authority
CEC	Chief Emergency Controller
CMO	Chief Medical Officer
CIC	Chief Incident Controller
CISF	Central Industry Security Force
CMG	Crisis Management Group
CMV	Central Motor Vehicle
CWC	Cyclone Warning Centers
CZMP	Coastal Zone Management Plan
DCA	District Coordinating Authority
DCC	District Contingency Committee
DDMA	District Disaster Management Authority
DISH	Director of Industrial Safety and Health
DMP	Disaster Management Plan
EAP	Emergency Action Plan
EOC	Emergency Operation Centre
EPPR	Emergency Prevention, Preparedness and Response
ERDMP	Emergency Response Disaster Management Plan
FA & CAO	Financial Advisor & Chief Account Officer
GNOME	General NOAA (National Oceanic and Atmospheric Administration) Oil Modeling Environment
GPS	Global Positioning System
HDC	Haldia Dock Complex
HPC	High Powered Committee
HVLR	High Velocity Long Range
ICZM	Integrated Coastal Zone Management
IDRN	Indian Disaster Resource Network
INCOIS	Indian National Centre for Ocean Information Services
IMD	India Meteorological Department
IMO	International Maritime Organization
IAP	Incident Action Plan
IRT	Incident Response Team
ITOPF	International Tanker Owners Pollution Federation
KDS	Kolkata Dock System
KPD	Kidderpore Dock
LCA	Lead Combat Agency
MARG	Mutual Aid Response Group
MMD	Mercantile Marine Department
MoEF	Ministry of Environment & Forest

MRCC	Maritime Rescue Coordination Centre
MSDS	Materials Safety Data Sheet
MSIHC	Manufacture, Storage and Import of Hazardous Chemical Rules
MTBE	Methyl-tert-butyl Ether
NEC	National Executive Committee
NCMC	National Crisis Management Committee
NDMA	National Disaster Management Authority
NIDM	National Institute of Disaster Management
NOSDCP	National Oil Spill Disaster Contingency Plan
NSD	Netaji Subhash Dock
OH&S	Occupational Health and Safety
OOSA	Online Oil Spill Advisory
OSRL	Oil Spill Response Limited
OSRO	Oil Spill Response Organization
OSTM	Oil Spill Trajectory Model
PAS	Public Address System
PESO	Petroleum and Explosives Safety Organisation
P&IR	Personnel and Industrial Relations
PNGRB	Petroleum and Natural Gas Regulatory Board
PRO	Public Relation Officer
RADMMD	The Revenue Administration, Disaster Management and Mitigation Department
RMC	Regional Meteorological Centre
SA	Statutory Agency
SAR	Search and Rescue
SCMG	State Crisis Management Group
SEC	State Executive Committee
SIC	Site Incident Controller
SIDM	State Institute of Disaster Management
SMP	Syama Prasad Mookerjee Port
SMPV	Static and Mobile Pressure Vessel
SDMA	State Disaster Management Authority
UNDP	United Nations Development Programme
WBCZMA	West Bengal Coastal Zone Management Authority
WBPCB	West Bengal Pollution Control Board
WMO	World Meteorological Organization

# PART I

## 1.0 PRELIMINARIES

### 1.1 PROFILE OF THE PORT

Syama Prasad Mookerjee Port (SMP) established in 1870, the oldest Major Port in India, is located on the eastern coast of West Bengal. It is a riverine port located on the west bank of Hooghly River. SMP comprises of two dock systems one at Kolkata and other at Haldia. Kolkata dock consists of three sub-components i.e., Kidderpore Dock (KPD), Netaji Subhash Dock (NSD) and Budge-Budge Oil jetties. The Kolkata port is about 145 km from the Sagar Island and 232 km from Sand head. River anchorages of KDS are located at Garden reach and Diamond harbor.

Port is well connected to nearby places by road, rail and ferry boats. National Highway (NH) 117 is about 1.5 km from KDS and connects to NH 6 (Mumbai – Kolkata Road). Port is also well connected to South-Eastern railway network. Nearest railway station to KDS is Majherhat.

#### 1.1.1 Location of the port

The port lies in the city of Kolkata of West Bengal.

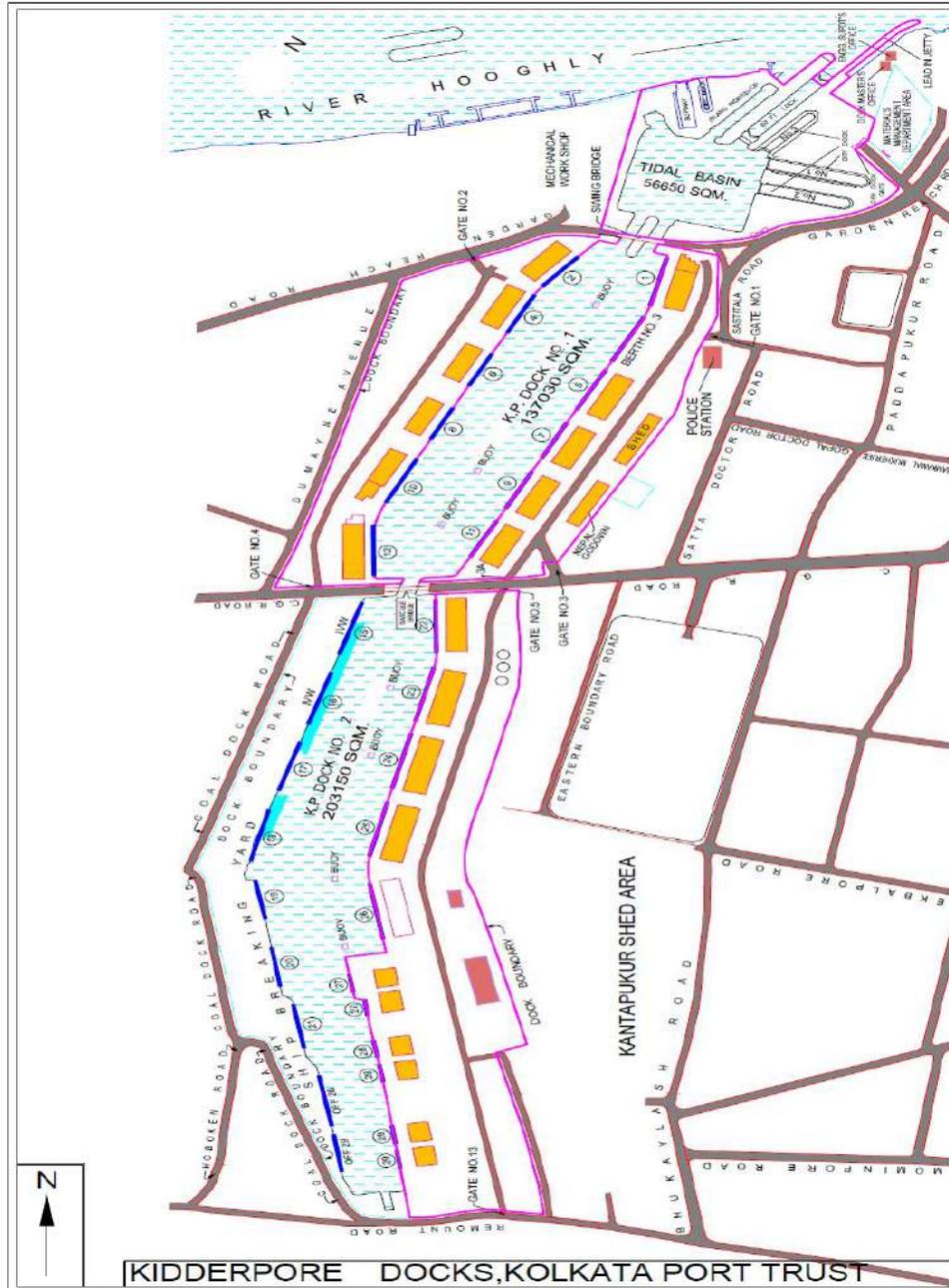
Latitude	22° 32' N
Longitude	88° 18' E

**Table 1.1:** Location of Port

**1.1.2 Kidderpore Dock (KPD)**

The KPD comprises of two Dock basins – separated by a bascule bridge. KPD – I has 12 berths and KPD – II has 8 berths (**Figure 1.1**). The entrance to basin is through twin locks. The size of berths and the back-up storage facilities in KPD – I and KPD – II is listed in **Table 1.2**.

**1.1.2.1 Kidder Dock Port Layout**



**Figure 1.1: KPD Layout**

**1.1.2.2 Berth wise specification and Storage Shed details**

Sr. No	Name of Berth	Type of Berth	Actual depth (m)	Quay length (m)	Maximum length of vessel that can be accommodated	Shed	
						Covered (sqm)	Open (sqm)
1	1	General Cargo	8	133	475	3345	2565
2	3	General Cargo	8.7	128	515	-	3887
3	5/7	General Cargo	8.7	229	515	6689	4218/4374
4	9	General Cargo	8.7	108	515	3345	3812
5	11	Passenger & Coastal	8.5	151	515	3344	1604
6	2	Coastal	8	142	465		2693
7	4	General Cargo	8.5	136	515	3344	9098
8	6	General Cargo	8.2	118	515	3345	11849
9	8	General Cargo	8.5	128	515	3344	4647
10	10	General Cargo	8.5	161	515	3345	5693
11	12	Coastal	8.6	143	475	3344	5699
12	22	General Cargo	8.7	151	500	8919	Nil
13	23	General Cargo	8.7	147	515	-	Nil
14	24	General Cargo	8.7	152	515	6919	Nil
15	25	General Cargo	8.5	169	515	8919	Nil
16	26	General Cargo	8.4	185	515	9033	2616
17	27	General Cargo	8.2	195	515	3623	3680
18	28	General Cargo	8.4	195	515	3623	3726
19	29	General Cargo	8.4	185	515	3623	3440

**Table 1.2: Berth wise specification**

### 1.1.3 Netaji Subhash Dock (NSD)

The NSD comprises of dock basin with a single lock entrance and has 10 berths and 2 dry docks (Figure 1.2). Sizes of berths and the storage space around these is given in Table 1.3.

#### 1.1.3.1 Netaji Subhash Dock Port Layout

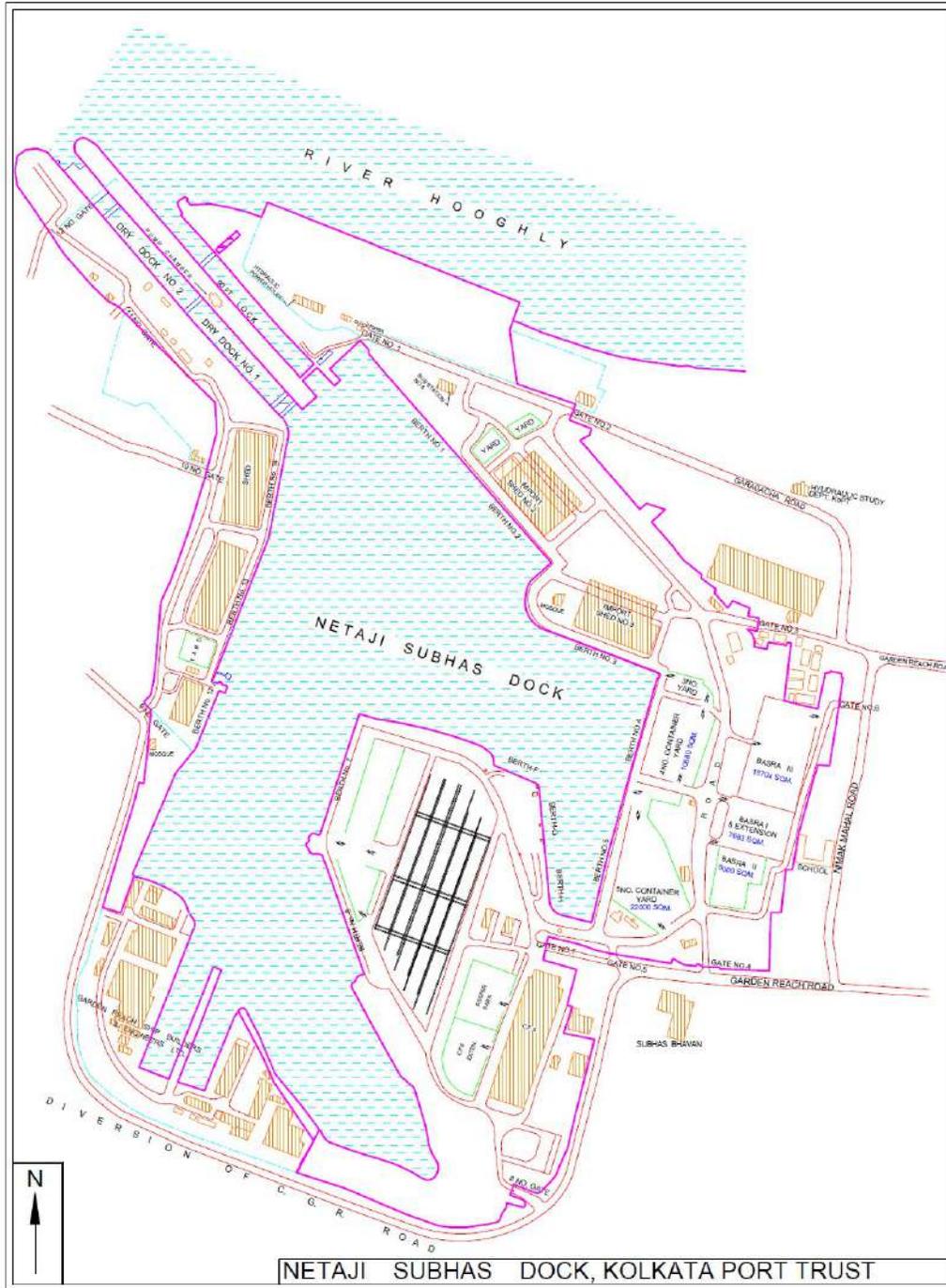


Figure 1.2: NSD Layout

**1.1.3.2 Berth wise specification and Storage Shed details**

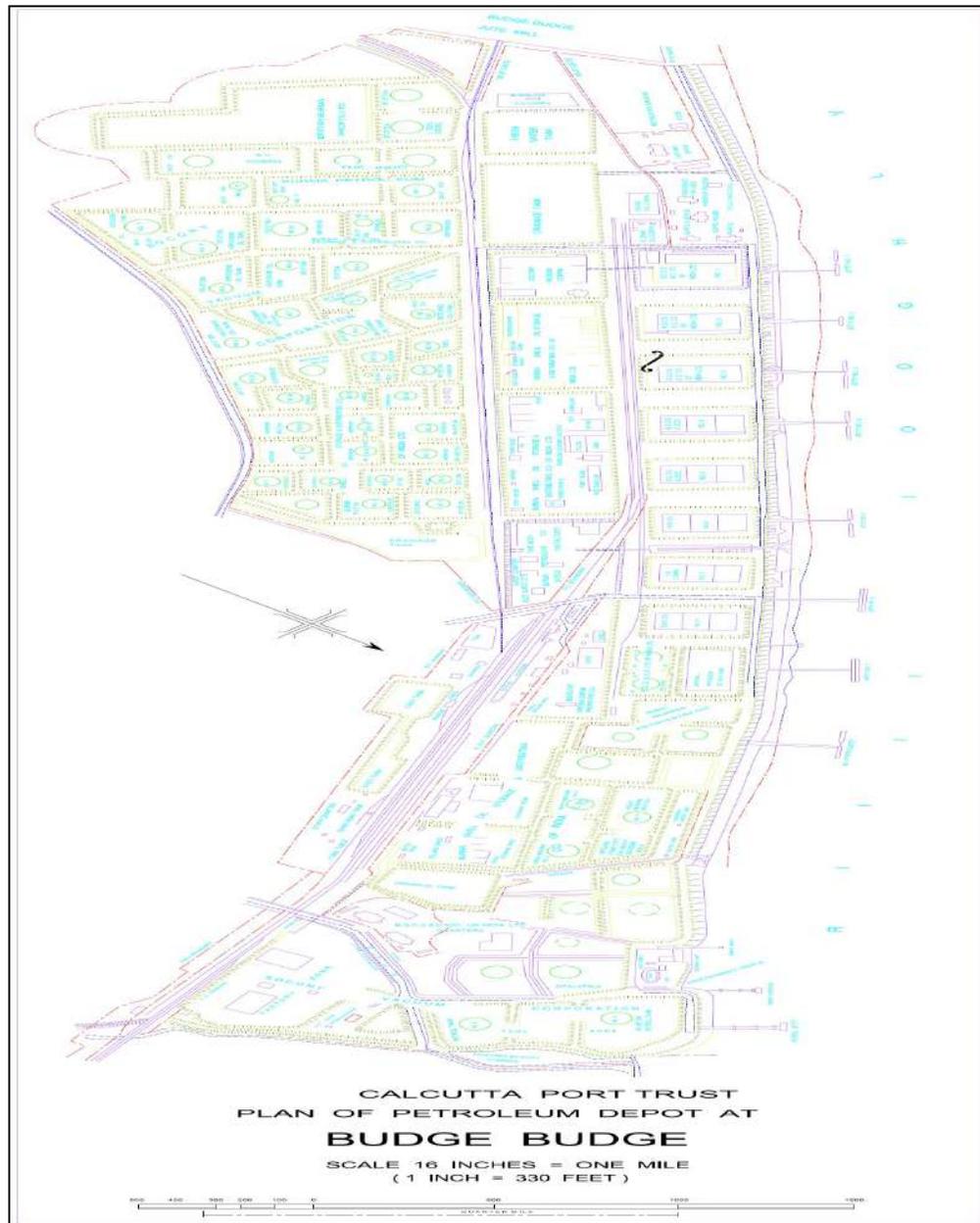
Sr. No	Name of Berth	Type of Berth	Actual depth (m)	Quay length (m)	Maximum length of vessel that can be accommodated	Shed	
						Covered (sqm)	Open (sqm)
1	1	General Cargo + Heavy Lift	8.2	200	565	-	6000
2	2	General Cargo	8.2	187	565	11757	3831
3	3	Container	8.7	183	565	-	3600
4	4	Container	8.6	181	565	-	3400
5	5	Container	8.6	182	565	-	11000
6	7	Container	8.7	192	550	-	50000
7	8	Container	8	225	507	-	-
8	12	Liquid	8	152	500	-	-
9	13	General Cargo	8.4	174	565	-	1278
10	14	General Cargo	7.2	174	540	-	2555

**Table 1.3:** Berth wise specification

### 1.1.4 Budge-Budge Oil Jetties

Budge-Budge is located about 25 km downstream of Kolkata. There are 6 jetties of different sizes with associated storage facilities as shown in **Figure 1.3**. Details of these jetties and the associated storage facilities are given in **Table 1.4**.

#### 1.1.4.1 Layout



**Figure 1.3:** Layout of Budge-Budge Oil Jetties

**1.1.4.2 Jetty Facilities**

Jetty No.	Length (m)*	Commodity handled
1	189	POL, Vegetable Oil & other liquid
2	102	
3	163	
5	189	
7	189	
8	189	

\* Length mentioned in this Table refers to the maximum length of the vessel that can be berthed at these jetties

**Table 1.4:** Jetty Facilities**1.1.5 Dry Dock Facilities**

KDS has five dry docks inside the impounded dock system to cater to the repair and maintenance of the vessels. The details are as follows:

Dry Dock	Maximum size of vessels
N.S. Dry Dock no.1 & 2	172.21m*22.86m
K.P. Dry Dock no.1	160.02*19.5m
K.P. Dry Dock no.2	142.95m*19.5m
K.P. Dry Dock no.3	102.1m*14.63m

**Table 1.5:** Dry Dock facilities**1.1.6 Cargo Handling Equipment**

KDS has self-owned as well as hired equipment for cargo handling (Table 1.5).

Self- owned equipment	Quantity/Capacity
Mobile crane	1 no. -9 T 1 no. -10 T 2 no. - 13 T 3 no. – 30 T
Wharf Crane	1 no. – 200 T
Fork Lift Truck	10 no. – 3 T 1 no. – 2 T
Tractor	8 no. – 20 T
Reach Stacker	3 no. – 45 T
Rubber Tyred Gantry Cranes	3 no. – 35.5 T 1 no. – 40 T
Trailers	24 no. – 10 T 4 no. – 20 T 2 no. – 25 T 2 no. – 35 T 19 no. – 40 T 6 no. – 20 T

**Table 1.6:** Cargo Handling Equipment / Facilities

**1.1.7 Navigational Facilities**

SMP maintains two approach channels from sea one via Eastern channel for vessels visiting to KDS and the other via Western channel / EDEN for vessels visiting to HDC as shown in **Figure 1.4**.

The pilotage distance to KDS is 223 km comprising 148 km of river and 75 km of sea pilotage. Remote pilotage assistance is provided through VTMS during the sea passage of the vessels in both the channels.

The channels are well marked with nearly 125 light vessels / lighted buoys and 500 shore marks. The Centre Pilot Control Station is located on Sagar Island. In addition to the pilot station, SMP maintains a pilot vessel at around Sagar in foul weather. The pilot transfer is undertaken for the pilot station / pilot vessel through dedicated pilot launches. The pilots for KDS vessels board at middle point south of Sagar. For the outward passage the same process is used in a reverse order.

Being a riverine port with numerous sand bars (shoals), the advantage of rise of tide is utilized to obtain the maximum draft for shipping. Because of the sharp bends in the river the length of the vessel is restricted to 172 m at Kolkata and 189 m at Budge-Budge. Due to the nature of river and the shifting of sand taking place regularly inside the channels regular hydrographic surveys are done to confirm the depth and width of the channel.

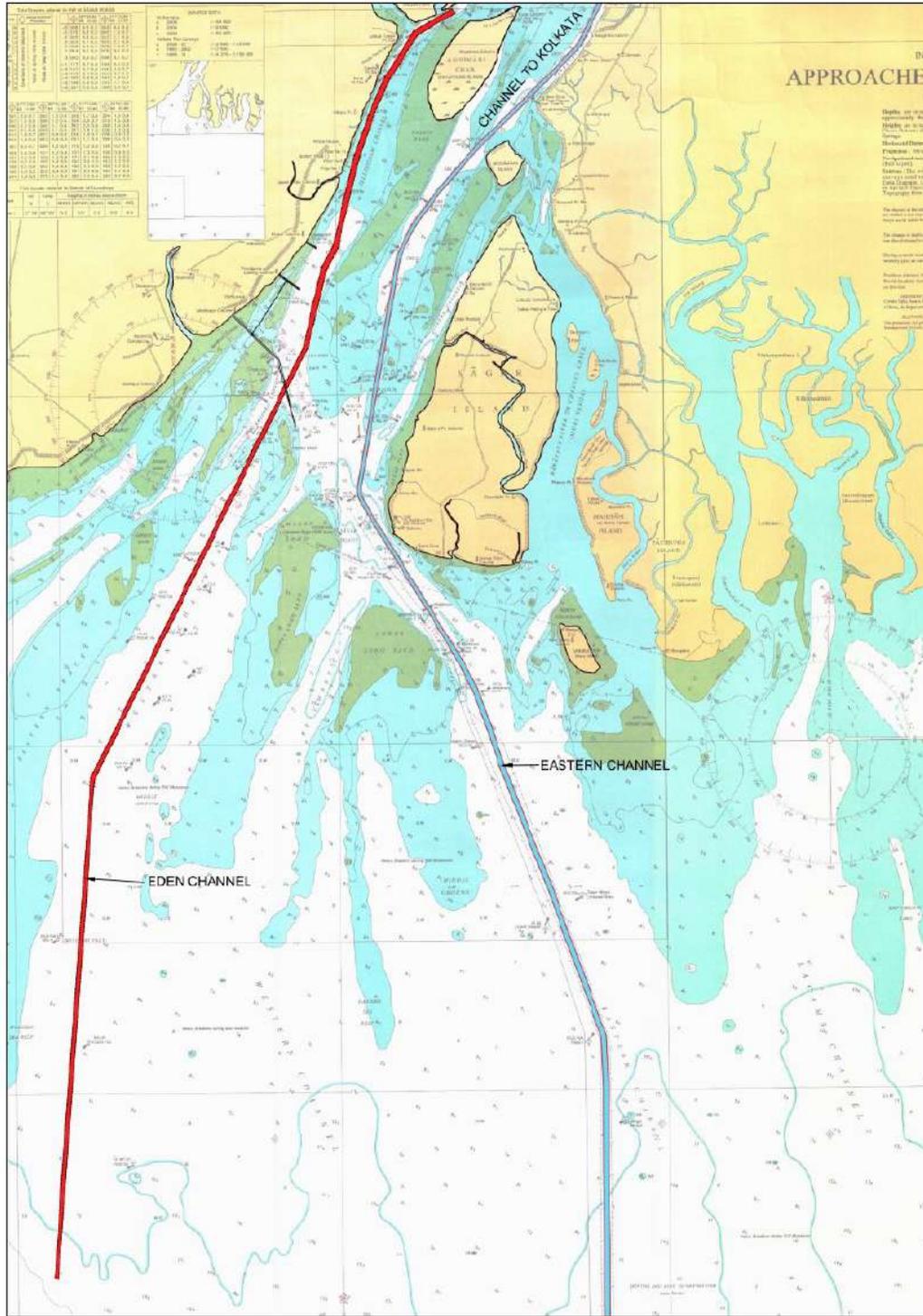


Figure 1.4: Navigational Channel layout

### 1.1.7.1 Navigational Aids

#### 1.1.7.1.1 Lighthouse

Sagar Lighthouse (21°39'N 88°03'E) is situated at Middleton Point on the Sagar Island which is about 1.5 km inshore. It is visible from a distance of 28 km in clear weather.

Dariapur Lighthouse (21°47'N, 87°52'E) is situated on the right bank of Hooghly River south of Rasulpur River and is about 2.7 km inshore. It is visible from a distance of 35 km in clear weather.

#### 1.1.7.1.2 Light Vessels

There are five unmanned light vessels to aid in navigation and these are located at following locations:

- U.G.L.F. at 21°29'57"N, 88°06'37.5"E;
- L.G.L.F. at 21°21'57"N, 88°10'05"E;
- Talent WK Light vessel at 21°17'21"N, 88°11'17"E;
- Eastern Channel Light vessel at 21°04'19"N, 88°11'07"E;
- Western Channel Light vessel at 21°05'002"N, 87°50'24.8"E.

#### 1.1.7.1.3 Port Flotilla and Other Crafts

There are nine tugs of different capacity with the port (**Table 1.7**). Apart from tugs, port has one grab dredger, one anti-pollution vessel and two multi-purpose launches. Port also engages private dredgers on contract basis for dredging the channel.

Number	Type
1	22 T Bollard Pull
1	32 T Bollard Pull
3	30 T Bollard Pull
2	45 T Bollard Pull
2	35 T Bollard Pull

**Table 1.7:** Details of Port Tugs

#### 1.1.7.1.4 River Marks and Buoys

Over 500 (of which 140 are lighted) River Marks and Buoys are maintained by the SMP. These are used in facilitating night navigation, pilotage and dredging. There are 1 boat buoy, 30 lighted buoys and 72 unlit buoys marking the navigational channel from Sandheads to Kolkata.

#### 1.1.7.1.5 Vessel Traffic Management System (VTMS)

Navigational aid information is provided through VTMS for plying vessels. SMP is having VTMS console at Haldia with four X band RADAR and AIS stations at Haldia, Frasergaunj, Dadanpatra and Sagar with communication system, meteorological system, microwave communication link etc.

### 1.1.7.2 Port Channel and turning circle

Entrance Channel			Turning Circle	
Distance from Harbour entrance (in km)	Minimum depth (in m)	Minimum width (in m)	Number	Diameter (in m)
232	2.5	45	2	KPD - 190/ NSD - 228

**Table 1.8:** Port Channel and turning circle

### 1.1.7.3 Anchorage points

In order to handle large vessels with no requirement of pilotage, there are three anchorage points (Inner Sandheads anchorages – NX1, NX2 and NX3) which are 24 nautical miles north of sandheads and 18 nautical miles below the present point ‘X’ anchorage.

NX1, NX2 and NX3 have drafts of 9.5m, 10m and 10.5 respectively and no dimensional (Length or Beam restrictions) constraints of vessels. These anchorages are used for midstream lighterage/ topping up of only cape, baby cape, panamax etc. and not for waiting vessels.

NX1, NX2 and NX3 lies in the eastern channel and are sufficiently clear of the entrance channel, leaving clear passage for the inbound and outbound vessels.

The geographical coordinates are as follows

Anchorage	Position
NX1	Latitude: 21°18'15" N Longitude: 88°13'45" E
NX2	Latitude: 21°16'45" N Longitude: 88°14'00" E
NX3	Latitude: 21°15'30" N Longitude: 88°14'00" E

**Table 1.9:** Anchorage points

### 1.1.8 Stakeholders

1. Port Authority,
2. Ship owners and operators,
3. Container Terminal operators,
4. Liquid Cargo operators,
5. Solid Bulk Cargo Operators,
6. Stevedoring companies,
7. Rail carriers/operators,
8. Truck and Shipping companies,
9. Contractors to support the day- to- day activities of the port,
10. Govt. of West Bengal – River Transport dept. and district agencies including marine police, etc.

### 1.1.9 Meteorological Parameters

#### 1.1.9.1 Climate

The climate of the West Bengal is tropical having four well-marked seasons, i.e., summer (March – May); monsoon (June – September); post monsoon (October – November); winter (December – February).

**1.1.9.2 Visibility**

Due to heavy rainfall poor visibility is reported during the southwest monsoon. On an average, fog is reported on 5-7 days in each month from November to February during morning hours.

**1.1.9.3 Temperature**

The month of May is the hottest, whereas December and January are colder months for Kolkata. According to the IMD data, the highest temperature recorded is 40.6°C at Kolkata while 36.1°C at Sagar Island. The lowest temperatures were observed to be 9.7°C for Kolkata.

**1.1.9.4 Rainfall Data**

The region is mainly exposed to Southwest monsoon from June to September and an annual rainfall of more than 1700 mm were reported. The IMD data suggests that the months of July and August are the wettest months having monthly rainfall of more than 350 mm. During northwest monsoon from November to March, monthly average rainfall of less than 50 mm is experienced.

**1.1.9.5 Tides**

Manual tidal gauges are maintained at Akra, Mayapur, Hooghly point, Balari, Gangra and Sagar for displaying rises of tide for the convenience of various vessels navigating, dredging and surveying in river Hooghly.

The tides details at Kolkata are as follows:

- Highest High-Water Level (HHWL): + 7.70 m CD
- Mean High Water Springs (MHWS): +5.62 m CD
- Mean High Water (MHW): +5.01 m CD
- Mean Low Water Springs (MLWS): +0.71 m CD
- Local Mean Water level (LMWL): + 3.19 m CD
- Mean Low Water Neaps (MLWN): +2.00 m CD
- Mean Low Water (MLW): 1.68 m CD
- Mean Low Water Springs (MLWS): + 1.41 m CD
- Lower Low Water (LLW): + 0.14 m CD

**1.1.9.6 Wind**

The predominant wind direction reported at Alipur, Kolkata and Sagar Island, is from south and southwest. About 25 % of the time wind was reported to be blowing from north and northeast. The highest wind speed of 16 knots was reported in the month of May. During the months of April to August wind speed was found to be higher than 10 knots.

**1.1.9.7 Currents**

The coastal currents that are prevalent along the West Bengal coast are of two types. The northerly drift – during the months of May to October and the southerly drift-during November to March.

**1.1.9.8 Waves**

Wave heights are in the range of 1.5m to 3.5m (INCOIS – 2017-2018 data).

**1.1.10 Meteorological Observatory**

Meteorological Observatory receive forecast for Rainfall, Cyclone, and Wind warnings from Regional Meteorological Centre (RMC) - Kolkata.

Meteorological Observatory provides data on Pressure, Temperature, Humidity, Rainfall, Wind Speed and Direction and Tide level.

**1.2 RATIONALE****1.2.1 International Framework****1.2.1.1 Sendai framework for Disaster Risk Reduction (SFDRR- 2015-2030)**

The Post-2015 goals and agenda are set forth in the three landmark global agreements reached in 2015 – the Sendai Framework for Disaster Risk Reduction (Sendai, Japan, March 2015), Sustainable Development Goals (UN General Assembly, New York, September 2015) and Climate Change Agreement (Conference of Parties, COP21, Paris, December 2015). The three documents set the stage for future global actions on DRR, sustainable development and climate change.

**1.2.2 National Framework****1.2.2.1 Disaster Management Act, 2005;**

The Disaster Management Act, 2005 (DM Act 2005) lays down institutional and coordination mechanism for effective Disaster Management (DM) at the national, state, district and local levels. As mandated by this Act, the GoI created a multi-tiered institutional system consisting of the National Disaster Management Authority (NDMA) headed by the Prime Minister, the State Disaster Management Authorities (SDMA) headed by the respective Chief Ministers and the District Disaster Management Authorities (DDMA) headed by the District Collectors/ District Magistrate and co-chaired by Chairpersons of the local bodies.

**1.2.2.1.1 The Disaster Management Act 2005, Section 36**

This section of the act lays down the primary responsibility of ministries in the GoI and departments with respect to institutional framework for prevention and mitigation of disasters, allocating sufficient funds and other resources to the National and State government agencies.

**1.2.2.1.2 The Disaster Management Act 2005, Section 37**

This section of the act lay down the primary responsibility of ministries in the GoI and departments with respect to preparation of Disaster Management Plan, their review, Updation and its approvals. Measures for financing the activities within the plan are also required to be spelled out in the plan.

**1.2.2.1.3 The Disaster Management Act 2005, Section 41**

This Act specifies the function of local authorities with regards to Disaster Management.

It includes the following functions:

- Ensure that its officers and employees are trained for disaster management;
- Ensure that the resources relating to DM are so maintained as to be readily available for use in the event of any threatening disaster situation or disaster;

- Ensure all construction projects under it or within its jurisdiction conform to the standards and specifications laid down for prevention of disasters and mitigation by National Authority, State Authority and District Authority;
- Carry out relief, rehabilitation and reconstruction activities in the affected area in accordance with the State Plan and District Plan.

#### **1.2.2.2 National Disaster Management Plan – 2019;**

The National Disaster Management Plan (NDMP) provides a framework and direction to the government agencies for all phases of disaster management cycle. The NDMP is a “dynamic document” in the sense that it will be periodically improved keeping up with the emerging global best practices and knowledge base in disaster management. It is in accordance with the provisions of the DM Act 2005, the guidance given in the National Policy on Disaster Management (NPDM) 2009, and the established national practices.

#### **1.2.2.3 NDMA suggested framework – 2019;**

##### **1.2.2.4 Prime Minister of India – Ten-Point Agenda for Disaster Risk Reduction**

1. All development sectors must imbibe the principles of disaster risk management
2. Risk coverage must include all, starting from poor households to SMEs to multi-national corporations to nation states
3. Women’s leadership and greater involvement should be central to disaster risk management
4. Invest in risk mapping globally to improve global understanding of Nature and disaster risks
5. Leverage technology to enhance the efficiency of disaster risk management efforts
6. Develop a network of universities to work on disaster-related issues
7. Utilize the opportunities provided by social media and mobile technologies for disaster risk reduction
8. Build on local capacity and initiative to enhance disaster risk reduction
9. Make use of every opportunity to learn from disasters and, to achieve that, there must be studies on the lessons after every disaster
10. Bring about greater cohesion in international response to disasters

#### **1.2.2.5 Indian Ports Act, 1908 and amendment;**

#### **1.2.2.6 Merchant Shipping Act, 1958 and amendment;**

#### **1.2.2.7 Major Port Trust Act, 1963 and amendment;**

#### **1.2.2.8 Calcutta Port Rules, 1994 and amendment;**

#### **1.2.3 Legal provisions and its amendment to regulate Fire and Chemical risk in industries**

1. Explosives Act, 1884;
2. Petroleum Act, 1934;
3. Factories Act, 1948;
4. Insecticides Act, 1968;
5. Environment Protection Act, 1986;

6. Motor Vehicles Act, 1988;
7. Public Liability Insurance Act, 1991;
8. Dock Workers Act, 1986;
9. Other relevant rules and its amendments
  - NDMA guidelines on Chemical Disaster, 2007;
  - NOSDCP, 2015;
  - MSIHC Rules, 1989;
  - Chemical Accidents (Emergency Planning Preparedness and Response) Rules, 1996;
  - SMPV Rules, 1981;
  - CMV Rules, 1989;
  - Gas Cylinder Rules, 2016;
  - Hazardous Waste Management Rules, 2016.

#### **1.2.4 Safety initiatives to address Natural Disasters**

NDMA guidelines on Disasters like Wind & Cyclone, Tsunami, Earthquake and Floods Management are relevant and these have been prepared to provide the directions to ministries, departments and state authorities for the preparation of their detailed Disaster Management Plans.

### **1.3 SCOPE OF THE PLAN**

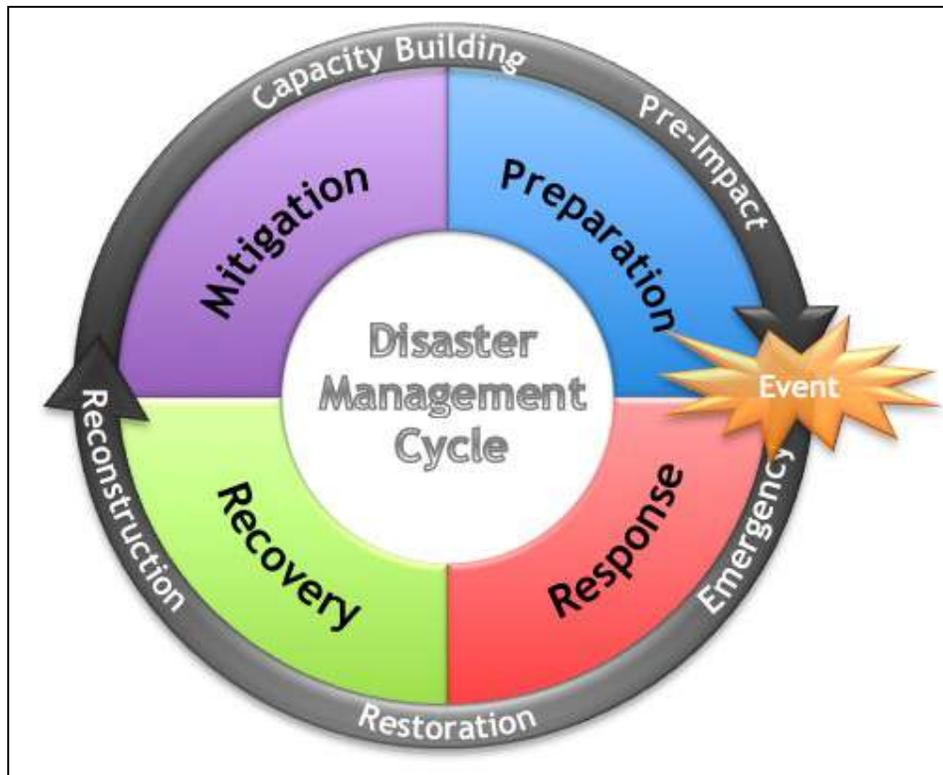
#### **1.3.1 Aim and Objective**

This plan reflects the commitment to the safety of employees and increases the organizational safety awareness. It defines the roles and actions necessary to prepare for and respond to any disaster situation in a coordinated manner. Thus, minimize or avoid the potential losses from hazards and disasters caused due to human, technical or natural phenomena inside the Port and Port water limits, through the implementation of rapid, effective and appropriate response & recovery procedures.

DMP is intended to provide guidance to all concerned departments within the port with a general concept of potential emergency assignments before, during and following emergency situations in accordance with the priorities of SENDAI framework.

#### **1.3.2 Disaster Management Cycle**

Based on the culture of prevention and mitigation following a disaster or near disaster event, the capacity building measures are institutionalized.



**Figure 1.5:** Disaster Management Cycle

The primary objectives of the DMP are to:

- a. To contain and control the emergency incidents,
- b. Proactively safeguard the lives of the port employees, contractors, stakeholders, visitors and neighboring population,
- c. Mitigate the effect and minimize the damage to the environment,
- d. Limit damages of port assets,
- e. To ensure that the port responds according to the priorities set by the Chief Incident Controller (CIC) during response operation,
- f. Safely restore operations back to normal as quickly as possible after occurrence of any accident, to enable business to be resumed at the earliest,
- g. To initiate off-site emergency plan in-case of necessity as and when required.

The scope covers –

- The existing preventive and mitigation measures besides those that are additionally required to reduce the risk in time bound manner;
- Identification of potential scenarios that are likely to occur considering risk profile of port;
- the preparedness to develop plans for actions when disaster or emergencies occur;
- the responses that mobilize the necessary emergency services including responders like fire service, police service, medical service including ambulance, government as well as non-governmental agencies;
- the initiation of off-site emergency plan, should the situation escalate to call for support of civic administrations (district and/or state) and their resources;

- the post disaster recovery with aim to restore the affected area to its original conditions.

#### **1.4 VISION**

"To build, operate and maintain a safer and disaster resilient Port by a holistic, proactive, technology driven and sustainable development strategy that involves all stakeholders and fosters a culture of prevention, preparedness and mitigation"

#### **1.5 TIME FRAMES**

Port is committed to establish required timeframes for capacity building, introducing research and experienced based steps for prevention and mitigation in accordance with SENDAI framework (2015-2030). As part of the effort to institutionalize such timeframes, Hazard specific thematic areas and their timeframes have been tabulated in paragraph 3.2.

Timeframe as per NDMP considered in paragraph 3.2 are as below:

<b>Short Term</b>	Two years
<b>Medium Term</b>	Two to five years
<b>Long Term</b>	Ending up to 2030

## 1.6 INSTITUTIONAL FRAMEWORK FOR DISASTER MANAGEMENT

### 1.6.1 National Level

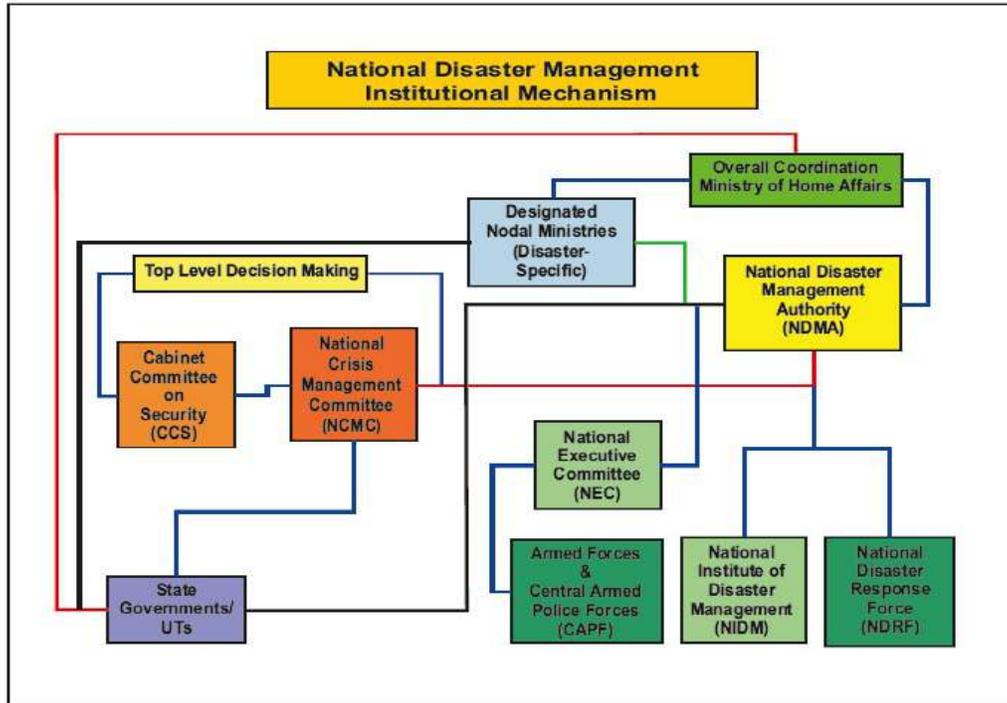


Figure 1.6: National –level disaster management – basic institutional framework

### 1.6.2 State Level

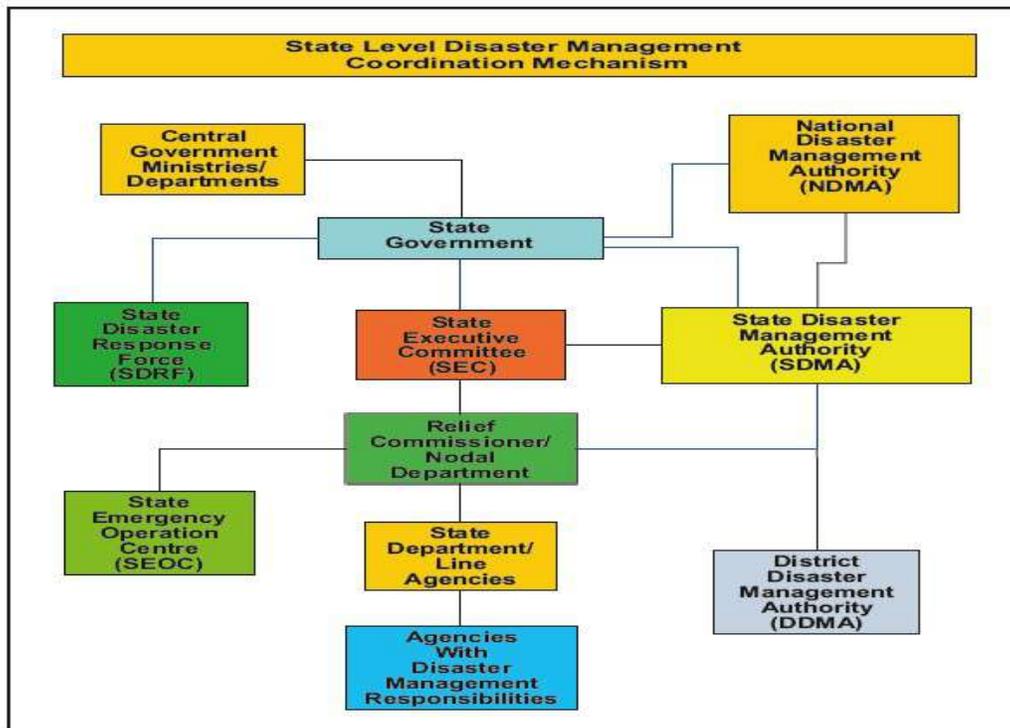


Figure 1.7: State –level disaster management – basic institutional framework

**1.6.3 District Level**

The DDMA will be headed by the District Collector, Deputy Commissioner, or District Magistrate of Kolkata/South-24 Parganas District as the case may be, with the elected representative of the local authority as the Co-Chairperson.

**1.6.4 On-site Emergency response team- KDS**

Team will be headed by the CIC with the elected representative of the Port department and various functional heads of stakeholders.

Refer **Figure 1.8 and Figure 1.9** for Onsite and Offsite Emergency Organization Chart.

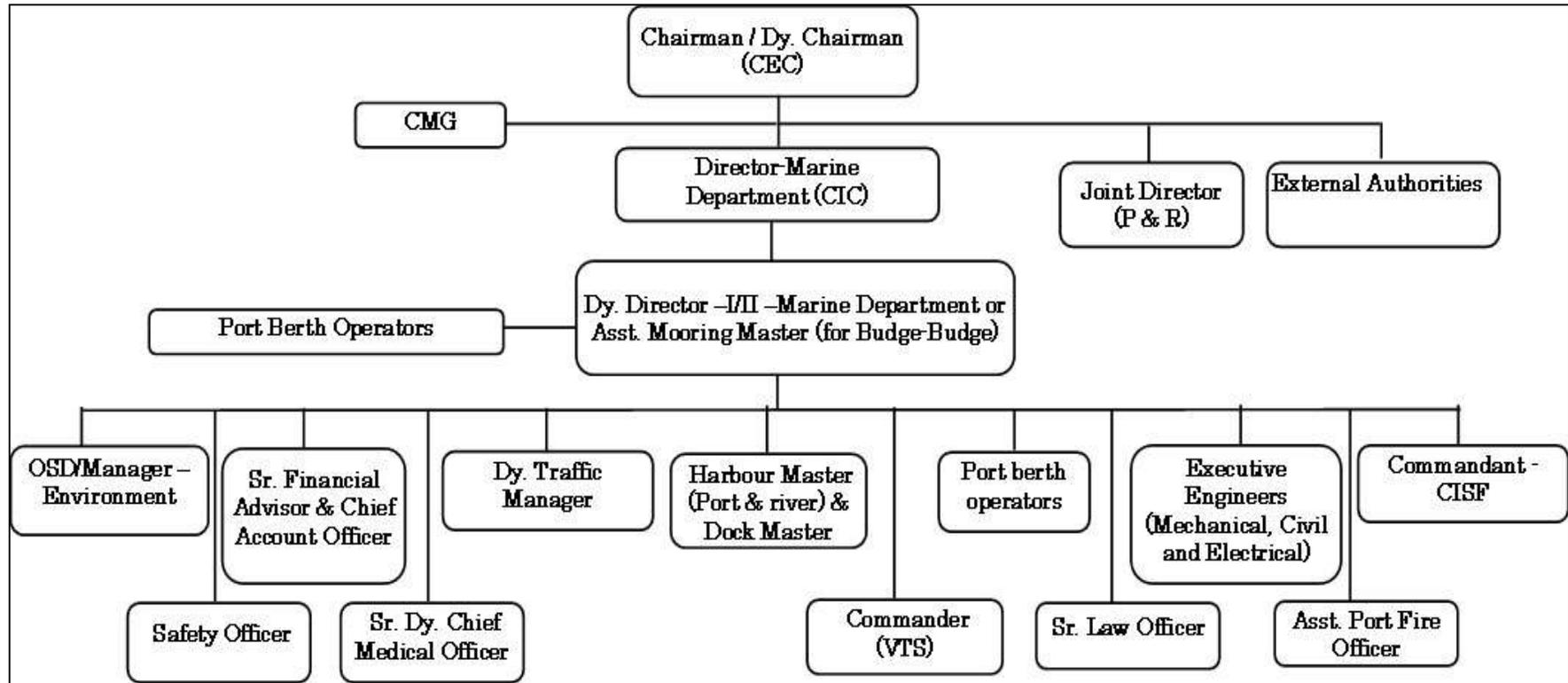


Figure 1.8: On-Site Emergency Organization Chart



## 2. HAZARD, RISK, VULNERABILITY & CAPACITY ANALYSIS

### 2.1 DISASTER RISKS, VULNERABILITIES AND CHALLENGES

#### 2.1.1 Disasters Classification (as per NDMA)

- Man-Made Disasters
  - Chemical
  
- Natural Disasters
  - Wind and Cyclone
  - Flood
  - Earthquake
  - Tsunami

##### 2.1.1.1 Chemical Disaster (Fire/Explosion/Toxicity)

Chemical disasters may be traumatic in their impacts on human beings and may have casualties and also damages nature and property. The elements which are at highest risks due to chemical disaster primarily include the Port, its employees & staff, adjacent industries, hazardous chemicals vehicles, the residents of nearby settlements, adjacent buildings, occupants and surrounding community.

Chemical disasters may arise in number of ways, such as:

1. Process and safety systems failures
  - Human errors
  - Technical errors
  - Management errors
2. Induced effect of natural calamities
3. Accidents during the land transportation (Loading/Unloading/Pipeline/Tank truck/Rail) and sea transportation
4. Hazardous waste processing/ disposal
5. Terrorist attack/ unrest leading to sabotage.

##### 2.1.1.2 Wind and Cyclone

Cyclones can cause damage to port infrastructures including damage to mangroves, trees and flooding of low line and poor drainage affected areas. In addition, ships in the harbor can also sustain serious damage and grounding.

Cyclones are classified by

- Strength of associated winds,
- Storm surges
- Exceptional rainfall occurrences.

Type of Disturbances	Wind Speed in km/h	Wind Speed in Knots
Depression	31-49	17-27
Deep Depression	49-61	27-33
Cyclonic Storm	61-88	33-47
Severe Cyclonic Storm	88-117	47-63
Super Cyclone	More than 221	More than 120
<b>1 knot - 1.85 km per hour</b>		

**Table 2.1:** Wind speed Criterion for deep depression and cyclonic storm

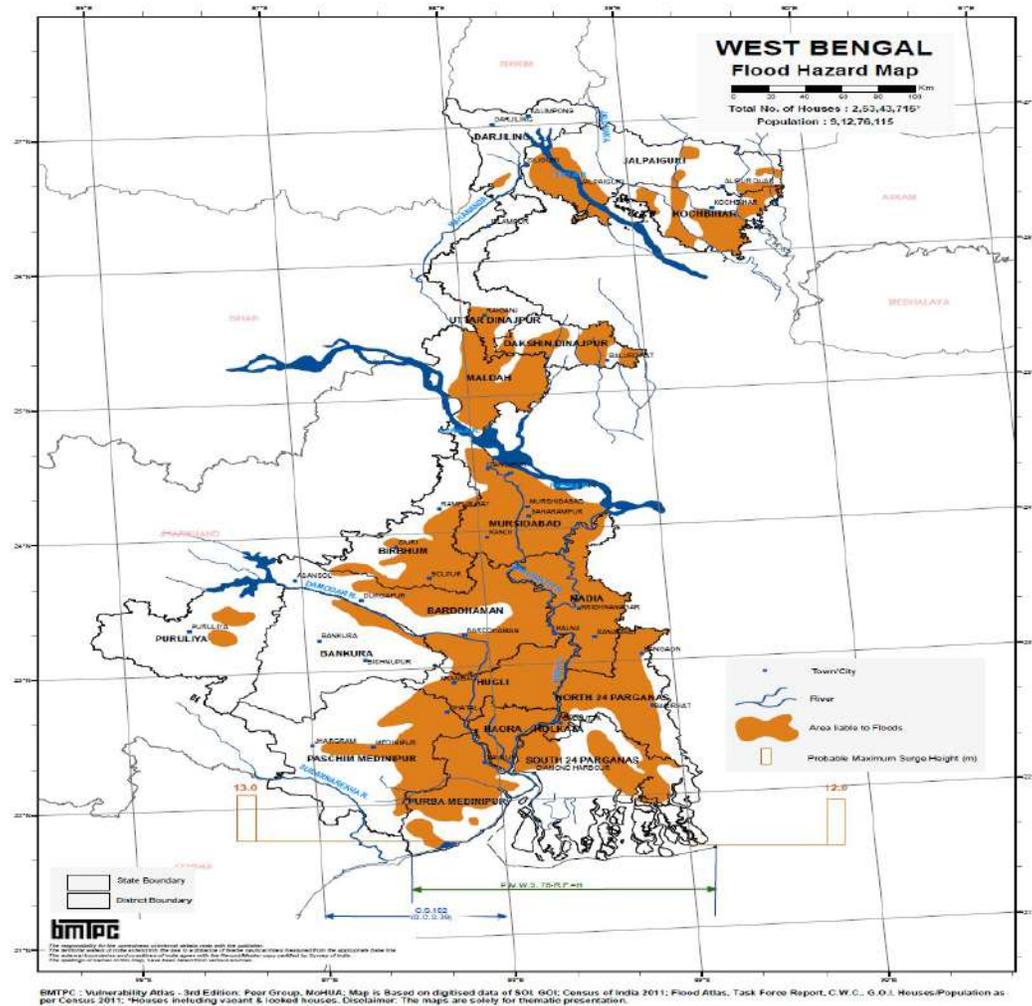
*The east coast of India is prone to frequent cyclones, storm surges and floods.* Major damage is resulted due to the inundation caused by the combined effects of tides, waves and storm surges, as compared to the damage occurs from the strong winds. Occurrence of storms and depressions in the Bay of Bengal is very high during October and November. It is also high during southwest monsoon. The initial movement of the cyclones is towards north westerly/westerly direction, but occasionally they change their direction and move in a north-easterly direction (generally referred to as re-curvature of a cyclone). This re-curvature of cyclones takes place during April-May and October-November months.

In accordance with national and regional hazard map available with BMTPC the Kolkata and South-24 Parganas district falls under *very high damage risk zone (max. wind speed of 50 m/s)*.



**2.1.1.3 Floods**

Due to its geographical situation, the Kolkata and South-24 Parganas districts are **highly vulnerable to occurrence of Flood**.



**Figure 2.2:** Flood Hazard Map (Source: BMTPC, India)

**2.1.1.4 Earthquake**

Kolkata and South-24 Parganas district districts fall under **Moderate earthquake damage Risk zone (zone category III)**.

Class	Richter Scale
Great	8 or more
Major	7-7.9
Strong	6-6.9
Moderate	5-5.9
Light	4-4.9
Minor	3-3.9

**Table 2.2:** Classification of Earthquakes

The offices, utility buildings and berthing structures including cranes are required to be constructed for damage zone III. The relevant BIS standards are as follows:

- a) For office and other utility buildings (IS 1893:2016)
- b) For berthing structures (IS 1893:2002).

Some infrastructure has deteriorated with time due to wind weather effects and aging. A time bound strategy will be undertaken by the port to assess the condition and strengthening of the older buildings and quay side structures that might be affected. This also applies to quay cranes and RMGs.

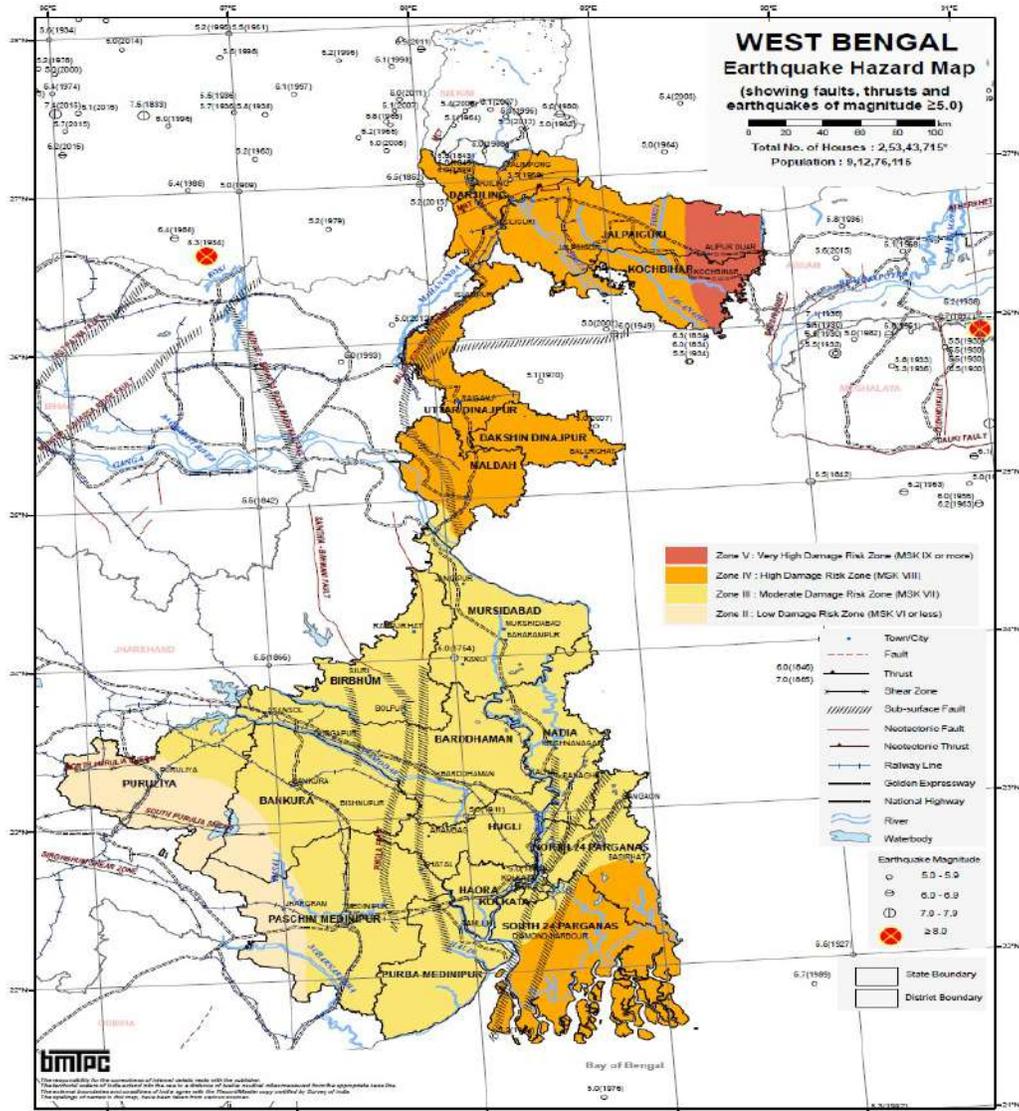


Figure 2.3: Earthquake Hazard Map (Source: Vulnerability Atlas of India)

2.1.1.5 Tsunami

An Early Warning System for information related to earthquakes and generation of tsunami has been created under the Ministry of Earth Science, GOI.

A network of tsunami coastal stations has been setup which relay information to the center via satellites.

INCOIS provides such data to port on a regular basis. Hence, adequate early warning will be available to the port. Necessary evacuation measures and provision of tsunami shelters will be provided.

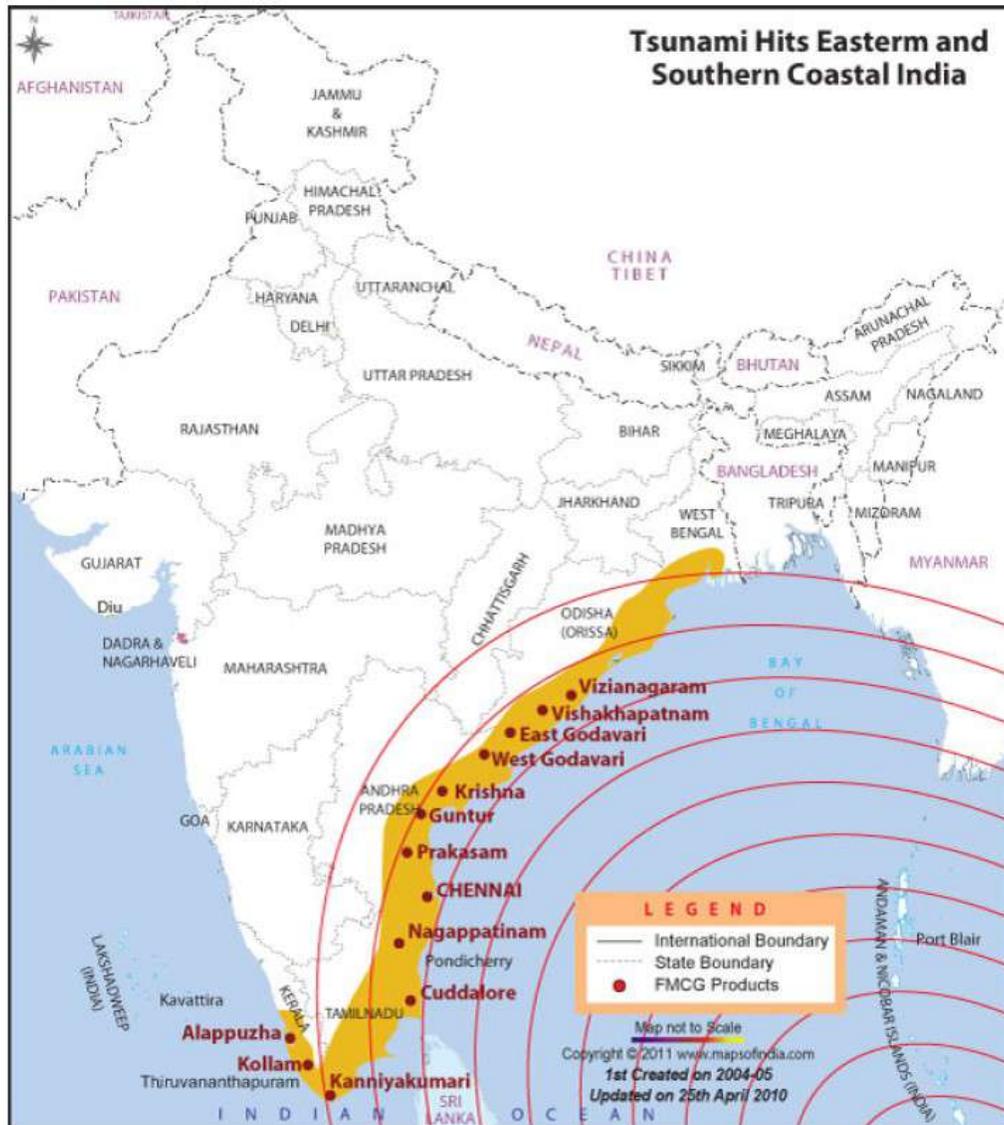


Figure 2.4: Tsunami (Source: West Bengal Disaster Management and Civil Defence Department Website)

## 2.2 UNDERSTANDING DISASTER RISKS

### 2.2.1 Navigational Risk

In view of the complex nature of the navigational operations connected with pilotage of ships inside the narrow channel and their traffic regulation by VTMS, weather variations including tidal windows etc., berthing complexities, turning circles and usage of tugs; HAZID workshop (Refer **Appendix A**) with various stakeholders connected to marine department was carried out. As a result, a better understanding of navigational risk was achieved.

Potential scenarios considered in this plan are as follows:

**Scenario 1:** Collision with small craft - Tanker / Container/ Bulk Carrier/Barge (Area B)

**Scenario 2a:** Collision between two vessels (Area A)

**Scenario 2b:** Collision between two vessels (Area B)

**Scenario 3:** Tanker /Container/ Bulk Carrier berthing - Contact with jetty/berth/wharf (Area C and Budge-Budge Wharf)

**Scenario 4:** Grounding- Tanker/Container/ Bulk Carrier –Pilot On-board (Area B)

**Scenario 5:** Grounding- Tanker/Container/ Bulk Carrier–Pilot not on-board (Area A)

**Scenario 6:** Collision of vessel with dredger (Area A, B)

**Scenario 7:** Dragging anchor (River and sea anchorage) (Area A, B)

**Scenario 8:** Contact with channel and river marking buoys/light vessels (Area A, B)

**Scenario 9:** Contact/Allision with Lock Gate (KPD & NSD) (Area C)

**Scenario 10a:** Fire on vessel in the river and approach channel (Area A and B)

**Scenario 10b:** Fire on vessel in the berth/jetty.

#### Note:

**Area A:** Approaches to Kolkata port (East anchorage to Middleton pilot boarding point);

**Area B:** River passage area (from Middleton to Garden reach anchorage or Budge-Budge wharf, anchorage to lock gate);

**Area C:** Lock gate to berth.

### 2.2.2 Chemical Disaster (Fire / Explosion/Toxicity) Risks

These can be caused due to loss of containment of hazardous cargo (MS, Toluene, Xylene, Naphtha, ATF, MTBE etc.) handled at a Port – Budge-Budge Oil Jetties.

Consequence Assessment using software analysis has been carried out for the following scenarios. The impact zone results are placed in **Appendix C**.

Sr. No.	Cargo handling activity	Location	Chemical leakage scenario
1.	MS unloading and transfer to terminal	Oil Jetty	Small, Large and Full-Bore Rupture of unloading hose and transfer pipeline.
2.	Naphtha, ATF unloading and transfer to terminal	Oil Jetty	Small, Large and Full-Bore Rupture of unloading hose and transfer pipeline.
3.	Toluene unloading and transfer to terminal	Oil Jetty	Small, Large and Full-Bore Rupture of unloading hose and transfer pipeline.
4.	Xylene unloading	Oil Jetty	Small, Large and Full-Bore Rupture of

	and transfer to terminal		unloading hose and transfer pipeline.
5.	MTBE unloading and transfer to terminal	Oil Jetty	Small, Large and Full-Bore Rupture of unloading hose and transfer pipeline.

**Table 2.3:** Potential Scenarios for liquid bulk cargoes

Mutual Aid Agreement between SMP-Budge-Budge and industries for fire and chemical disaster are in place. Joint drills with all stakeholders are carried out periodically.

The shortfalls and gaps if any in these areas will be addressed through time bound measures as given in the hazard specific measures (Refer para 3.2).

### **2.2.3 Oil Spill Disaster Risk**

An Oil Spill Contingency Plan (OSCP) in accordance with the requirements of National Oil Spill Disaster Contingency Plan (NOS-DCP) will be applicable in case of an oil and chemical spill disaster.

Collision and Grounding of ships as described in para 2.2.1 above have the secondary risk potential for causing oil spills of magnitude of Tier 1 (700 tonnes) and above. For oil spill trajectory analysis Refer **Appendix B**.

### **2.2.4 Natural Disasters Risk**

In view of the historical records and HRVCA profile of the port the following natural disasters are considered for the preparation of the action-plans and their implementation.

1. Wind and Cyclone
2. Flood
3. Earthquake
4. Tsunami

The port is committed to update plans for the above mentioned geological and meteorological disasters on a periodical basis. Such updates include preparation/updation of SOPs, structural assessments, project planning, environmental and utility management and provision of emergency equipment. These steps will highlight the strengths and weakness of capabilities, thus creating resilience. The remedial steps if any will form part of institutional capacity building as described in chapter 3 and contained in the paragraph 3.2 of hazard specific preventive and mitigative measures.

### **2.2.5 CBRN/ Terrorism risk**

Considering the threats of nuclear / radiological risk due to concealment of cargoes and mis-declaration, the port will take actions as directed by Ministry of Ports, Shipping and Waterways and equipment and capability provided within the ambit of such directives.

### 2.2.6 Vulnerability & threat matrix

An assessment of vulnerabilities and threats were carried out and a representative matrix was prepared depicting the vulnerability as low, moderate and high categories for various operational areas inside the port limit.

Threats →	Vulnerable Areas ↓	Vessel Accident s: Collision / Grounding/ Fire/ Explosion	Land Transport: Personnel Accident: Rail Road	Fire & Explosion Manifold / Pipeline/ hose	Toxic Gas Leakage: Pipeline/ Manifold/ hose	Pollution: Oil/ Chemical	Technical Failures: Power/ Transport/ Communication/ Infrastructure	Cyclone - Floods	Tsunami Earth Quake
<b>VESSEL MOVEMENT</b>									
	Approach Channel	xxx	-	-	-	xx	x	xx	x
	Turning Basin (KDS and NSD)	x	-	x	-	x	x	xx	x
	Berths (KDS and NSD)	xx	-	xx	xx	xx	x	xx	x
	Oil Berth (NSD)	xx	-	xx	xx	xxx	x	xx	x
	Oil Jetties (Budge-Budge)	xx	-	xxx	xxx	xxx	x	xx	xx
	Lock Gate	x	-	x	x	x	x	xx	x
<b>STORAGE-TRANSFER</b>									
	Coal stack yards	-	x	xx	-	-	x	xx	x
<b>CARGO TRANSFER</b>									
	Pipe lines	-	-	xxx	xx	xx	xx	xx	xx
	Trucks/Mobile equipment	-	xx	x	-	x	x	xx	xx
	Cranes & Ship Loaders	-	xx	-	-	-	x	xx	xx
<b>SERVICES</b>									
	Control gates	-	x	x	-	-	x	x	x
	Electric Substations	-	-	x	-	-	x	x	x
	Dry Dock	-	-	x	-	-	x	x	x
	Port Fire station	-	-	x	-	-	x	x	x
	Port tugs, crafts, dredger, launchers	x	-	x	-	x	x	xx	x
<b>ADMINISTRATION</b>									
	Buildings	-	-	x	x	-	x	xx	xx

Note: x=slightly vulnerable; xx=moderately vulnerable; xxx=highly vulnerable

**Table 2.4: Vulnerability and Threat Matrix**

**2.2.7 Hazard Assessment worksheet**

The identified hazards have been assessed considering the history of incidents, vulnerability and risk assessment and are placed in the following Hazard Assessment worksheet.

**Table 2.5: HAZARD ASSESSMENT WORKSHEET**

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
<b>DISASTER DURING CARGO STORAGE/TRANSFER</b>																		
1	D	Leakage - Fire/Explosion	Fire /Explosion due to POL/ Chemical leakage at Jetty (NSD Berth 12 and Budge-Budge)	Leakage at the connections of the hose to the manifold, damage to the hose/pipeline, Static Electricity	Standard Operating Procedure, Ship-Shore checklist, Mobile/or fixed fire-fighting system – Manually operated, Portable gas detectors	Minor Damage to vessel &/or other vessels/ Shore structures, injury to personnel	Major damage to shore structures e.g. pipelines etc., Major damage to vessel & pollution, Capsizing & port closure, Fatalities	2	2	1	1	2	4	4	1	3	3	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

*Disaster Management Plan*

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed					Mitigation						
								Most Credible			Worst Credible								
								Impact			Impact								
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency	
2	D	Leakage - Fire/Explosion	Rupture/ leakage of POL/ Chemical Pipeline from Oil Jetties (NSD and Budge-Budge) (Manifold to terminal within port area)	Failure of the equipment, Human error, Falling of Tree or branches on pipelines during operation, Inadequate precautions during maintenance work e.g., pigging, Earthquake.	SOP, work permits, Patrolling of the area, Periodic Inspection and Maintenance of hose/pipeline and equipment	Minor damage to pipeline and shore structures, personal injury.	Major damage to the pipelines and shore structures due to fire and explosion, fatality, oil/ chemical pollution, closure of jetty	1	1	0	1	2	3	3	1	3	3	3	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP
3	D	Corrosive	Corrosive acid (Phosphoric /Sulphuric) leakage at Budge-Budge.	Leakage at the connections of the hose to the manifolds	Standard Operating Procedure, Ship-Shore checklist, Fixed/Mobile fire-fighting system, PPE.	Minor Damage to vessel, Shore structures, minor injury to personnel	Major damage to shore structures e.g., hoses, Major damage to vessel & pollution, Serious injuries to personnel/f atality	1	1	0	1	2	3	2	1	2	3	Report incident to Port and relevant authority, Shipboard EAP, Port DMP	

*Disaster Management Plan*

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed					Mitigation					
								Most Credible			Worst Credible							
								Impact			Impact							
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency
4	D	Toxic	Toxic effects of Toluene, Benzene – leakage from pipeline/ hose during operation at Budge-Budge	Failure of the pipeline, Human error, Falling of Tree or branches on pipelines during operation, NAT-CHEM disaster.	Standard Operating Procedure, Ship-Shore checklist, Fixed/Mobile fire-fighting system - Manually Operated, PPE.	Injury to personnel, Minor environment damage	Multiple fatalities	2	0	1	1	2	4	0	2	3	3	Report incident to Port and relevant authority, Shipboard EAP, Port DMP
5	E	Fire/Leakage	Leakage/ Fire due to Crane Accidents (Container drop/ crane fall)-secondary event (NSD- Container Yard/Berth)	Human Error, Equipment failure.	Overload alarm, Standard Operating Procedure	Minor Damage to container and berth, Injury to personnel	Major Damage to crane, container and berth, Serious injury to personnel/ fatality, Berth closure	1	1	0	1	1	3	3	1	3	3	Report incident to Port and relevant authority, Activation of terminal EAP and port DMP

*Disaster Management Plan*

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed					Mitigation					
								Most Credible			Worst Credible							
								Impact			Impact							
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency
6	F	Fire	Fire in Coal Stack yard (KPD & NSD)	Self-ignition of coal	Manual Sprinkler system, Port Fire Water Tender	Minor damage to property, Minor injury to the person	Major damage to the property (coal), Serious injury to the person	1	1	1	1	1	2	2	3	2	3	Activation of Terminal EAP and port DMP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
<b>NAVIGATIONAL DISASTERS</b>																		
7.1	B	Collision	Collision of Small Craft with Tanker / Container/ BC/Barge (Area B)	Vessel equipment failure/ malfunction (navigational, propulsion, steering, auxiliary, tugs), Human error (pilot, tug master), Language communication issues, Failure to follow Collision Regulations, Environmental conditions (poor visibility, high current flow, unpredicted current eddies, channel size/depth, rough weather, high wind speed)	PMS, Exchange of information between Pilot & Master (Pilot exchange card), Training of personnel and experienced pilots, River marks and buoy, weather monitoring, suspension of vessel movement on increase of wind speed beyond permissible limits.	Avoiding action fails resulting in glancing blow with moderate damage to one or both vessel, Injury to Person	Oil pollution (damage to Flora and Fauna & loss of fishing activity), Fly ash, coal & other hazardous cargo spillage sinking of small craft, Injuries / loss of life, blockage of navigationa l and river channel	1	1	0	1	2	3	4	1	2	3	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
7.2	A	Collision	Collision between two vessels (Area A)	Non-compliance with collision regulation, Human error (fatigue, lack of situational awareness, knowledge etc.), Ship's equipment breakdown, Local congestion and sandbars, difficulty in communication, maneuvering to (dis)embark pilot, Environmental conditions (poor visibility, high current flow, unpredicted current eddies, rough weather, high wind speed).	VTMS, VHF, Pilot information exchange card, Designated anchorage area & designated VHF frequency, Navigational channel is buoyed & well marked, weather monitoring, suspension of vessel movement on increase of wind speed beyond permissible.	Moderate damage to one or both vessel, Delay in berthing, Injuries to personnel, Temporary passage block	Serious damage to vessels and Oil / HNS pollution, Fire and Explosion, Blockage of the navigational Channel, Injuries / Loss of life.	1	2	0	1	3	3	3	2	4	4	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
7.3	B	Collision	Collision between two vessels (Area B)	Non-compliance with collision regulation, Human error (fatigue, lack of situational awareness, knowledge etc.), Ship's equipment breakdown, Local congestion (fishing activity, vessel traffic) and sandbars, Environmental conditions (poor visibility, high current flow, unpredictable current eddies, rough weather, high wind speed) Sharp bends/turns in the river impeding navigation	River marks and buoys, light vessels, Experienced pilots, Training of personnel, PMS, Pilotage information exchange card, Designated anchorage areas, boarding area, designated VHF frequency, Weather monitoring, Suspension of operation on increase of wind speed beyond 25 knots, No night navigation, Proper communication	Moderate damage to one or both vessel, Delay in berthing, injuries to personnel, Temporary channel block	Serious damage to vessels and Oil / HNS pollution (damage to Flora and Fauna & loss of fishing activity), Fire and Explosion, Blockage of the navigation l/river Channel, Injuries / Loss of life.	1	2	0	2	2	3	3	2	4	4	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
7.4	C	Contact	Tanker /Container/ BC berthing - Contact with Jetty/berth/ wharf (Area C and Budge-Budge Wharf)	Vessel equipment failure / malfunction (navigational propulsion, steering or main engine), misjudgment by pilot/Master/tug master, Environmental conditions (poor visibility, high current flow, unpredicted eddies, rough weather, high wind speed), breakdown of tugs, parting of tow line, Inadequate illumination at Berth / Jetty, Damaged or missing fenders.	PMS, Assistance of tugs and use of anchor, Use of electronic aids and proper bridge team management, Weather monitoring, Suspension of operation on increase of wind speed beyond permissible limits, Use of anchor and call for standby tugs, Use of engines, Ships portable fenders, Use of ship's and tugs illumination, preventive maintenance of fenders.	Minor damage to side shell plating of vessel, Minor damage to quay moorings or fendering system.	Serious damage to side shell plating of vessel, Serious damage to quay/ Fender/ moorings, Loss of cargo / containers, Oil / HNS pollution (damage to Flora and Fauna & loss of fishing activity), fire/ explosion, personnel injuries or loss of life.	0	1	0	1	2	3	2	1	3	4	Report incident to Port and relevant authority, Shipboard EAP, Remove vessel from damage areas and re-berth, Port DMP, POLREP, Port OSCP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed					Mitigation					
								Most Credible			Worst Credible							
								Impact			Impact							
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency
7.5	B	Grounding	Grounding-Tanker/ Container/ BC - Pilot onboard (Area B)	Misjudgment by pilot / master / tug master, Environmental conditions (poor visibility, high current flow, unpredicted current eddies, rough weather, high wind speed), Fishing vessel/small craft impedes passage, vessel equipment failure / malfunction (navigational, propulsion, steering, auxiliary), outdated electronic chart, wrong position fixing, failure of navigational aids, shifting of sand bars in the approach channel.	Electronic aids and proper bridge team management, Leading Lights, River marks and buoys, light vessels, Continuous monitoring of the drift by pilot and "Course made Good", Weather monitoring, suspension of vessel movement on increase of wind speed beyond permissible limits, Use of Anchor, Proper ship signal, security boat signals, PMS, Assistance of tugs, updated navigational chart, preventive maintenance of navigational aids, Experience pilots, Periodical maintenance dredging, vessel length and draft restriction.	Minor damage to shell plating – possible water ingress, Temporary passage block	Major hull damage leading to stranding of vessel, Oil / HNS pollution (damage to Flora and Fauna & loss of fishing activity), Possible loss of cargo or containers, Blockage of Navigation al/River channel, Fire / explosion, Injuries / loss of life	0	1	0	1	2	3	3	2	3	3	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed					Mitigation					
								Most Credible			Worst Credible							
								Impact			Impact							
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency
7.6	A	Grounding	Grounding-Tanker/Container/BC - Pilot not onboard (Area A)	Vessel equipment failure / malfunction (navigational propulsion, steering, auxiliary), vessel transiting too fast, outdated electronic chart, wrong position fixing, Environmental conditions (poor visibility, high current flow, unpredictable current eddies, rough weather, high wind speed), improper maintenance of navigational aids, Human error (fatigue, lack of situational awareness, knowledge etc.), small craft impedes passage	PMS, Use of anchor, vessel to transit in safe manueuring, VTMS, updated navigational chart to be used at all times, suspension of vessel movement on increase of wind speed beyond permissible limit, preventive maintenance of navigational aids, Bridge team management, training of personnel, proper ship signal, use of boat signals	Minor Damage to shell plating, possible water ingress, Temporary passage block, Injury to personnel	Major hull damage leading to vessel stranding, Possible loss of cargo or containers, Oil / HNS pollution (damage to Flora and Fauna & loss of fishing activity), Blockage of Navigation al Channel, Fire / explosion, Injuries / loss of life.	1	1	0	1	2	3	3	2	3	4	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
7.7	A, B	Collision	Collision of vessel with Dredger (Area A, B)	Vessel equipment failure / malfunction (navigational propulsion, steering, auxiliary), Human error (improper communication, fatigue), Environmental conditions (poor visibility, high current flows, unpredictable current eddies), results of avoiding action (e. g. Small craft), navigational failure (markers, lights)	PMS, VTMS, Exchange of information between Pilot & Master (Pilot Exchange Card) training, adequate work/rest hour, situational awareness, weather monitoring, communication with dredger, suspension of vessel movement on increase of wind speed beyond permissible limit, proper ship signal, use of security boat	Temporary Grounding of either of the vessel, Temporary passage block.	Grounding or sinking of either of the vessel, Possible loss of cargo or containers, Oil / HNS pollution (damage to Flora and Fauna & loss of fishing activity), Fire / Explosion, Blockage of Navigational channel, Injuries / Loss of life.	0	1	0	1	2	3	3	1	3	4	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed					Mitigation					
								Most Credible			Worst Credible							
								Impact			Impact							
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency
7.8	A, B	Collision	Dragging anchor (River and sea anchorage) (Area A, B)	Bad weather e.g. Norwester season, Poor monitoring, Poor holding ground, Insufficient scope of anchor chain, vessel equipment failure, heavy underwater current, loss of anchor	MET warning through VTMS, Bridge team management, Vessel to drop anchor in designated anchorage area, Vessel to ensure that sufficient chain is paid out, training of personnel, PMS, main engine standby vessel, Tug assistance, use of navigational aids	Minor Damage to vessel and/or other vessels, Injury to personnel	Grounding, Oil / HNS pollution (damage to Flora and Fauna & loss of fishing activity), Grounding and capsizing, Possible loss of cargo or containers, Blockage of Navigational channel, Injuries / Loss of life.	1	1	0	1	2	3	3	1	3	3	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
7.9	A, B	Contact/Riding over the buoy	Contact with channel and river marking buoys/ light vessels/ Fishing Nets (Area A, B)	Vessel equipment failure/ malfunction (navigational propulsion, steering, auxiliary), Human error (improper communication, Fatigue), Environmental conditions (poor visibility, high current flows, unpredicted current eddies, channel size/ depth), results of avoiding action (e. g. small craft), navigational failure (markers, lights), Drifting of Channel Marking Buoy	PMS, VTMS, Exchange of information between Pilot & Master (Pilot Exchange Card) adequate work/rest hour, situational awareness, weather monitoring, experienced pilot, proper ship signal, security boat, Information about the location of missing buoys	Minor Damage to vessel (including propeller fouling) &/or buoy/light vessel	Grounding or sinking of light vessel or buoy, Oil/HNS pollution (damage to Flora and Fauna & loss of fishing activity), Blockage of navigational channel, Injury to personnel	0	1	0	1	2	2	4	1	2	4	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP.

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Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
7.10	C	Contact / Allision	Contact/ Allision with Lock gate (KPD & NSD) (Area C)	Environmental conditions (poor visibility, high current flows, unpredicted current eddies, channel size/ depth), unexpected Wind effect, Parting of tow line, High rate of turn, Misjudgment, Human error (fatigue, lack of knowledge, etc.), Breakdown of tugs, vessel equipment failure/malfunction (navigational propulsion, steering, auxiliary)	Use of anchor and use of standby tugs, assistance of tugs, capstan rope adjustment, Suspension of movement of vessel on increase of wind speed beyond permissible limits, Use of additional tugs, Use of electronic aid, proper bridge team management, use of all navigational aids, PMS.	Minor Damage to vessel &/or Tug / Lock gate	Major damage to Tug / Lock gate, Temporary port closure, Injury to Personnel, Grounding of vessels due to failure to maintain impounding basin water level.	0	1	0	0	2	2	2	0	3	3	Report incident to Port and relevant authority, Shipboard EAP, Port DMP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed					Mitigation					
								Most Credible			Worst Credible							
								Impact			Impact							
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency
7.11	A, B	Fire	Fire on vessel in the river and approach Channel (Area A and B)	Fire caused by faulty equipment (e.g. engine room fire, electrical fire), fire caused by human error (fatigue) e.g Galley fire, , failure to take appropriate precautions with gas bottles and/or inflammable vapour, failure to take the appropriate precaution when carrying specific cargoes (Coal/Sulphur etc.), fire in containers	PMS, Proper electrical connections and earthing, training, adequate work/rest hour, situational awareness, SMS, fire-fighting assistance from FIFI tugs, Inert Gas system.	Minor damage to vessel, Injury to personnel	Major damage to vessel, Stranding / Grounding or sinking of vessel, Oil / HNS pollution (damage to Flora and Fauna & loss of fishing activity) , Drifting of vessel and collision with other vessel, Blockage of navigationa l channel, Loss of life, loss of cargo/ containers	2	2	0	1	2	4	3	1	3	3	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
7.12	D	Fire	Fire on vessel at the Berth/Jetty	Fire caused by faulty equipment (e.g. engine room fire, electrical fire), fire caused by human error (fatigue) e.g galley fire, inadequate precautions during hot work, failure to take appropriate precautions during operations, Fire spread from one jetty to other fire in container	PMS, Proper electrical connections and earthing, adequate work/rest hour, situational awareness, SMS, SOP, Inert gas, intrinsically safe equipment, fire-fighting assistance from FIFI tugs and port fire-fighting system.	Minor damage to vessel, Injury to personnel.	Major damage to vessel, Stranding / Grounding or sinking of vessel, Oil / HNS Pollution (damage to Flora and Fauna & loss of fishing activity), Loss of life.	1	1	0	1	2	3	3	1	3	3	Report incident to Port and relevant authority, Shipboard EAP, Port DMP, POLREP and Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed					Mitigation					
								Most Credible			Worst Credible							
								Impact			Impact							
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency
<b>DISASTER IN SERVICE AND ADMINISTRATION FACILITIES</b>																		
8	G	Fire	Fire in the Office building/ VTMS-Sagar Island/ Control rooms/Dry-dock/ Hospital/ Electrical Substation/ Transit Sheds	Short circuit, Smoking, Hot-work in dry dock area	Portable Fire extinguishers, Fixed fire-fighting system	Minor fire incident leading to minor damage, Injury to the personnel.	Major fire incident, Property damage, Injuries/ Loss of life.	2	1	0	1	2	3	3	1	3	3	Activation of port DMP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
<b>HUMAN RELATED DISASTER</b>																		
9	H, I	Civil Disturbance	Fire/ Explosion	War and Terrorism, Bomb Threat	Continuous Monitoring on News channel, Radio, Newspapers, mails, Security, Continuous Vigilance	Damage to vessels, Shore structures	Major damage to shore structures e.g. cranes, Major damage to vessel & Oil/ HNS pollution, Capsizing & port closure	3	3	3	4	-	4	4	4	4	-	CISF EAP, Activation of port and terminal DMP, POLREP, Activation of port and terminal OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation				
								Most Credible					Worst Credible									
								Impact					Impact									
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency					
<b>NATURAL DISASTER</b>																						
10.1	H, I	Natural Disaster	Cyclone	Natural cause (high wind)	Weather Monitoring and Public Warning system, SOP for cyclone implemented by respective terminals and port.	Minor Damage to tugs, pilot boats, Shore structures, Injury to personnel, uprooting of trees	Major damage to shore structures e.g. pipelines, pontoon jetty, crane etc, Major damage to tugs, pilot boats, pollution, Capsizing & port closure, Serious injury to personnel/ fatality, Flooding, damage to road structures, uprooting of trees															Shipboard EAP, Port DMP and terminal EAP, POLREP, Port OSCP

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Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
10.2	I	Natural Disaster	Flood	Natural cause (thunderstorm, cyclone), Inadequacy and improper maintenance of the drainage system, rise of tide level and wave heights	Weather Monitoring and Public Warning system, drainage system, physical barriers, Bore tide notice	Minor Damage to tugs, pilot boats, Shore structures & port property, Injury to personnel, minor damage to the road structures	Major damage to shore structures e.g. pipelines, lock gates etc., Major damage to tugs, pilot boats & pollution, Capsizing & port closure, Serious injury to personnel, major damage to road structures	1	2	1	2	1	3	3	2	3	2	Shipboard EAP, Port DMP and terminal EAP, POLREP, Port OSCP

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Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
10.3	H, I	Natural Disaster	Tsunami	Natural cause (Earthquake in seabed)	Weather Monitoring and Public Warning system, Shipboard emergency procedure	Not Applicable	Major damage to shore structures e.g. pipelines, lock gates etc., Major damage to tugs, pilot boats & pollution, Capsizing & port closure, Serious injury/fatal ity to personnel	-	-	-	-	-	4	4	3	4	4	Port DMP and terminal EAP, POLREP, Port OSCP

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Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed					Mitigation					
								Most Credible			Worst Credible							
								Impact			Impact							
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency
10.4	1	Natural Disaster	Earthquake	Natural cause	Earthquake resilient structural design (as per relevant standards), Periodic Assessment and reinforcement of old structures	Minor damage to properties/ structures/ cranes, Injury to personnel	Major damage to shore structures e.g. pipelines, lock gates etc., major damage to pipelines, Oil/ chemical pollution, Major damage properties/s tructures/cr anes, port closure, Serious injury/ fatality to personnel	2	2	0	1	3	4	4	2	4	4	Shipboard EAP, Port DMP and terminal EAP, Port OSCP

*Refer Section 9.3 – Hazard Specific Response Plan			
#Area code	Area	#Area code	Area
A	Approaches to Kolkata port (East anchorage to middleton pilot boarding point).	E	Container berth
B	River passage area (from middleton to Garden Reach anchorage or budge-budge wharf, Anchorage to lock gate).	F	Coal stackyard/coal berth
C	Lock gate to berth	G	Fire in the Office building/ VTMS-Sagar Island/ Control rooms/Dry-dock/ Hospital/ Electrical Substation/Transit Sheds
D	Jetties	H	Entire Port Limit (sea side)

## 2.2.8 Risk Estimation

### 2.2.8.1 Consequence (Impact) and Frequency Assessment

Assessment of consequence has been done considering the effect of potential accidents on -

- Life (e.g., personal injury, fatality, etc.),
- Property damage (e.g., damage to port, damage to ship),
- Environment (Oil pollution, Air pollution, soil contamination etc.),
- Port Business (reputation, financial loss, etc.).

Scale	People	Property	Environment	Port Business /Port stakeholders
<b>I0</b>	No injury	No damage	Negligible environmental impact (<1T)	Negligible
<b>I1</b>	Minor (Single slight injury)	Minor damage	Minor (<100 T) Tier 1 oil spill, Minimal environmental harm	Minor
<b>I2</b>	Slight (multiple minor or single major injury)	Local damage	Moderate (100T – 700T) Tier 1 (limited outside assistance) oil spill or environmental amenity impaired, Moderate environmental impact	Moderate Bad local publicity or short-term loss of dues, revenue, etc.
<b>I3</b>	Serious (multiple major injuries or single fatality)	Major damage	Serious (>700T) Tier 2 (regional assistance) oil spill, localized flooding or multiple amenities impaired, Long term or serious environmental damage	Serious Bad widespread publicity, temporary port closure or prolonged restriction of navigation
<b>I4</b>	Major (More than one fatality)	Total loss	Major Tier 3 (national assistance) oil spill, widespread flooding or extensive damage to amenities, Major environmental harm. e.g., major pollution incident causing significant damage or potential to health or the environment	Major Port closes, navigation seriously disrupted for more than 1-2 days. Long term loss of trade

**Table 2.6:** Scale of Impact (I0 – I4)

Category	Descriptive term	Definition
F1	Frequent	An event occurring once in a operating year
F2	Likely	An event occurring once a year to once every 10 operating years
F3	Remote	An event occurring once every 10 operating years to once in 50 operating years
F4	Unlikely	An event occurring once every 50 operating years to once in 100 operating years
F5	Rare	An event occurring once in more than 100 operating years

**Table 2.7:** Frequency scale (F1- F5)

### 2.2.8.2 Risk Assessment Matrix

For each identified hazard, risk quantification is done based on a scale of 1 (low risk) to 10 (high risk) as described in the as below:

Impact	I4	5	6	7	8	10
	I3	4	5	6	7	9
	I2	3	3	4	6	8
	I1	1	2	2	3	6
	I0	0	0	0	0	0
Frequency	F5	F4	F3	F2	F1	

**Table 2.8:** Risk Assessment Matrix

Where: -

- 0 & 1 - Negligible Risk
- 2 & 3 - Low Risk
- 4 & 5 – Assessed to be in ALARP region
- 6 – Heightened Risk
- 7, 8 & 9 - Significant Risk
- 10- High Risk

Based on the values of frequency and impact as assessed, Risk Ranking have been done in **Table 2.9** for each of the four impact entities as described in **Table 2.6** both for the ‘most likely’ and the ‘worst credible’ scenarios as mentioned in **Table 2.5** Hazard Assessment Worksheet.

### 2.2.8.3 Risk Ranking

The risk score of each of the four categories (People, Property, Environment and Business) is analyzed to obtain four indices for each hazardous scenario as follows:

- a) The average risk value of the four categories in the ‘most likely’ set.
- b) The average risk value of the four categories in the ‘worst credible’ set.
- c) The maximum risk value of the four categories in the ‘most likely’ set.
- d) The maximum risk value of the four categories in the ‘worst credible’ set.

The hazardous scenarios list is then sorted in order of the aggregate of the four indices to produce an Assessed Risk Ranking List, in descending order, with the highest risk scenario prioritized at the top.

Scenario No.	Rank No.	Area	Category	Hazard Detail	Assessed Risk							
					Most Credible				Worst Credible			
					People	Property	Environment	Business	People	Property	Environment	Business
10.1	1	H, I	Natural Disaster	Cyclone	8	8	6	8	7	8	7	8
10.2	2	I	Natural Disaster	Flood	6	8	6	8	7	7	6	7
1	3	D	Fire/Explosion	Fire /Explosion due to POL/ Chemical leakage at Jetty (NSD Berth 12 and Budge-Budge.	6	6	3	3	7	7	2	6
6	4	F	Fire	Fire in Coal Stack yard (KPD & NSD)	6	6	6	6	4	4	6	4
7.11	5	A, B	Fire	Fire on vessel in the river and approach Channel (Area A and B)	6	6	0	3	7	6	2	6
5	6	E	Fire/Leakage	Leakage/ Fire due to Crane Accidents (Container drop/ crane fall)- secondary event (NSD-Container Yard/Berth)	6	6	0	6	6	6	2	6
7.3	7	B	Collision	Collision between two vessels (Area B)	3	6	0	6	5	5	3	6
4	8	D	Toxic	Toxic effects of Toluene, Benzene – leakage from pipeline during operation at Budge-Budge	6	0	3	3	7	0	4	6
8	9	G	Fire	Fire in the Office building/ VTMS-Sagar Island/ Control rooms/Dry-dock/ Hospital/ Electrical Substation/Transit Sheds	6	3	0	3	6	6	2	6
10.4	10	I	Natural Disaster	Earthquake	4	4	0	2	6	6	3	6
7.1	11	B	Collision	Collision of Small Craft with Tanker / Container/BC/Barge (Area B)	3	3	0	3	6	7	2	4

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7.2	12	A	<b>Collision</b>	Collision between two vessels (Area A)	2	4	0	2	5	5	3	6
2	13	D	<b>Fire/Explosion</b>	Rupture/leakage of POL/Chemical Pipeline/hose from Oil Jetties (NSD and Budge-Budge) (Manifold to terminal within port area)	3	3	0	3	6	6	2	6
7.8	14	A, B	<b>Collision</b>	Dragging anchor (River and sea anchorage) (Area A, B)	3	3	0	3	6	6	2	6
7.12	15	D	<b>Fire</b>	Fire on vessel at the Berth/Jetty	3	3	0	3	6	6	2	6
7.5	16	B	<b>Grounding</b>	Grounding-Tanker/Container/BC - Pilot onboard (Area B)	0	3	0	3	6	6	4	6
3	17	D	<b>Corrosive</b>	Corrosive acid (Phosphoric/Sulphuric) leakage at Budge-Budge.	3	3	0	3	6	4	3	4
7.6	18	A	<b>Grounding</b>	Grounding-Tanker/Container/BC - Pilot not onboard (Area A)	3	3	0	3	5	5	3	5
7.9	19	A, B	<b>Contact</b>	Contact with channel and river marking buoys/ light vessels/ Fishing Nets (Area A, B)	0	3	0	3	3	6	2	3
7.7	20	A, B	<b>Collision</b>	Collision of Tanker/BC/Container vessel with Dredger (Area A, B)	0	3	0	3	5	5	2	5
7.10	21	C	<b>Contact/Allision</b>	Contact/ Allision with Lock gate (KPD & NSD) (Area C)	0	3	0	0	4	4	0	6
7.4	22	C	<b>Contact</b>	Tanker /Container/BC berthing - Contact with Jetty (Area C and Budge-Budge Wharf)	0	3	0	3	5	3	2	5
10.3	23	H, I	<b>Natural Disaster</b>	Tsunami	-	-	-	-	6	6	5	6
9	24	H, I	<b>Civil Disturbance</b>	War/Terrorism/Bomb Threat	-	-	-	-	-	-	-	-

**Table 2.9:** Risk ranking for KDS for identified hazards

**Note 1:** Scenario number 23 cannot be ranked because **Tsunami** can most probably lead to worst case impact on people, property, environment and business and hence rating for the most credible impacts has not been given in the Hazard Assessment Worksheet.

**Note2:** Scenario number 24 cannot be ranked because frequency of **Civil Disturbance** scenario cannot be assessed, hence risk rating for the most credible and worst credible impacts on people, property, environment and business have not been given in the Hazard Assessment Worksheet.

### **3. HAZARD SPECIFIC PREVENTION & MITIGATION MEASURES**

#### **3.1 PREVENTIVE AND MITIGATION MEASURES**

In accordance with the guiding principle of Sendai Framework, Disaster Risk Reduction (DRR) requires responsibilities to be shared by different divisions/departments of port and various stakeholders. The effectiveness in disaster risk reduction will depend on coordination mechanisms within and across departments and with relevant stakeholders at all levels. For each identified hazard/disaster, the approach used in DM plan incorporates the four priorities enunciated in the Sendai Framework into the framework for DRR under the six thematic areas for action as follows

1. Understanding Risk
2. Inter-Agency Coordination
3. Investing in DRR – Structural Measures
4. Investing in DRR – Non-Structural Measures
5. Capacity Development
6. Climate change risk management

##### **3.1.1 Understanding Risk**

This thematic area for action focuses on understanding disaster risk, the Priority-1 in the Sendai Framework integrates into it numerous actions needed for strengthening disaster resilience. The major themes for action are: a) Observation Networks, Information Systems, Research, Forecasting, b) Zoning / Mapping, c) Monitoring and Warning Systems, d) Hazard Risk and Vulnerability Assessment (HRVA), and e) Dissemination of Warnings, Data, and Information. Having adequate systems to provide warnings, disseminate information, and carry out meaningful monitoring of hazards are crucial to disaster risk reduction, and improving resilience. They are also an integral part of improving the understanding of risk.

##### **3.1.2 Inter-Agency Coordination**

Inter-agency coordination is a key component of strengthening the disaster risk governance -Priority-2 of the Sendai Framework. The major themes for action required for improving the top-level interagency coordination are a) Overall disaster governance b) Response c) Providing warnings, information, and data and d) Non-structural measures.

##### **3.1.3 Investing in DRR – Structural Measures**

Undertaking necessary structural measures is one of the major thematic areas for action for disaster risk reduction and enhancing resilience. These consist of various physical infrastructure and facilities required to help communities cope with disasters. The implementation of these measures is essential to enhance disaster preparedness, a component of Priority-4 of the Sendai Framework. It is also an important component of investing in disaster risk reduction for resilience, which is Priority-3 of Sendai Framework.

**3.1.4 Investing in DRR – Non-Structural Measures**

Set of appropriate laws, mechanisms, and techno-legal regimes are crucial components in strengthening the disaster risk governance to manage disaster risk, which is Priority-2 of the Sendai Framework. These non-structural measures comprising of laws, norms, rules, guidelines, and techno-legal regime (e.g., building codes) framework and empowers the authorities to mainstream disaster risk reduction and disaster resilience into development activities.

**3.1.5 Capacity Development**

Capacity development is a theme in all the thematic areas for action. The Sendai Priority-2 (Strengthening DRR governance to manage DR) and Priority-3 (Investing in DRR for resilience) are central to capacity development. The capacity development includes training programs, curriculum development, large-scale awareness creation efforts, and carrying out regular mock drills and disaster response exercises. The capability to implement, enforce, and monitor various disaster mitigation measures has to be improved at all levels from the local to the higher levels of governance. It is also strengthening the DRR governance at all levels to better manage risk and to make the governance systems more responsive.

**3.1.6 Climate change risk management**

Climate change significantly alters the geographic spread, frequency and intensity of hydro metrological extreme events. It can also exacerbate their impacts. Investments in DRR can play an important role in supporting communities to adapt to climate change.

**3.2 HAZARD-WISE RESPONSIBILITY MATRICES FOR DISASTER RISK MITIGATION**

For the successful implementation of DM plans, it is necessary to identify various stakeholders within the port and clearly specify their roles and responsibilities. For each hazard/disaster, in the subsections that follow, themes for action are presented in a separate responsibility matrix for each of the five thematic areas for action. The port will play a pro-active role in disaster situations. In the domains of DM planning, preparedness, and capacity building, the port will constantly work to upgrade DM systems and practices. This section covers the matrices for the identified hazards relevant to KDS as listed below:

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>1. Thematic area</b>		Understanding Risk					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Information Systems and Research	Support and coordination	<ul style="list-style-type: none"> <li>SMP-KDS (Port should consider relevant dept.),</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Inventory of oils/chemicals/IMDG cargo handled,</li> <li>Coordination with vessel for Ship to Shore checklist.</li> </ul>			
		Information on (operation and during emergency) dealing with HAZCHEM	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>MSDS copy maintained,</li> <li>Hazardous Waste Management Plan.</li> </ul>			
		Chemical Accident Information Reporting System	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Incidents records maintained with NSD and Budge-Budge terminals</li> </ul>	<ul style="list-style-type: none"> <li>Centralized mechanism for data collection /incident database with SMP</li> </ul>		
2	Zoning/ Mapping	Industrial zones on basis of hazard potential and effective disaster management for worst case scenarios	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Earmarked area for DG cargo at NSD container terminal,</li> <li>Barricading of Jetty area at Budge-Budge,</li> </ul>	<ul style="list-style-type: none"> <li>Barricading of DG cargo area at NSD container terminal,</li> <li>PESO approved</li> </ul>		

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>1. Thematic area</b>		Understanding Risk					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
					hazardous area classification for oil jetties at Budge-Budge, <ul style="list-style-type: none"> <li>• Safety instructions to be displayed and ensured for oil cargo handling at berth no. 12 – NSD,</li> <li>• Updation of zoning carried out regularly after any addition or up-gradation of the facility.</li> </ul>		
		Carry out the mapping and related studies in collaboration with central agencies/ technical organizations	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Port layout maps,</li> <li>• DG cargo storage area map,</li> <li>• Pipeline layout map for Budge-Budge,</li> </ul>	<ul style="list-style-type: none"> <li>• Provision of Hazardous bund for DG containers</li> <li>• Updation of maps</li> </ul>	Adhere to CRZ mapping	Land Use Plan

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>1. Thematic area</b>		Understanding Risk					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
				<ul style="list-style-type: none"> <li>• Firefighting system layout map for Budge-Budge</li> </ul>			
3	Monitoring	Monitoring compliance with safety norms for HAZCHEM	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Standard Operating Procedure,</li> <li>• CCTV surveillance available covering entire port area.</li> </ul>			
		Disposal of hazardous waste	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Recording and Monitoring of generation of hazardous waste,</li> <li>• Disposal of waste through WBPCB approved waste management parties.</li> </ul>			
4	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake and provide technical support to HRVCA as part of preparing and periodic revision of DM plans	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Port DMP as per Disaster Management Act -2005, NDMA Guidelines 2018 and NDMP 2019,</li> <li>• Port OSCP,</li> <li>• Emergency Action Plan (EAP),</li> </ul>	<ul style="list-style-type: none"> <li>• Periodic update plans</li> </ul>		

*Disaster Management Plan*

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>1. Thematic area</b>		Understanding Risk					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
				<ul style="list-style-type: none"> <li>Emergency Response Disaster Management Plan (ERDMP).</li> </ul>			
		Constitute/ strengthen the mechanism for consultation with experts and stakeholders	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	Mechanism for strengthening of the port disaster management through <ul style="list-style-type: none"> <li>Standard Operating Procedures,</li> <li>Audits (Structural, Fire and Safety),</li> <li>Mock Drills,</li> <li>Training and Awareness,</li> <li>Land use planning.</li> </ul>	<ul style="list-style-type: none"> <li>Prepare plans for removal of abandoned pipelines at Oil Jetties.</li> </ul>		<ul style="list-style-type: none"> <li>Land Use Plan,</li> <li>Business Development Plan, Environment Management Plan.</li> </ul>

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>2. Thematic area</b>		Inter- agency coordination					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Overall disaster governance	Providing coordination, technical inputs, and support, Periodical inspection from competent agencies.	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Emergency Operation Centre,</li> <li>• Coordination with DRR Cell (at Ministry level),</li> <li>• Coordination with SDMA and DDMA,</li> <li>• PNGRB, WBPCB, OISD, MoEF inspection.</li> </ul>	<ul style="list-style-type: none"> <li>• Compliance to recommendations.</li> </ul>		
		Address/ identify gaps in equipment/ infrastructure and human resources with DM tasks	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Developmental project reports,</li> <li>• Safety Committee Meetings.</li> </ul>	<ul style="list-style-type: none"> <li>• Gap analysis / Periodic reviews in equipment/ infrastructure and human resources.</li> </ul>		
2	Warnings, Information, data	Effective coordination and seamless communication among various stakeholders	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Vessel Master,</li> <li>• CISF,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• VTMS-Sagar Island,</li> <li>• VHF/MF/UHF,</li> <li>• Satellite Phone,</li> <li>• Radio Over IP,</li> <li>• Mobile,</li> <li>• Landline,</li> <li>• PA system,</li> </ul>			

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>2. Thematic area</b>		Inter- agency coordination					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
				<ul style="list-style-type: none"> <li>• Emergency Siren,</li> <li>• Email and TELEX.</li> </ul>			
		Dissemination of warnings and information	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Vessel Master,</li> <li>• CISF,</li> <li>• Operators,</li> <li>• Local and District Authority.</li> </ul>	Dissemination of information to/from <ul style="list-style-type: none"> <li>• Vessel Master,</li> <li>• CMG,</li> <li>• Ministry of Port, Shipping and Waterways, DG shipping, NDMA, ICG, MMD, PESO, WBPCB, Navy, Local Authorities,</li> <li>• CISF,</li> <li>• Any other relevant authority.</li> </ul>			
3	Response	Organizing and coordinating with Government agencies and stakeholders of the port	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Vessel Master,</li> <li>• CISF,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Coordinating with CMG group,</li> <li>• Coordinating with Vessel Master,</li> <li>• Coordinating with Govt. Agencies (DG Shipping, NDMA, SDRF, DDMA, Local admin., ICG, MMD, PESO, WBPCB,</li> </ul>	<ul style="list-style-type: none"> <li>• Periodic renewal of Mutual Aid Agreements</li> </ul>		

*Disaster Management Plan*

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>2. Thematic area</b>		Inter- agency coordination					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
				Navy, etc.), <ul style="list-style-type: none"> <li>• Mutual aid agreement with relevant stakeholders.</li> </ul>			

Hazard		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	Sub-thematic area	Plan components	Responsible section	Recurring / Regular measures	Short term	Medium term	Long term
1	Evacuation and support facilities.	<ul style="list-style-type: none"> <li>• Identification of hospitals and first aid</li> </ul>	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISF,</li> <li>• Operators,</li> <li>• Local Authorities.</li> </ul>	<ul style="list-style-type: none"> <li>• Port Hospital,</li> <li>• Tie up with nearby hospitals,</li> <li>• First Aid centers,</li> <li>• Ambulances.</li> </ul>		<ul style="list-style-type: none"> <li>• Expansion of Hospital facilities</li> </ul>	
	Multiple routes for reliable access and escape.	<ul style="list-style-type: none"> <li>• Ensuring fresh water storage facilities for drinking purpose</li> </ul>	<ul style="list-style-type: none"> <li>• SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>• Municipal water supply available,</li> <li>• Water tankers.</li> </ul>			
	Decontamination facilities	<ul style="list-style-type: none"> <li>• Providing wide roads and multiple routes to allow quick access by first responders and to ensure escape pathways</li> </ul>	<ul style="list-style-type: none"> <li>• SMP-KDS</li> </ul>	<p><b>Evacuation by Land facilities</b></p> <ul style="list-style-type: none"> <li>• Entry-exit Gate available,</li> <li>• Internal roads,</li> <li>• Port and hired vehicles,</li> <li>• Individual terminal vehicles,</li> <li>• Coordination with Local administration,</li> <li>• Land Use Planning,</li> <li>• Vehicle Traffic management.</li> </ul>	<ul style="list-style-type: none"> <li>• Repair of access roads,</li> <li>• Repair of wooden walkway for pontoon jetty at Budge-Budge.</li> </ul>		

Hazard		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	Sub-thematic area	Plan components	Responsible section	Recurring / Regular measures	Short term	Medium term	Long term
				<b>Evacuation by sea route facilities</b> <ul style="list-style-type: none"> <li>Port owned/hired crafts,</li> </ul>			
		<ul style="list-style-type: none"> <li>Establish decontamination facilities</li> </ul>	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	Personnel decontamination <ul style="list-style-type: none"> <li>Port Hospital,</li> <li>Tie up with nearby hospitals,</li> <li>First Aid Facilities,</li> <li>Eyewash and Safety Showers at terminals in Budge-Budge.</li> </ul>			
2	Disaster Response equipment	Ensuring (as per OISD and other relevant requirements) and maintaining fire-fighting equipment	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Fire hydrant line at Budge-Budge,</li> <li>Port Fire Station,</li> <li>Mutual Aid Agreement with the Stakeholders,</li> <li>Fire Water storage facilities (available at respective terminals),</li> <li>FIFI Tugs.</li> </ul>	<ul style="list-style-type: none"> <li>Provision of Fire-fighting as per OISD-156 at Budge-Budge Oil Jetties,</li> <li>Provision of Fire firefighting at Container and NSD Berth 12.</li> </ul>		

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>3. Thematic area</b>		Investing in DRR – Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
		Ensuring (as per ICG requirements) and maintaining oil pollution response equipment	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Pollution response equipment of Port.</li> </ul>	<ul style="list-style-type: none"> <li>• Provision for Mutual Aid Agreement for use of Oil Spill equipment at Budge-Budge.</li> </ul>		

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>4. Thematic area</b>		Investing in DRR – Non- Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Laws Regulations, Techno Legal regimes Enforcements, compliance and Monitoring Institutional arrangements	Formulate/ strengthen the SOP for the compliance w.r.t. the statutory requirements ensuring greater safety in hazardous industries and reduce the likelihood of disasters	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Periodical inspection and testing of Oil/chemical Pipelines,</li> <li>• Periodical inspection and testing of Hoses,</li> <li>• Audits - Fire, Safety,</li> <li>• Risk Assessment,</li> <li>• Safety committee meetings.</li> </ul>	<ul style="list-style-type: none"> <li>• Compliance of recommendations.</li> </ul>		
2	Risk Transfer	Insurance	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Workmen Compensation Policy,</li> <li>• Public Liability Insurance,</li> <li>• Property Insurance,</li> <li>• Oil pollution insurance.</li> </ul>	<ul style="list-style-type: none"> <li>• Periodic Renewals of Policies.</li> </ul>		

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>5. Thematic area</b>		Capacity Development					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Training	<ul style="list-style-type: none"> <li>• Training and orientation programs on management (handling, storage and transfer) and disposal of HAZCHEM</li> <li>• Incorporating disaster response, search and rescue in the training programs</li> </ul>	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators,</li> <li>• CISF.</li> </ul>	<ul style="list-style-type: none"> <li>• IMO level training (OSR) for the identified personnel,</li> <li>• ISO and OHSAS training,</li> <li>• Fire-fighting training,</li> <li>• Safety Training,</li> <li>• First Aid training,</li> <li>• CBRN training,</li> <li>• Hazard identification and management training.</li> </ul>			
2	Mock drills/ Exercises	<ul style="list-style-type: none"> <li>• Planning and execution of emergency drills by all the</li> </ul>	<ul style="list-style-type: none"> <li>• SMP--KDS,</li> <li>• Operators,</li> <li>• CISF,</li> <li>• Other stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>• Mock drills conducted regularly with all the stakeholders,</li> <li>• Annual drill schedule.</li> </ul>			

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>5. Thematic area</b>		Capacity Development					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
		stakeholders					
		<ul style="list-style-type: none"> <li>Joint planning and execution of emergency drills</li> </ul>	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators,</li> <li>CISF,</li> <li>Other stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>Organize and participation (involving all the stakeholders) mock-drills through various government agencies like ICG, CISF, NDRF, NSG, SDMA, Local authorities, etc.</li> </ul>			
3	Documentation	Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and Risk Management planning	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators,</li> <li>CISF.</li> </ul>	<ul style="list-style-type: none"> <li>Maintenance of the incident and near miss record.</li> <li>Accident/incident reporting, analysis, investigation and implementation of recommendations.</li> </ul>	<ul style="list-style-type: none"> <li>Centralized mechanism for documentation</li> </ul>		

<b>Hazard</b>		Chemical Disaster (Budge-Budge oil jetties, NSD Berth No.12 and Container Terminal)					
<b>5. Thematic area</b>		Capacity Development					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
4	Awareness	Promote culture of disaster risk prevention, mitigation, and better risk management	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators,</li> <li>• CISF,</li> <li>• Other stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>• Safety day/week celebration,</li> <li>• Award and recognition,</li> <li>• Fire week celebration,</li> <li>• Environment day celebration,</li> <li>• Safety Bulletins,</li> <li>• Periodic Health Check- up (PME Periodical medical examination),</li> <li>• Road safety week.</li> </ul>			

<b>Hazard</b>		Fire (Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard)					
<b>1. Thematic area</b>		Understanding Risk					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Information Systems and Research	Support and coordination	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Port Fire Station (common for NSD &amp; KPD),</li> <li>Nearby WBFES - fire station.</li> </ul>			
2	Zoning/ Mapping	Mapping of sites that pose fire risks	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Fire system layout,</li> <li>Electrical system layout,</li> <li>Coal stack yard identified as a fire risk zone,</li> <li>Dedicated storage area for reefer containers.</li> </ul>	<ul style="list-style-type: none"> <li>Update layout plans,</li> <li>Display of layout maps at suitable locations.</li> </ul>		
3	Monitoring	Monitoring compliance with safety norms	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Firefighting and extinguishing system,</li> <li>CCTV surveillance,</li> <li>Manning/Patrolling of the areas.</li> </ul>	<ul style="list-style-type: none"> <li>Periodic reviews about the efficacy.</li> </ul>		

<b>Hazard</b>		Fire (Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard)					
<b>1. Thematic area</b>		Understanding Risk					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
4	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake HRVCA as part of preparing and periodic revision of DM plans	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Port DMP as per Disaster Management Act -2005, NDMA Guidelines and NDMP,</li> <li>• Emergency Action Plan (EAP)</li> </ul>	<ul style="list-style-type: none"> <li>• Periodic updation of plans.</li> </ul>		
		Constitute/ strengthen the mechanism for consultation with experts and stakeholders	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	Mechanism for strengthening of the port disaster management through <ul style="list-style-type: none"> <li>• Periodical inspection and testing of response equipment,</li> <li>• Fire Audit,</li> <li>• Capacity analysis,</li> <li>• Drills,</li> <li>• Training and Awareness,</li> <li>• Safety Committee meetings.</li> </ul>	<ul style="list-style-type: none"> <li>• Compliance of recommendations</li> </ul>		

<b>Hazard</b>		Fire (Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard)					
<b>2. Thematic area</b>		Inter- agency coordination					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Overall disaster governance	Identify and address the gaps in existing capabilities, equipment, infrastructure, and human resources	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>CISF,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>Emergency Operation Centre,</li> <li>Periodic reviews and upgradation of the fire systems/equipment and manpower as per the relevant standards and best practices.</li> </ul>	<ul style="list-style-type: none"> <li>Mutual aid agreement for sharing of resources.</li> </ul>	<ul style="list-style-type: none"> <li>Install and upgrade systems as per periodic reviews (Considering obsolescence and vintage)</li> </ul>	
		Establish fire stations	<ul style="list-style-type: none"> <li>SMP-KDS.</li> </ul>	<ul style="list-style-type: none"> <li>Port Fire station,</li> <li>Identified list of nearby Fire Stations.</li> </ul>			
		Implementation of DM plans	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>CISF,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>Conducting fire and evacuation drills,</li> <li>Training and Awareness.</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of the updated DMP.</li> </ul>		
2	Warnings, Information, data	Effective coordination and seamless communication	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>CISF,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	Coordination among various port stakeholders and CMG to ensure quick, clear, effective dissemination of warnings, information and data via			

<b>Hazard</b>		Fire (Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard)					
<b>2. Thematic area</b>		Inter- agency coordination					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
				<ul style="list-style-type: none"> <li>• VHF /MF/UHF,</li> <li>• RoIP,</li> <li>• Landline,</li> <li>• PA system,</li> <li>• Mobile Phones,</li> <li>• Emergency Siren,</li> <li>• Email and TELEX.</li> </ul>			
3	Response	Organizing and coordinating the immediate response Coordinate with Government agencies and stakeholders of the port	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISF,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Activation of DM Plan,</li> <li>• Coordinating with Fire station (Port &amp; External),</li> <li>• Coordination with SDMA and DDMA.</li> </ul>			

<b>Hazard</b>		Fire (Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard)					
<b>3. Thematic area</b>		Investing in DRR – Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Smoke, Heat, Fire detection and fire-fighting systems	Procurement and maintenance of fire Fighting systems as per relevant Standard and Rules	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Periodical testing and maintenance of the               <ul style="list-style-type: none"> <li>➤ Portable fire-fighting facility at Electrical substation, Hospital, Admin building, and Control Centres.</li> <li>➤ Emergency Siren.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Installation/ up-gradation of the fire-fighting system.</li> </ul>		
2	Evacuation and support facilities.	Identification of Assembly points	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>CISF,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>Identified assembly points.</li> </ul>	<ul style="list-style-type: none"> <li>Updation of assembly points and sign boards.</li> </ul>		
	Multiple routes for reliable access and escape.	Providing vehicles for safe transportation	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>CISF,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	List of <ul style="list-style-type: none"> <li>Passenger vehicles of KDS as per <b>Appendix D</b>.</li> <li>Passenger vehicles of operators,</li> <li>Passenger vehicles of CISF.</li> </ul>	<ul style="list-style-type: none"> <li>Periodical repair of Internal roads.</li> </ul>		

<b>Hazard</b>		Fire (Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard)					
<b>3. Thematic area</b>		Investing in DRR – Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
3	First aid and Decontamination facilities	<ul style="list-style-type: none"> <li>Establish First aid and decontamination facilities</li> <li>Identification of hospital</li> </ul>	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>CISF,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	Personnel first aid and decontamination <ul style="list-style-type: none"> <li>Port Hospital,</li> <li>Other identified hospitals as per <b>Appendix E</b>.</li> </ul>			

<b>Hazard</b>		Fire (Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard)					
<b>4. Thematic area</b>		Investing in DRR – Non- Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Rules, laws, guidelines	Strict implementation and strengthening of fire safety rules	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISF,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Safety Committee Meeting,</li> <li>• Environment, Health and Safety Policy,</li> <li>• Safety budget,</li> <li>• Work Permit System.</li> </ul>	<ul style="list-style-type: none"> <li>• Fire-fighting and evacuation plan.</li> </ul>		
2	Fire safety audit of structures and buildings	Carry out fire safety audit of buildings and critical infrastructure	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Periodic Fire audit.</li> </ul>	<ul style="list-style-type: none"> <li>• Compliance of recommendations.</li> </ul>		
3	Risk Transfer	Insurance	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISF,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Workmen Compensation Policy,</li> <li>• Public Liability Insurance,</li> <li>• Property Insurance.</li> </ul>	<ul style="list-style-type: none"> <li>• Periodical renewal of policies.</li> </ul>		

<b>Hazard</b>		Fire (Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard)					
<b>5. Thematic area</b>		Capacity Development					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Training	Incorporating disaster response in the training programs	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISO,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Induction/Refresher Training,</li> <li>• Fire-fighting training,</li> <li>• First Aid training.</li> </ul>			
2	Mock drills/ Exercises	Planning and execution of emergency drills by all the stakeholders  Joint planning and execution of emergency drills	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISO,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Mock drills.</li> </ul>	<ul style="list-style-type: none"> <li>• Annual Drill schedule.</li> </ul>		

<b>Hazard</b>		Fire (Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard)					
<b>5. Thematic area</b>		Capacity Development					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
3	Documentation	Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and Risk Management planning	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISF,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Maintenance of the incident and near miss record,</li> <li>• Accident/incident reporting, analysis, investigation and implementation of recommendations.</li> </ul>	<ul style="list-style-type: none"> <li>• Centralized mechanism for the accident / incident and near miss record.</li> </ul>		
4	Awareness	Promote culture of disaster risk prevention, mitigation, and better risk management	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISF,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Safety day/week celebration,</li> <li>• Award and recognition,</li> <li>• Safety Bulletin,</li> <li>• Periodical Health Checkup.</li> </ul>	<ul style="list-style-type: none"> <li>• Promote awareness by posting details of activities on social media platforms regarding important events.</li> </ul>		

<b>Hazard</b>		Wind and Cyclone					
<b>1. Thematic area</b>		Understanding Risk					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring /Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Observation networks, Information systems, Research, Forecasting, Early warning	Enhancement of Observational Network Stations (ONS)	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	The port authority relies on observational network operated by external sources and information shared: <ul style="list-style-type: none"> <li>Internet sources,</li> <li>IMD Bulletins,</li> <li>NAVAREA warnings.</li> </ul>			
		Establishment of at least one High Wind Speed Recorder and one surge recorder		<ul style="list-style-type: none"> <li>Wind speed recorder,</li> <li>Surge Recorder.</li> </ul>			
2	Zoning / Mapping	Identification of the vulnerable areas	Not applicable to SMP-KDS for zoning and mapping.	<ul style="list-style-type: none"> <li>Cyclone hazard map (Very High damage risk zone – maximum wind speed of 50 m/s).</li> </ul>			
3	Monitoring	System to monitor cyclone	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	Monitoring via <ul style="list-style-type: none"> <li>TV /Radio,</li> <li>IMD bulletins.</li> </ul>			

<b>Hazard</b>		Fire (Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard)					
<b>5. Thematic area</b>		Capacity Development					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
4	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake HRVCA as part of preparing and periodic revision of DM plans	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Port DMP as per Disaster Management Act -2005, NDMA Guidelines and NDMP,</li> <li>Emergency Action Plan (EAP),</li> <li>Emergency Response Disaster Management Plan (ERDMP).</li> </ul>	<ul style="list-style-type: none"> <li>Periodic update Plans.</li> </ul>		
		Constitute/ strengthen the mechanism for consultation with experts and stakeholders	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	Mechanism for strengthening through <ul style="list-style-type: none"> <li>Preventive inspection of cranes, high mast lighting, communication towers and antennae,</li> <li>Stacking of containers as per wind criteria,</li> <li>Effective storm drainage system.</li> </ul>			<ul style="list-style-type: none"> <li>Land use planning</li> </ul>

<b>Hazard</b>		Wind and Cyclone					
<b>2. Thematic area</b>		Inter- agency coordination					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Overall disaster governance	Providing coordination, technical inputs, and support.	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Emergency Operation Centre,</li> <li>• IMD Bulletins,</li> <li>• Coordination with DRR Cell (at Ministry level),</li> <li>• Coordination with SDMA and DDMA.</li> </ul>			
2	Warnings, Information, data collection	Effective communication to ensure quick, clear, effective dissemination of warnings, information and data.	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators,</li> <li>• Vessel Master,</li> <li>• CISF.</li> </ul>	Effective communication via: <ul style="list-style-type: none"> <li>• VTMS-Sagar Island,</li> <li>• UHF/MF/VHF channels,</li> <li>• Mobile Phones,</li> <li>• PA System.</li> </ul>			
3	Response	Coordinating with port stakeholders and Government agencies	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators,</li> <li>• Vessel Master,</li> <li>• CISF.</li> </ul>	<ul style="list-style-type: none"> <li>• CMG group,</li> <li>• Vessel Master,</li> <li>• NDRF, SDRF, WBPCB, Civil Defense, Local authorities,</li> <li>• ICG and Navy.</li> </ul>			

<b>Hazard</b>		Wind and Cyclone					
<b>3. Thematic area</b>		Investing in DRR – Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Multi-Purpose Cyclone Shelters	Identification of safe buildings and sites with basic facilities like drinking water, food, sanitation and first aid to serve as temporary shelters for people evacuated from localities at risk.	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Identified nearby Cyclone Shelters such as schools, community halls, etc.</li> </ul>			
2	Hospitals and First Aid Centres	<ul style="list-style-type: none"> <li>Identification of hospitals and first aid</li> </ul>	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>Port Hospital,</li> <li>Tie up with nearby hospitals,</li> <li>First Aid centers.</li> </ul>			

<b>Hazard</b>		Wind and Cyclone					
<b>4. Thematic area</b>		Investing in DRR – Non- Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Regulation and enforcement of relevant laws	Ensure compliance with coastal environment protection laws and regulations such as the CRZ	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>EIA / EMP recommendations regarding environment sustainability measures viz air quality, sewage and effluent.</li> </ul>			<ul style="list-style-type: none"> <li>Land-use planning</li> </ul>
2	Non-structural shore stabilization measures and bio-shields	Establishment of bio-shields like mangroves, as natural defense	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Beach nourishment,</li> <li>Spur nourishment.</li> </ul>	<ul style="list-style-type: none"> <li>Plantation of mangroves</li> </ul>		
3	Risk Transfer	Insurance	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Workmen Compensation Policy,</li> <li>Public Liability Insurance,</li> <li>Property Insurance.</li> </ul>	<ul style="list-style-type: none"> <li>Periodic Renewals of Policies</li> </ul>		

<b>Hazard</b>		Wind and Cyclone					
<b>5. Thematic area</b>		Capacity Development					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Training	Training and awareness regarding cyclone related emergencies and do's and don'ts	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Training and awareness as per NDMA guidelines for cyclones</li> </ul>		<ul style="list-style-type: none"> <li>• Training by Civil Defense and other agencies</li> </ul>	
2	Mock drills/ Exercises	Joint planning and execution of emergency drills	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Participation in drills/exercises with the District and State Disaster Authorities.</li> </ul>			
3	Awareness		<ul style="list-style-type: none"> <li>• SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>• Environment day celebration,</li> </ul>			

<b>Hazard</b>		Wind and Cyclone					
<b>6. Thematic area</b>		Climate change risk management					
<b>Sr. No</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Climate change adaptation (CCA)	Sensitization and awareness creation	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<p>Port has taken an initiative related to environmental protection as part of Green Port Initiative from GoI.</p> <p>This includes</p> <ul style="list-style-type: none"> <li>Monitoring of the level of air, water and soil pollution regularly,</li> <li>Prohibition of disposal of all kind of garbage in river.</li> </ul>	<ul style="list-style-type: none"> <li>Provision of net barrier for coal dust pollution,</li> <li>Installation of Dry fogging system (Dust suppression system).</li> </ul>	<ul style="list-style-type: none"> <li>Use of renewable energy</li> </ul>	

Hazard		Flood					
1. Thematic area		Understanding Risk					
Sr. no.	Sub-thematic area	Plan components	Responsible section	Recurring / Regular measures	Short term	Medium term	Long term
1	Observation networks, Information systems, Research, Forecasting, Early warning	Assessment and Monitoring	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Tide/Bore tide gauging,</li> <li>Sea, river and impound basin water level monitoring,</li> <li>IMD bulletins,</li> <li>CWPRS/PWD bulletins,</li> <li>Hydrographic study.</li> </ul>			
2	Zoning/ Mapping and classification of flood prone areas	Identification of the vulnerable areas	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators</li> </ul>	<ul style="list-style-type: none"> <li>The present port infrastructure poses a flooding risk.</li> </ul>			
3	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake HRVCA as part of preparing and periodic revision of DM plans	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Port DMP as per Disaster Management Act -2005, NDMA Guidelines and NDMP,</li> <li>Emergency Action Plan (EAP),</li> <li>Emergency Response Disaster Management Plan.</li> </ul>	<ul style="list-style-type: none"> <li>Periodic update Plans</li> </ul>		
		Constitute/ strengthen the mechanism for	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	Mechanism for strengthening through <ul style="list-style-type: none"> <li>Project development reports incorporating effective</li> </ul>			<ul style="list-style-type: none"> <li>Land use planning</li> </ul>

<b>Hazard</b>		Flood					
<b>1. Thematic area</b>		Understanding Risk					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
		consultation with experts and stakeholders		draining and anti-flooding measures, <ul style="list-style-type: none"> <li>• Hydrographic Survey.</li> </ul>			

Hazard		Flood					
2. Thematic area		Inter- agency coordination					
Sr. No	Sub-thematic area	Plan components	Responsible section	Recurring / Regular measures	Short term	Medium term	Long term
1	Overall disaster governance	Providing coordination, technical inputs, and support	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Emergency Operation Centre,</li> <li>Coordination with IMD, CWPRS, PWD,</li> <li>Coordination with DDMA and SDMA.</li> </ul>			
2	Warnings, Information, data	Effective communication to ensure quick, clear, effective dissemination of warnings, information and data.	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>VTMS-Sagar Island,</li> <li>VHF/ MF/UHF,</li> <li>Mobile Phones,</li> <li>PA System,</li> <li>Tide tables,</li> <li>Email and Telex,</li> <li>Internet Sources.</li> </ul>			
3	Response	Coordinating with port stakeholders and Government agencies	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>CMG group,</li> <li>NDRF/SDRF, Civil Defense, Local authorities.</li> <li>ICG and Navy.</li> </ul>			

Hazard		Flood					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	Sub-thematic area	Plan components	Responsible section	Recurring / Regular measures	Short term	Medium term	Long term
1	Multi-Purpose Shelters	Identification of safe buildings and sites with basic facilities like drinking water, food, sanitation and first aid to serve as temporary shelters for people evacuated from localities at risk	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Identified nearby shelters such as schools and community halls, etc.</li> </ul>			
2	Hospitals and First Aid centres	Identification hospitals and first aid	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>Port Hospital,</li> <li>Tie up with nearby hospitals,</li> <li>First Aid Centres.</li> </ul>			
3	Civil works	Upgrade and maintenance of the existing drainage and storm water systems	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Periodic maintenance of drainage system,</li> <li>Availability of dewatering pump system.</li> </ul>			

<b>Hazard</b>		Flood					
<b>4. Thematic area</b>		Investing in DRR – Non- Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Operation and Maintenance of Drainage Systems	Budgetary Provision	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Adequate budget to be provided to take care of the men, material, equipment and machinery for O&amp;M of drainage systems on a periodic basis.</li> </ul>			
2	Regulation and enforcement of laws, norms, regulations, guidelines	Complying with the coastal zone laws	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Implementing land-use regulation as per flood control norms.</li> </ul>	<ul style="list-style-type: none"> <li>Land-use planning as per the CRZ notification</li> </ul>		
3	Risk Transfer	Insurance	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Workmen Compensation Policy,</li> <li>Public Liability Insurance,</li> <li>Property Insurance.</li> </ul>	<ul style="list-style-type: none"> <li>Periodic Renewals of Policies</li> </ul>		

<b>Hazard</b>		Flood					
<b>5. Thematic area</b>		Capacity Development					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Training	Training and awareness regarding flood related emergencies and do's and don'ts	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Training and awareness as per NDMA guidelines for Flood.</li> </ul>			
2	Mock drills/ Exercises	Joint planning and execution of emergency drills	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>Participation in drills/exercises with the District and State Disaster Authorities.</li> </ul>			

*Disaster Management Plan*

<b>Disaster</b>		Earthquake					
<b>1. Thematic area</b>		Understanding Risk					
<b>Sr · No</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Seismic Zoning/ Mapping	Identification of the vulnerable areas	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Earthquake hazard map as given in BMTPC.</li> </ul>	<ul style="list-style-type: none"> <li>The requirements of BIS standard 1893- 2016 are to be complied with for seismic zone III as per BMTPC chart. (For Sagar Island only seismic zone IV)</li> </ul>		
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake HRVCA as part of preparing and periodic revision of DM plans	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators</li> </ul>	<ul style="list-style-type: none"> <li>Port DMP as per Disaster Management Act -2005, NDMA Guidelines and NDMP,</li> <li>Emergency Action Plan (EAP),</li> <li>Emergency Response Disaster Management Plan (ERDMP).</li> </ul>	<ul style="list-style-type: none"> <li>Periodic updation of Plans.</li> </ul>		

<b>Hazard</b>		Earthquake					
<b>2. Thematic area</b>		Inter- agency coordination					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring /Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Overall disaster governance	Providing coordination, technical inputs, and support	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISF,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Emergency Operation Centre,</li> <li>• As per National Disaster Management Authority Guidelines for Earthquakes,</li> <li>• Coordination with DDMA and SDMA.</li> </ul>			
2	Response	Coordinating with port stakeholders and Government agencies	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISF,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• CMG group,</li> <li>• NDRF, SDRF, Civil Defense, WBPCB and Local authorities,</li> <li>• ICG and Navy.</li> </ul>			

<b>Hazard</b>		Earthquake					
<b>3. Thematic area</b>		Investing in DRR – Structural measures					
<b>Sr. No</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Strengthening and seismic retrofitting of prioritized critical structures and buildings	Implementation strengthening and seismic retrofitting as per recommendations of structural safety audits	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Seismically safe design and construction of jetties, wharfs, trestles, pipeline trestles, office buildings, township at Sagar Island and utilities.</li> </ul>			

<b>Hazard</b>		Earthquake					
<b>4. Thematic area</b>		Investing in DRR – Non- Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring /Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Structural safety audit of lifeline structures and buildings	Carry out structural safety audit of lifeline buildings and critical infrastructure	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Inspection of critical structures and buildings and prioritization for repairs and demolition. Special emphasis to be given for structural areas affected by ground settlement.</li> </ul>	<ul style="list-style-type: none"> <li>• Compliance of recommendations</li> </ul>		
2	Risk Transfer	Insurance	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• Operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Workmen Compensation Policy,</li> <li>• Public Liability Insurance,</li> <li>• Property Insurance.</li> </ul>	<ul style="list-style-type: none"> <li>• Periodic Renewals of Insurance Policies</li> </ul>		

<b>Hazard</b>		Earthquake					
<b>5. Thematic area</b>		Capacity Development					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring /Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Training	Training and awareness regarding earthquake related emergencies and do's and don't's	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISF,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Training and awareness as per NDMA Earthquake guidelines</li> </ul>			
2	Mock drills/ Exercises (Evacuation and rescue)	Joint planning and execution of emergency drills	<ul style="list-style-type: none"> <li>• SMP-KDS,</li> <li>• CISF,</li> <li>• Operators,</li> <li>• Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Participation in drills/exercises with the District and State Disaster Authorities.</li> </ul>			

<b>Hazard</b>		Tsunami					
<b>1. Thematic area</b>		Understanding Risk					
<b>Sr. No.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Zoning/ Mapping	Identification of the vulnerable areas	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Tsunami hazard map as per West Bengal Disaster management &amp; civil defense dept. website.</li> </ul>			
2	Receipt of warnings, data and information	Monitor periodic bulletins from agency	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	Monitoring via <ul style="list-style-type: none"> <li>Forecasting agencies,</li> <li>INCOIS.</li> </ul>			
3	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake HRVCA as part of preparing and periodic revision of DM plans	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Port DMP as per Disaster Management Act -2005, NDMA Guidelines and NDMP,</li> <li>Emergency Action Plan (EAP),</li> <li>Emergency Response Disaster Management Plan (ERDMP).</li> </ul>	<ul style="list-style-type: none"> <li>Periodic update Plans</li> </ul>		

Hazard		Tsunami					
2. Thematic area		Inter- agency coordination					
Sr. no.	Sub-thematic area	Plan components	Responsible section	Recurring / Regular measures	Short term	Medium term	Long term
1	Overall disaster governance	Providing coordination, technical inputs, and support	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Emergency Operation Centre,</li> <li>Coordination with DDMA and SDMA.</li> </ul>			
2	Warnings, Information, data	Effective communication to ensure quick, clear, effective dissemination of warnings, information and data.	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>VTMS-Sagar Island,</li> <li>VHF/MF/UHF,</li> <li>Mobile Phones,</li> <li>PA System.</li> </ul>	<ul style="list-style-type: none"> <li>Real time information setup from INCOIS.</li> </ul>		
3	Response	Coordinating with port stakeholders and Government agencies	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>CMG group,</li> <li>Vessel Master,</li> <li>NDRF, SDRF, Civil Defense, Local authorities,</li> <li>ICG, Navy.</li> </ul>			

<b>Hazard</b>		Tsunami					
<b>3. Thematic area</b>		Investing in DRR – Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Strengthening and retrofitting of prioritized vulnerable and critical structures	Ensure compliance with relevant building codes or hazard resistant construction	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Implementation in compliance with relevant building codes/ standards/ technical guidance. e.g. NDMA guidelines for Tsunami and Earthquake</li> </ul>			
		Identification and repair/ retrofitting of houses and buildings as per the recommendations of structural audit  Detailed assessment of tsunami hazard to the structure and foundation and the benefits of strengthening	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Periodic inspection of vulnerable/critical structures (electrical sub stations, warehouse, fire station, office buildings, marine structures, VTMS at Sagar Island, etc.).</li> <li>Repairs/ retrofitting done as and when required for tsunami resistance.</li> </ul>			

<b>Hazard</b>		Tsunami					
<b>3. Thematic area</b>		Investing in DRR – Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
2	Multi-Purpose Tsunami Shelters	Identification of safe buildings and sites with basic facilities like drinking water, food and first aid to serve as temporary shelters for people evacuated from localities at risk	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Identified nearby Shelters in consultation with DDMA and SDMA.</li> </ul>			
3	Hospitals and First Aid Centers	Identification of hospitals and first aid	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>Port Hospital,</li> <li>Tie up with nearest hospitals,</li> <li>First Aid Centers.</li> </ul>			

<b>Hazard</b>		Tsunami					
<b>4. Thematic area</b>		Investing in DRR – Non-Structural measures					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Regulation and enforcement of relevant laws	Ensure compliance with coastal environment protection laws and regulations such as the CRZ	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of West Bengal State Coastal Zone Regulation (Only Coastal Area e.g., up to Sagar Island area).</li> </ul>			
2	Non-structural shore stabilization measures and bio-shields	Establishment of bio-shields like mangroves, as natural defense	<ul style="list-style-type: none"> <li>SMP-KDS</li> </ul>	<ul style="list-style-type: none"> <li>Beach nourishment,</li> <li>Spur nourishment.</li> </ul>	<ul style="list-style-type: none"> <li>Plantation of mangroves</li> </ul>		
3	Risk Transfer	Insurance	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators.</li> </ul>	<ul style="list-style-type: none"> <li>Workmen Compensation Policy,</li> <li>Public Liability Insurance,</li> <li>Property Insurance.</li> </ul>	<ul style="list-style-type: none"> <li>Periodic Renewals of Policies</li> </ul>		

<b>Hazard</b>		Tsunami					
<b>5. Thematic area</b>		Capacity Development					
<b>Sr. no.</b>	<b>Sub-thematic area</b>	<b>Plan components</b>	<b>Responsible section</b>	<b>Recurring / Regular measures</b>	<b>Short term</b>	<b>Medium term</b>	<b>Long term</b>
1	Training	Training and awareness regarding Tsunami related emergencies and do's and don'ts  <b>Reference documents:</b> NDMA and SDMA guidelines for Tsunami	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>Training of local administration in forecasting warning dissemination and evacuation techniques.</li> </ul>			
2	Mock drills/ Exercises (Evacuation and Rescue)	Joint planning and execution of emergency drills	<ul style="list-style-type: none"> <li>SMP-KDS,</li> <li>Operators,</li> <li>Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>Participation in drills/exercises with the District and State Disaster Authorities.</li> </ul>			

## **4. MAINSTREAMING DISASTER RISK REDUCTION**

The objective of mainstreaming is ensuring the ongoing and new development projects of the port leading to integration measures. The sub-thematic areas where such measures can lead to DRR are as follows:

Awareness and understanding of disaster risk;

1. Disaster governance;
2. Disaster risk transfer;
3. Institutional arrangements and capacity development;
4. Budget allocations for integrating DRR into development programs;
5. Project appraisals, scrutiny of development plans, effective and detailed land-use plans, from the point of view of expected hazards;
6. Setting targets and monitoring mechanisms.

### **4.1 INVESTING IN DRR – STRUCTURAL MEASURES**

Port sector in general implements the building code as per IS standards. Hence, engineered buildings and structures are designed and constructed taking into account various loads including seismic criterion. As such, only the older buildings which suffer degradation on account of aging related factors will require reassessment and strengthening. Damage of buildings and structures also depends upon the soil conditions e.g., settlement and topology of the area.

### **4.2 INVESTING IN DRR – NON-STRUCTURAL MEASURES**

#### **4.2.1 Land Use Planning**

Port land is being used for various activities such as harbour area, industrial area, road network, water supply network, storm water drainage system, sewer system and greenbelt/green cover.

#### **4.2.2 Capacity Building**

Port takes initiative by deputing personnel to attend and undergo various trainings such as Disaster and Safety Management, Safety Audit, Dock Safety, CBRN, Radiological safety aspects of container scanners, etc.

The port undertakes consultative measures with expert agencies such as IITs, Govt. Departments, Technical Universities and Private Institutions for advice in Land use planning, port development, projects implementation, environmental management and training of personnel. It also conducts awareness programme through agencies such as CISF, Civil Defence, NDRF, SDRF, NDMA, DGFASLI, etc.

#### **4.2.3 Risk Transfer Insurance**

The details of such arrangements are given in chapter 11.

### **4.3 STRATEGIES FOR SUSTAINABLE DEVELOPMENT PRACTICES FOLLOWED IN THE PORT**

Port's developmental plans are synchronized with the Coastal Zone Management and Land Use plans.

## 4.4 DISASTER RISK GOVERNANCE PROGRAMMES AND PRACTICES OF THE PORT

### 4.4.1 Environmental macro level-Coastal zone monitoring

The macro level monitoring includes following aspects.

1. Master planning of the port facilities with respect to the traffic forecast and identification of projects.
2. Environmental impact analysis, land use planning and finalisation of the location of the projects.
3. Finalisation of the Port's conceptual plan for future development.
4. The port's Integrated Management System (IMS), includes ISO-14001 Environment Management System.
5. Obtaining statutory permissions like Environmental Clearance, Consent to Establish/Operate from the MoEF & CC and State Pollution Control Board.

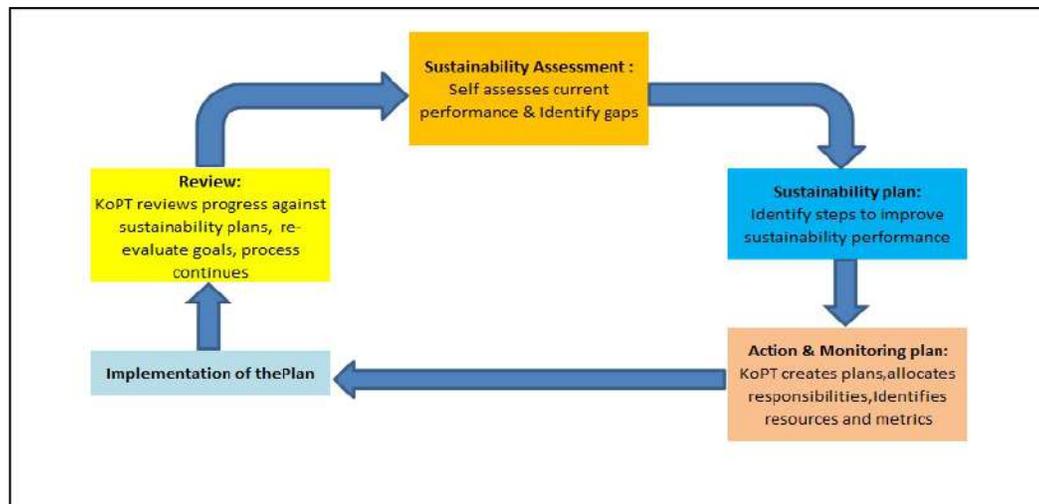
### 4.4.2 Micro Level Monitoring

An Environmental Cell looks after the environmental protection activities. This body undertakes various initiatives at the micro level which are as follows

1. Development of green verge including plantation.
2. Regular water sprinkling by mobile tanker for controlling air pollution caused by coal dust.
3. Drainage system and sewage treatment plant.
4. Obtaining environmental clearances for projects and monitoring of the pollutants during the execution of the project as per the approved Environmental Management Plan (EMP).

## 4.5 SUSTAINABILITY PLAN

The environment cell also undertakes preparation of sustainability plan at the port level and takes care of maintaining and monitoring this plan.



Consequent to development/expansion of new programme and addition of facilities it is imperative that a sustainability plan involving key issues like economic, environmental and social costs of the projects to be followed. This will help reduce disaster losses and control the risk level.

## **5. INCLUSIVE DRR**

The port functions as a riverine port developed in post-independence era and subsequently changes have been made with respect port traffic and available draft in the channel due to continuously reducing water flow over the years. The design and development is based on established engineering standards of safety and as such the stakeholders do not include socially vulnerable groups.

The port will ensure special needs in respect of women employees and disabled employees are taken care of and they are adequately empowered to escalate their concerns and appeals. The action plans preparation will take care of evacuation measures in the event of emergencies for these employees.

## 6. COHERENCE OF DISASTER RISK MANAGEMENT ACROSS RESILIENT DEVELOPMENT AND CLIMATE CHANGE ACTION

In accordance with the Sendai Framework, it is necessary to address existing challenges and prepare for future ones by focusing on monitoring, assessing, and understanding disaster risk and sharing relevant information.

- The framework notes that, to cope with disasters, it is “urgent and critical *to anticipate, plan for and reduce disaster risk*”.
- It requires the *strengthening of disaster risk governance and coordination* across various port departments.
- It requires the full and meaningful *participation of relevant stakeholders* at different levels.
- It is necessary to *invest in the economic, social, health, cultural and educational resilience* at all levels.
- It requires *investments in research* and the use of technology to enhance multi-hazard Early Warning Systems (EWS), preparedness, response, recovery, rehabilitation, and reconstruction.

The port has undertaken the above in the implementation of DMP as follows:

In the chapter 2 of HRVCA, the risk profile of the port has been assessed through detailed planning steps. The gap analysis for equipment’s is a continuous process which the port will undertake through periodic reviews.

With regard to natural disaster, the vulnerability profiling has been prepared and areas requiring immediate actions are identified. For NAT-CHEM disasters the vulnerability areas have been identified.

In the chapter 3 of Hazard Specific Prevention and Mitigation Measures, the hazards have been identified and thematic areas of Sendai framework introduced, so that the development responsibility in each of these thematic areas is properly addressed indicating present and planned arrangement and who is responsible to address each of these.

With regard to the participation of stakeholders in the risk governance the following mechanisms are in place:

- Availability of Mutual Aid Agreement for disaster situations;
- Joint planning and execution of mock drills at unit level (individual facility) and also at the level of the entire port (including non-custom bound area);

In respect of aspects relating to climate change the following issues have been identified having bearing on disaster risk reduction and resilience:

- Heavy rain fall (cloudburst) and flooding – Land use planning and the detailed development thereafter will factor-in the requirements of natural slope, land topography, storm water drainage, height and width of culverts, natural drainage for ponds.
- High wind and cyclone – Implementation of SOPs for preventing damage during an event.

## 7. CAPACITY DEVELOPMENT AND COMMUNICATION

### 7.1 CAPACITY DEVELOPMENT

The capacity development covers all aspects of disaster management. The key aspects and broad thematic areas for capacity development applicable are summarized in **Table 7.1**. The hazard-specific capacity development needs for prevention and response are given in the plan matrix of the Chapter-3. The effort will be to follow the industry best practices especially in the area of oil spill response and chemical disaster response which affect the ports in a major way.

	<i>Capacity Development Themes</i>
<b>Key Aspect</b>	<b>Thematic Areas</b>
<b>Prevention or mitigation for disaster risk reduction</b>	Hazards, Risk, and Vulnerability Assessment <ul style="list-style-type: none"> <li>• Safety awareness and training</li> <li>• Improve the awareness and preparedness of stakeholders at all levels</li> <li>• Documenting lessons from previous disasters and ensuring their wide dissemination</li> <li>• Preparing DM plans, regular updating, and mock drills</li> <li>• Institutional arrangements, policies, legal support, and regulatory framework</li> <li>• Developing appropriate risk transfer instruments by collaborating with insurance companies and financial Institutions</li> <li>• Mainstreaming of disaster risk assessment, mapping and management into development plans and programs</li> <li>• Retrofitting as per relevant standards</li> <li>• Rapid visual surveys for safety evaluation of buildings</li> <li>• Training and skill development for dock operators, crane operators, truck drivers, management staff.</li> <li>• Promoting community-based DM taking into account specific needs,</li> <li>• Disaster resilience by maintaining list of nearby hospitals and health care centres</li> <li>• Business resilience of productive assets by strengthening the supply chains and service providers, ensuring continuity of services</li> <li>• Integrate disaster risk management into business models and practices</li> </ul> Preparedness and response plans at all levels

<p><b>Effective preparedness and response</b></p>	<p>Emergency response capabilities – EOCs, infrastructure, equipment upgrades and adoption of best available technologies</p> <ul style="list-style-type: none"> <li>• Strengthening of the Fire and Emergency Service through revamping, institutional reforms, and modernization</li> <li>• Adoption and adaptation of emerging global good practices</li> <li>• Early warnings, maps/ satellite data/ effective dissemination of information</li> <li>• Table-top exercises, simulations, and mock drills to improve operational readiness of the plans</li> <li>• Earmarking of temporary shelters</li> <li>• Power and fuel supply management</li> <li>• Transportation systems and network</li> <li>• Logistics and supply chain management</li> </ul>
<p><b>Recovery and Build Back Better</b></p>	<ul style="list-style-type: none"> <li>• Port infrastructure damage assessment mechanism and award of reconstruction projects, contracting including revised specifications for resilient infrastructure</li> <li>• Studies on past disasters and recovery to draw useful lessons</li> </ul>

**Table 7.1:** Summary of Broad Capacity Development Themes

**7.1.1 Training**

Regular training should be provided to all personnel who have a role in planning and operational response to an emergency. The goal of training for emergencies is to enable the participants to understand their roles in the response organization, the tasks associated with each position and the procedures for maintaining effective communications with other response functions and individuals.

**The training objectives are:**

1. To familiarize personnel with the contents and manner of implementation of the Plan and its procedures,
2. To train personnel in the performance of the specific duties assigned to them in the plan and in the applicable procedures,
3. To keep personnel informed of any changes in the plan,
4. To maintain a high degree of preparedness at all levels of the emergency response organization,
5. Train new personnel who may have moved within organization.

A well-coordinated programme of training exercises includes activities of varying degrees of interaction and complexity.

The SIC is responsible for the development and maintenance of emergency capabilities of the IRT through ongoing development and rehearsal of emergency response procedures and plans. Specific inductions are to be provided for all team members and support personnel to ensure they are conversant with the roles and responsibilities outlined in this plan prior to their appointment in any capacity.

Personnel allocated to the IRT should undergo skills training over and above that received by other personnel of the port. The skill training are delivered by external service providers to national competency standards in the following areas

- First aid,

- Self-Contained Breathing Apparatus,
- Rescue from heights,
- Rescue from confined spaces,
- Fire-fighting,
- Rescue from water,
- Handling Oil and Hazardous Material Spills.

### **7.1.2 Drills & Exercises**

Emergency drills and integrated exercises have the following objectives.

1. To test the adequacy of the effectiveness, timing, and content of the plan and implementing procedures,
2. To ensure that the emergency organization personnel are familiar with their duties and responsibilities by demonstration,
3. Provide hands-on experience with the procedures to be implemented during emergency,
4. Maintain emergency preparedness.

Periodicity of important drills should vary depending on the severity of the hazard. However, drills should be conducted at least once a year. Scenarios may be developed in such a manner as to accomplish more than one event objective

➤ **Notification exercises**

- Test communication systems, frequency, public warning system

➤ **Tabletop exercises**

- To check availability of participants and check response time

➤ **Equipment deployment exercises**

- Alarm systems to be tested,
- Frequent tests of fire fighting and other response equipment.

➤ **Incident management exercises**

- Simulated emergencies like fire, gas leakage, oil spillage, cyclone and vessel related emergencies like grounding, collusion, leakage, Pollution etc., to be conducted and monitored and feedback to be documented.
- Evacuation practice
- Deployment of Machineries

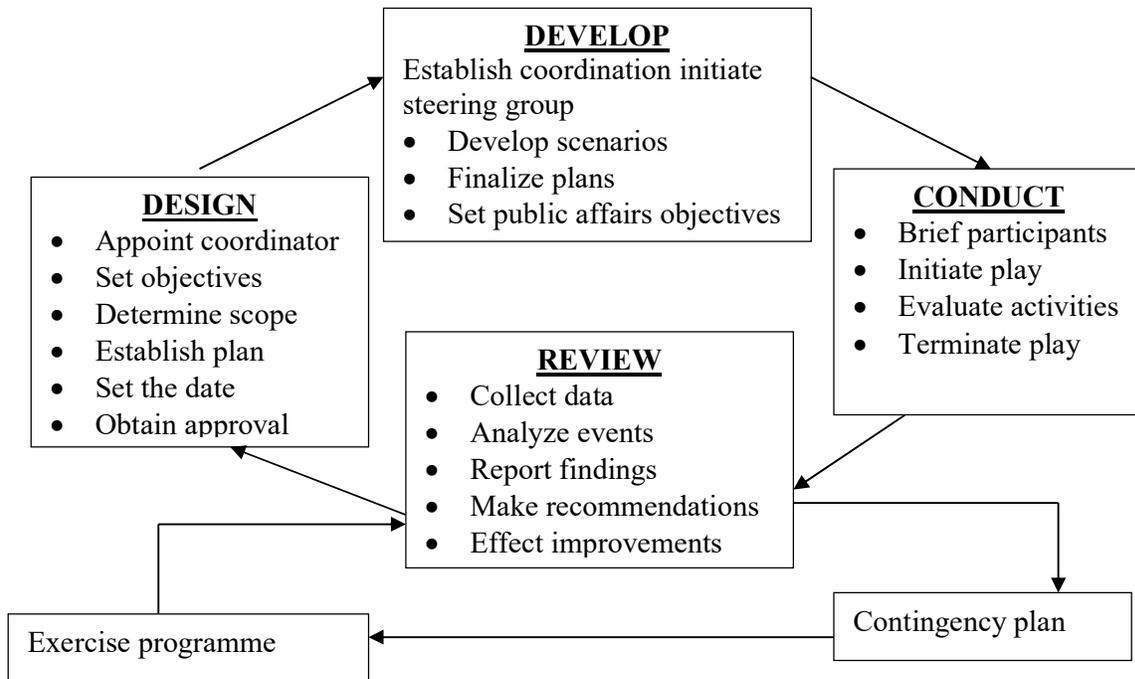


Figure 7.1: The Exercise Planning Process

The evaluation of a drill or exercise shall be submitted to CIC/SIC for review and acceptance who shall then determine the corrective actions to be taken and assign the responsibility to appropriate personnel. Thus, gap identification in terms of resources and procedures can be made and exercise plan amended accordingly.

Records of drills, exercises, evaluations, and corrective actions should be duly maintained.

Schedule of the drills and exercises of the port can be found in **Appendix D**.

**7.2 COMMUNICATION STRATEGY**

Communication technology is integral part of disaster management. It plays an important role in all the four distinct phases of disaster management namely mitigation, preparedness, response and recovery. The following table provides information on the communication equipment within the port.

Services & Authorities	Communication Network Element
Fire Service	Special fire alarm and normal communication system- VHF-TELEPHONE-WALKIE TALKIE- MOBILE
Personal and internal Medical services	Normal communication services
Fire-fighting craft and Rescue launches	UHF/VHF Radio telephones, via port authorities as reserve

Ships at Berth	Normal UHF/VHF Radio telephone link used in cargo operations. Terminal/Berth Operator representative at tanker berth to also have own radio-SATCOM
Civil authorities Including fire services, Police and medical services	UHF/VHF radio, telephone or public telephone system. SATCOM Cascade system to be used i.e. through department heads to subordinates
Harbour authorities, Pilots, tugs and other harbour craft	UHF/VHF Radio, telephone or public telephone SATCOM
District Collector or State Secretary	UHF/VHF Radio telephone, public telephone-hot line for emergency level 2 & 3-SATCOM
Jt. Secretary-Ministry of Ports, Shipping and Waterways, New Delhi	Public telephone-hot line for emergency level 2 & 3 SATCOM

**Table 7.2:** Communication Network within the Port

The following table provides information on the communication equipment available with the key personnel of the port.

Key Personnel	Equipment
CMG group and IRT	VHF
Signal Stations (Sagar Island and HDC)	VHF & SATCOM

**Table 7.3:** Port communication equipment

### 7.2.1 Communication Flowchart

Communication flowcharts between the key agencies and key personnel of the CMG/IRT for various hazards is as follows

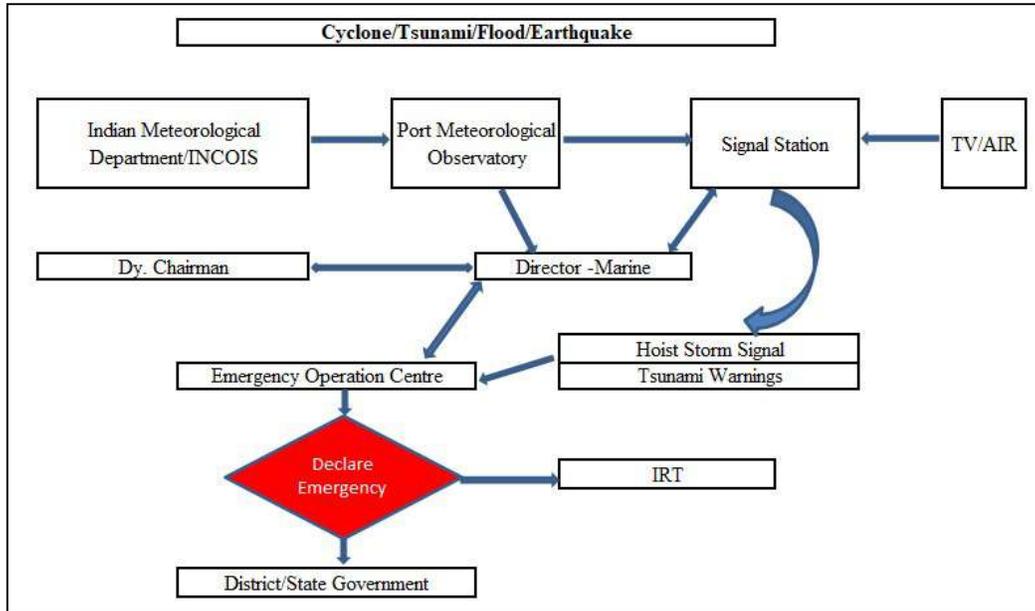


Figure 7.2: Cyclone /Tsunami/Flood/Earthquake

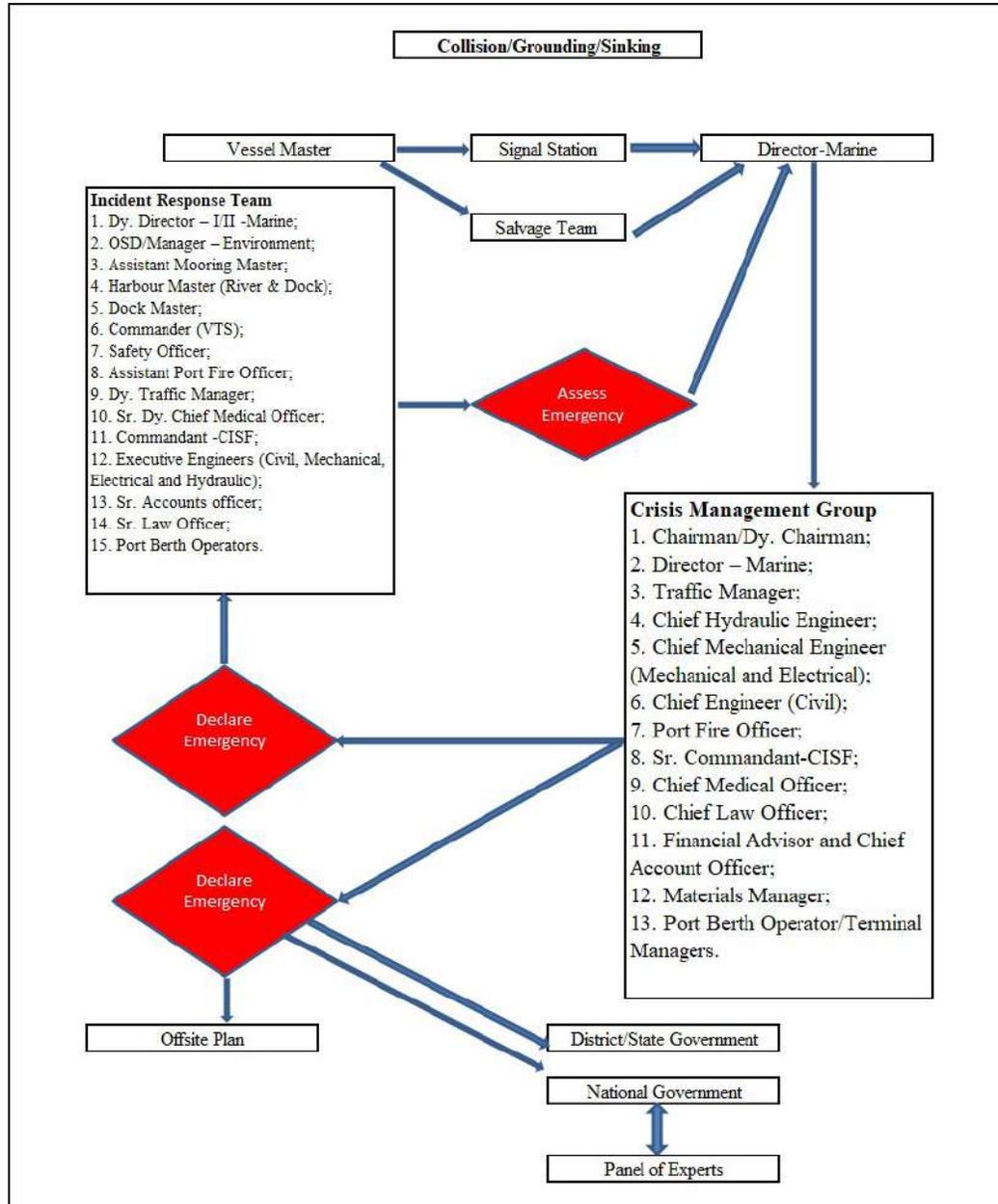
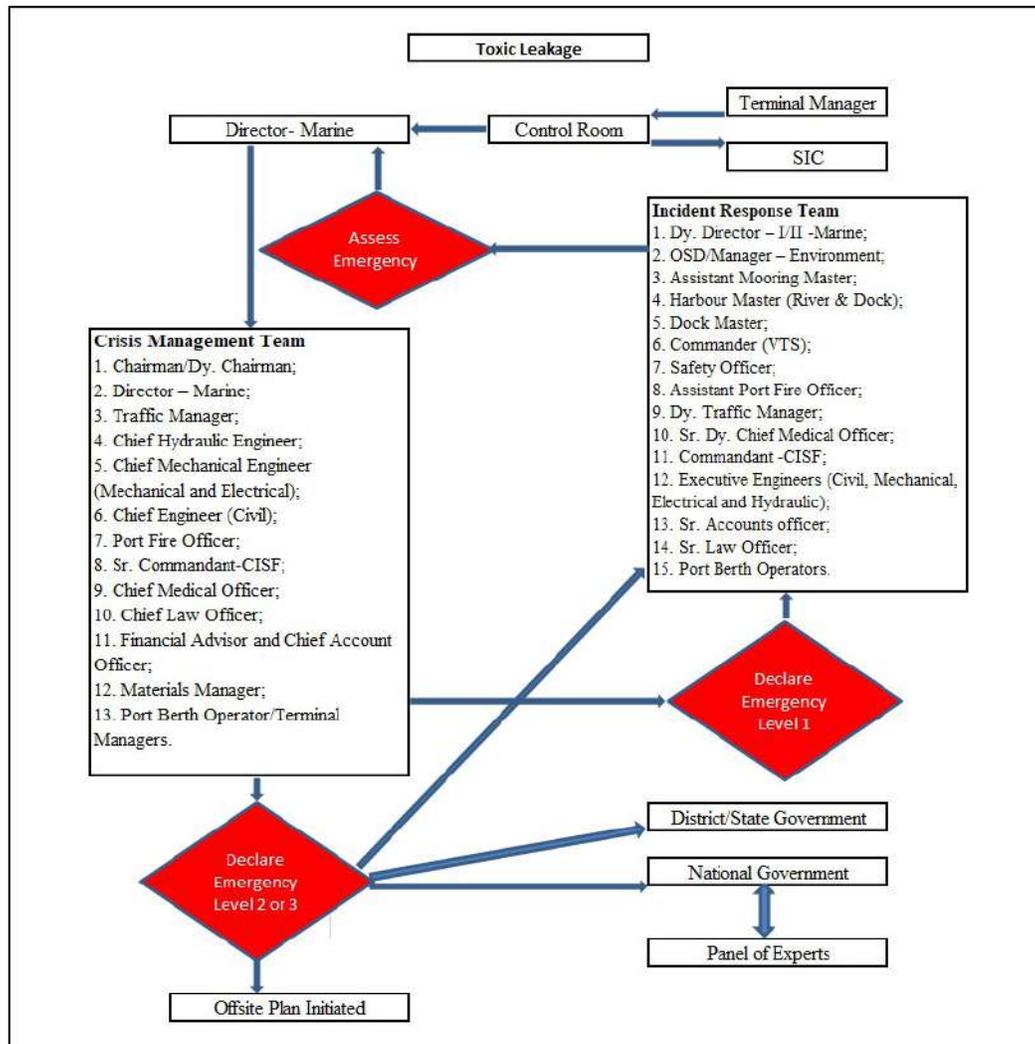
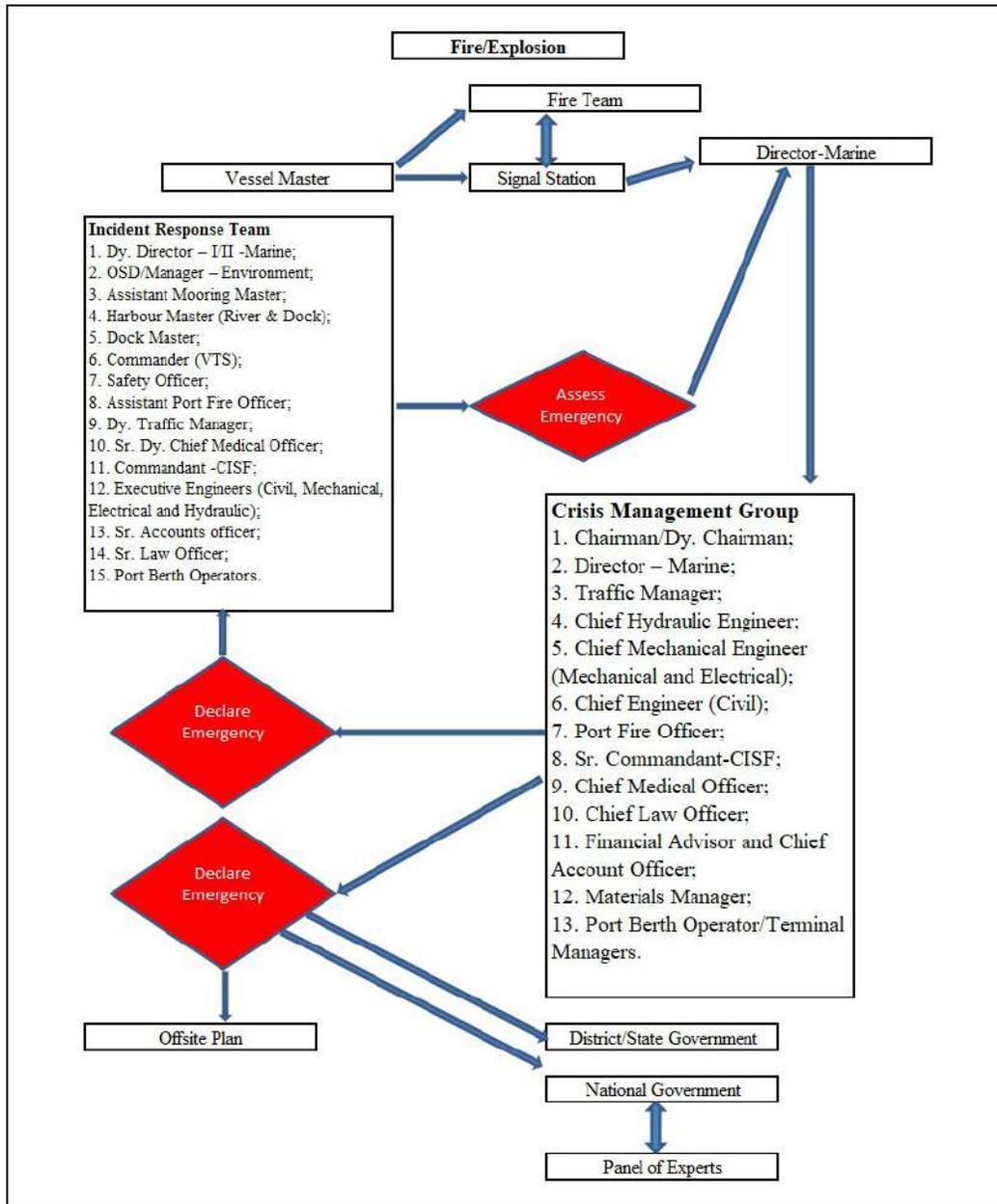


Figure 7.3: Collision/Grounding/Sinking



**Figure 7.4: Toxic**

*Note: For Level of disaster refer paragraph 9.1.2.*



**Figure 7.5: Fire/Explosion**

*Note: For level of disaster refer paragraph 9.1.2.*

## **8. COORDINATION – HORIZONTAL AND VERTICAL LINKAGES**

Dealing with a major disaster requires resources from outside the port. When the capacities of a port administration are overwhelmed, higher levels of aid assistance is required. Likewise, assets and capabilities in the industries and non-governmental organizations available around the port will have to be brought to use. There are many actions undertaken by participants in disaster management that support this goal, both pre-disaster (to reduce potential damage) and post-disaster (to recover from actual damage). For achieving this objective, the plan has a pre-established and practiced mechanism for Inter, intra and extra agency coordination.

Communication is the most important tool for effective coordination. Emergency Operation Centre (EOC) is the enabler of communication and coordination. Port Authority and stakeholders will coordinate with all heads of department at the local level, district & state level groups, CMG, Expert Groups, NGOs for effective implementation of DM Plans. Port authority should also have a link with neighbouring industries in case of disasters.

Coordination with the following external agencies would be required

- West Bengal State Disaster Management Authority (WBSDMA),
- District Disaster Management Authority (DDMA) – Kolkata/South-24 Parganas,
- District Level Committee on Natural Calamity (DLCNC) - Kolkata/South-24 Parganas,
- State and National Crisis Group,
- Indian Coast Guards, Indian Navy,
- DG Shipping, MMD,
- WBPCB,
- DD, AIR for media briefing,
- WBSEB, WBTC,
- Regional Meteorological Centre – Kolkata,
- Co-ordinate with the NGOs and aid agencies (contact nos.),
- P & I Club and their local correspondent,
- Salvage firms,
- Enlist services of GOI/GOO laboratories and expert institutions for Specialized services (contact nos.) e.g., BARC emergency response centre in case of radiological emergencies, DRDO for CBRN emergencies.
- Public Health Organization.

## 9. PREPAREDNESS AND RESPONSE

### 9.1 PREPAREDNESS

#### 9.1.1 Emergency Organization

##### 9.1.1.1 Crisis Management Group

The Crisis Management Group consists of all HOD's under the head of the Chairman which lays down the policies and decisions.

1. Chairman/Dy. Chairman;
2. Director – Marine;
3. Chief Mechanical Engineer (Mechanical & Electrical Engineer);
4. Chief Hydraulic Engineer;
5. Chief Engineer (Civil);
6. Sr. Dy. Material Manager;
7. Chief Medical Officer;
8. Traffic Manager;
9. Port Fire Officer;
10. Sr. Comdt. CISF – Security;
11. FA & CAO;
12. Chief Law Officer;
13. Relevant representative of Terminal/berth-operators.

##### 9.1.1.2 Action Group (Incident Response Team)

The action group carries out the decisions made by CMG. It shall be formed at the time of crisis with Dy. Director – I/II -Marine or Asst. Mooring Master as the head.

1. Harbour Master (River & Dock);
2. Dock Master;
3. Assistant Port Fire Officer;
4. Safety Officer;
5. Commandant -CISF;
6. Dy. Traffic Manager;
7. Executive Engineers (Civil, Mechanical, Electrical and Hydraulic);
8. Commander (VTS);
9. OSD/Manager – Environment;
10. Sr. Dy. Chief Medical Officer;
11. Sr. Accounts officer;
12. Sr. Law Officer;
13. Terminal/berth operators- In-Charge

Refer **Figure 1.8** and **Figure 1.9** for Onsite and Offsite Emergency Organization Chart respectively.

#### 9.1.2 Level of Disasters

**L** - Defines the different levels of disasters in order to facilitate the responses and assistances to ports.

**L0** – denotes normal times which will be utilized for close monitoring, documentation, prevention and preparatory activities. Training on search and rescue,

drills, evaluation and inventory updating for response activities will be carried out during this time

**L1** – specifies disaster that can be managed at Port level; however, the neighboring industries and district will remain in the state of readiness.

**L2** – disaster situations are those, which require assistance and active participation of the port, the neighboring industries and district/State.

**L3** – disaster situation is in case of large-scale disaster where the state and district authorities have been overwhelmed and require assistance from the Central Government for rescue, relief, and other response and recovery measures. In most cases, the scale and intensity of the disaster as determined by the concerned technical agency like IMD, INCOIS etc. are sufficient for the declaration of L3 disaster.

**9.1.3 Roles and Responsibilities of Terminal/Berth Operators and Port Authority**

<b>Role</b>	<b>Terminal/Berth Operators</b>	<b>Port Authority</b>
<b>Prevention</b>	<ul style="list-style-type: none"> <li>•Prepare, revise, test and exercise own facility EAP/ERDMP.</li> <li>•Train own staff.</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare DM Plan,</li> <li>•Conduct emergency exercises,</li> <li>•Guideline to encourage all Port Facility Operators to have Emergency Management Plans.</li> </ul>
<b>During Response</b>	<p>Undertake following:</p> <ul style="list-style-type: none"> <li>•First Aid,</li> <li>•Advise staff,</li> <li>•Contain (if possible),</li> <li>•Evacuation (as appropriate),</li> <li>•Partial or Full Shutdown (as appropriate),</li> <li>•Security.</li> </ul> <p>When external emergency services arrive:</p> <ul style="list-style-type: none"> <li>•Provide specialist advise/liaison,</li> <li>•Media Advise as required,</li> <li>•Advise Port, Security, and Harbour Master as required,</li> <li>•Advice neighbouring facilities as required.</li> </ul>	<ul style="list-style-type: none"> <li>•Monitor</li> <li>•Make Strategic decisions regarding:                             <ul style="list-style-type: none"> <li>○ Shipping movements</li> <li>○ Threats to Port facility operators and effects on their business operations</li> </ul> </li> <li>•Advice and assist to affected Port facility Operators on matters where qualified to do so.</li> <li>•Escalate response level by obtaining assistance from Local Crisis Groups.</li> </ul>
<b>Recovery and reconstruction</b>	<ul style="list-style-type: none"> <li>•Advice and assistance to own staff in resuming operations.</li> <li>• Implement respective BCPs.</li> </ul>	<ul style="list-style-type: none"> <li>•Assist Port facility operators &amp;/or shipping to resume operations.</li> <li>•Establish continuity of port business.</li> </ul>

**Table 9.1:** Roles and Responsibilities of Terminal/Berth Operators and Port Authority

## 9.1.4 Roles and Responsibility of key personnel

CHECKLIST -1		CHIEF EMERGENCY CONTROLLER (CEC) DEPUTY CHAIRMAN		
Phase		Action	Time	
<b>Mobilization /Activation</b>	1	Obtain details of incident and of any mitigative actions taken from CIC.		
	2	Communicate with and coordinate with		
		a.	Local, District, State and National Authorities	
		b.	Crisis Management Group (CMG)	
		c.	Chief Incident Controller (CIC)	
	d.	D.G. Shipping		
<b>Establishing Control</b>	3	Nominate alternate person if any functionary is not available.		
	4	Establish radio or telephone contact with CIC and CMG.		
<b>Planning</b>	5	Advice and provide support to CIC on		
		a.	Propriety of response level	
		b.	Location of EOC	
		c.	Additional Human Resource, materials, equipment and information.	
	d.	Authorizes the release of required funds for the necessary arrangements for evacuation, transportation, food & supplies.		
	6	Advice CIC on activation of DMP.		
<b>Ongoing Response</b>	7	Activate Off Site Plan, if necessary.		
	8	To issue Media briefings when required.		
<b>Response Termination</b>	9	Terminating response advice given to CIC if conditions are met.		
	10	Receive incident reports from CIC/ nominated alternate person.		
	11	Advise on further course of action in consultation with CIC/ nominated alternate person.		

END CEC CHECKLIST

CHECKLIST -2		CHIEF INCIDENT CONTROLLER (CIC) DIRECTOR-MARINE		
Phase		Action	Time	
<b>Mobilization / Activation</b>	1	Obtain details of incident and of any mitigative actions taken.		
	2	Start recording of events in the Personal Log.		
	3		Communicate and coordinate with	
		a.	Chairman/Dy. Chairman -CEC	
		b.	IRT and CMG	
		c.	CISF-Security	
		d.	Local Authorities and Neighboring industries, District, State and National Authorities	
e.		Respective Terminal Managers/Operators		
f.	Relevant external agencies for Natural Disasters.			
<b>Establishing Control</b>	4	Assess the Incident and authorize any immediate action by SIC (Raising appropriate alarm) and on-site staff as required.		
	5	Proceed to the EOC and conduct briefing meeting.		
	6	Convene IRT (as required).		
	7	Establish radio or telephone contact with Local, District, State and National Authorities.		
<b>Evaluation</b>	8	Determine resources at risk and the level of disaster.		
	9	Evaluate the assessment of the incident, in consultation with the SIC.		
<b>Planning</b>	10	Arrange for monitoring of the event/incident.		
	11	Convene planning meeting.		
	12	Instruct Material Manager to make a list of required needs: Personnel, equipment, transport etc. Authorize acquisition.		
<b>Ongoing Response</b>	13	Implement response actions as per OSCP and DMP.		
	14	Continue to monitor incident.		
	15	Monitor the response by scheduling and undertaking regular briefings/debriefings of IRT.		
	16	Amend the SOP and Action Plan as required.		
	17	Ensure that IRT is supplied with necessary personal needs such as tugs, walkie-talkies, PPE, food etc.		
	18	Monitor OH&S performance.		
	19	Monitor casualties and vessel traffic movements.		
20	Terminate response if conditions are met.			
<b>Response</b>	21	Advise the SIC and inform CEC.		

<b>Termination</b>	22	Ensure that all IRT members, combat and support agencies are informed of termination of response.	
	23	Monitor to ensure safe and complete demobilization.	
	24	Debrief CMG.	
	25	Attend debriefs with Chairman/Dy. Chairman.	
	26	Ensure that all records are collated and stored.	

**END CIC CHECKLIST**

<b>CHECKLIST -3</b>		<b>SITE INCIDENT CONTROLLER (SIC) DEPUTY DIRECTOR I/II – MARINE (FOR KDS AND NSD) Or ASST MOORING MASTER (FOR BUDGE BUDGE)</b>		
<b>Phase</b>		<b>Action</b>	<b>Time</b>	
<b>Mobilization /Activation</b>	1	Obtain details of incident and of any mitigative actions taken.		
	2	Start recording of events in the Personal Log.		
	3	Initiate		
		a.	DMP, OSCP as required	
	4	Communicate and coordinate with		
		a.	CIC	
		b.	IRT	
		c.	CMG	
		d.	Master of the vessel	
		e.	Terminal, Berth Managers and Operators	
<b>Establishing Control</b>	5	Assess the level of incident, nature, location, severity, casualties and resource requirement.		
	6	Conduct initial briefing.		
	7	Authorize any immediate action required by on site staff and contract agencies.		
	8	Establish radio or telephone contact with CIC and CMG.		
<b>Planning</b>	9	Arrange for		
		a.	Deployment of Pollution and Fire-extinguishing response equipment.	
		b.	Multi-Purpose Vessels	
		c.	Tugs, etc.	
	d.	Ensure evacuation of personnel to assembly areas.		
10	Assist Material Manager to compile a list of needs: Personnel, equipment, transport etc.			

<b>Ongoing Response</b>	11	Implement response actions as per OSCP and DMP.	
	12	Continue to monitor incident.	
	13	Monitor the response as per CIC schedule and undertake regular briefings/debriefings of IRT.	
	14	Coordinate Search and Rescue operations.	
	15	If necessary, call for additional resources.	
	16	Arrange relief for IRT members & Monitor OH&S performance.	
	17	Monitor waste volumes, if any.	
<b>Response Termination</b>	18	Terminate response if conditions are met on permission of CIC.	
	19	Ensure that all IRT members, Contract Agencies and CIC are informed of termination of response.	
	20	Monitor to ensure safe and complete demobilization.	
	21	Ensure that all records are collated and stored.	

**END SIC CHECKLIST**

<b>CHECKLIST -4</b>		<b>HARBOUR MASTER (PORT &amp; RIVER) &amp; DOCK MASTER</b>	
<b>Phase</b>		<b>Action</b>	<b>Time</b>
<b>Mobilization / Activation</b>	1	Communicate and coordinate with	
		a. CIC	
		b. SIC	
		c. Commander (VTS)	
		d. Pilot and Marine Engineers	
		e. Chief Hydraulic Engineer	
		f. Salvage Companies	
		g. Master of the vessel	
	h. Meteorological department		
<b>Initial Action</b>	2	Ensure telephone operator / signal room communicate with emergency team.	
	3	Ensure arrangement of tugs.	
	4	On receipt of instructions from SIC, notify the fire brigade/Police/Hospitals/District Collector/ Mutual Aid Partners.	
<b>Ongoing Response</b>	5	Coordinate with SIC and provide necessary information.	
<b>Response Termination</b>	6	Terminate response on instructions of CIC/SIC	
	7	Ensure that all records are collated and stored.	

**END HM/DM CHECKLIST**

<b>CHECKLIST -5</b>		<b>SAFETY OFFICER</b>		
<b>Phase</b>		<b>Action</b>	<b>Time</b>	
<b>Mobilization / Activation</b>	1	Start recording of events in the Personal Log.		
	2	Communicate and coordinate with		
		a.	CIC	
		b.	SIC	
		c.	Ship owners / Agents / C & F agents / stevedores.	
		d.	Terminal and Berth/Jetty Managers	
		e.	Salvage Association	
f.	Waste/ Sludge disposal agencies			
<b>Establishing Control</b>	3	Establish radio or telephone contact with CIC and SIC.		
	4	Furnish information to the SIC with regards to the safety.		
	5	Inform WBPCB and other environmental agencies about the incident for getting necessary guidance.		
<b>Initial Action</b>	6	Coordinate and consolidate list of dangerous goods including tanker in port.		
	7	To collect necessary evidences required for detailed investigation of any accidents.		
	8	Coordinate with the salvage association and waste/sludge disposal agencies.		
<b>Ongoing Response</b>	9	Assist in the safe evacuation of the personnel.		
<b>Response Termination</b>	10	Terminate response if conditions are met on permission of CIC/SIC.		
	11	Submit detailed report regarding the accidents to CIC/SIC.		
	12	Ensure that all records are collated and stored.		

**END SO CHECKLIST**

CHECKLIST -6		CHIEF MECHANICAL ENGINEER (CME)		
Phase		Action	Time	
<b>Mobilization / Activation</b>	1	Start recording of events in the Personal Log.		
	2	Communicate and coordinate with		
		a.	CIC	
		b.	SIC	
		c.	Port Electrical, Workshop divisions	
		d.	Maintenance Department	
		e.	Engineering Department	
		f.	Material Management Department	
g.	State Electricity Board			
<b>Establishing Control</b>	3	Depute engineers on-site.		
	4	Establish radio or telephone contact with CIC and SIC.		
<b>Initial Action</b>	5	Implements elaborate plans for providing continuity of emergency supplies and services such as, electric power, emergency lighting, communication system, bridges & lock gates, dry docks, vehicles, floating crafts etc.		
	6	Keep alert on duty for any electrical isolation of equipment during an emergency.		
	7	Suggests optimal strategies for conducting emergency isolation operations of damaged equipment, the emergency transfer of materials and all other process related emergency operations		
	8	Maintain sufficient stock of required equipment/materials.		
	9	Coordinate with CIC, SIC, CISF & Material Manager.		
	10	Ensure water supply to the hydrants.		
	11	If diving personnel are required, make arrangement for diving personnel and necessary equipment.		
<b>Ongoing Response</b>	12	Provide necessary advice and supports.		
	13	Arrange for Bulldozers, mobile cranes, forklifts or any other specialized equipment.		
	14	Mobilize cargo handling equipment.		
<b>Response Termination</b>	15	Terminate response if conditions are met on permission of CIC/SIC.		
	16	Ensure that all records are collated and stored.		

## END CME CHECKLIST

CHECKLIST-7		COMMANDER (VTS)	
Phase		Action	Time
<b>Mobilization / Activation</b>	1	Communicate with	
		a. CIC	
		b. SIC	
		c. Haldia VTMS	
		d. Master of the vessel	
		e. Dock Master/Pilots	
		f. Meteorological department	
<b>Initial Action</b>	2	Gather detailed information about the incident.	
	3	On receipt of instructions from SIC, notify the Master of the Vessel, craft, security boat	
<b>Ongoing Response</b>	4	Coordinate with SIC and provide necessary information.	
<b>Response Termination</b>	5	Terminate response on instructions of CIC/SIC	
	6	Ensure that all records are collated and stored.	

## END C(VTS) CHECKLIST

CHECKLIST -8		CHIEF ENGINEER (CE) – (Civil)	
Phase		Action	Time
<b>Mobilization / Activation</b>	1	Start recording of events in the Personal Log.	
	2	Communicate and coordinate with	
		a. CIC	
		b. SIC	
		c. M&E department	
		d. Workshop	
		e. Material Management Department	
f. Maintenance department			
	3	Depute engineers on-site.	
<b>Establishing Control</b>	4	Establish radio or telephone contact with CIC and SIC.	
<b>Initial Action</b>	5	Arrange sand bags, Diesel pumps, sufficient quantities of bleaching powder etc., for the event of Cyclone/flood. Plans/strategy, as contemplated, to be forwarded to higher levels.	
	6	Will look after navigational aids, fenders, sea wall, transit shed doors, roofs etc.	
	7	Identify local contractors and keep them as standby to meet emergency requirements such as man power, equipment etc.	

	8	Render and Monitor assistance for extricating trapped personnel by cutting structures etc.	
	9	To ensure that adequate clean water is available in the reservoirs.	
	10	Instruct the contractors to carry out urgency civil works if required.	
	11	Coordinate with CIC, SIC, CISF & Material Manager.	
<b>Ongoing Response</b>	12	Provide necessary advice and support.	
	13	In case of fire and especially if the fire involves toxic/flammable materials, contain the run off fire water and other water from the damaged units.	
	14	Cooperate with IRT to conduct the actual cleanup work during and after the emergency.	
<b>Response Termination</b>	15	Terminate response if conditions are met on permission of CIC/SIC.	
	16	Undertake strengthening of shore line, buildings and other civil works.	
	16	Ensure that all records are collated and stored.	

## END CE(C) CHECKLIST

CHECKLIST-9		SENIOR PILOT	
Phase		Action	Time
<b>Mobilization / Activation</b>	1	Upon callout, report to CIC/SIC.	
	2	Start recording of events in the Personal Log.	
	3	Attend Initial Briefing.	
<b>Assessment</b>	4	Assist SIC/Commander (VTS)/ Harbour Master/ Dock Master to obtain and collate available data re:	
		a. Weather.	
		b. Tides, currents.	
		c. Latest update on action taken.	
<b>Planning</b>	5	Determine field response equipment/ labor/ transport requirements and provide to CIC.	
<b>Ongoing Response</b>	6	Direct and coordinate marine response activities.	
	7	Prepare all tugs/crafts for mobilization at the earliest.	
	8	Prepare directive for marine response teams.	
	9	Ensure that field response teams receive required	
		a. Information i.e. Briefings/Inductions/Weather.	
		b. Personal protective equipment (PPE).	
		c. Essential supplies (e.g. food, first aid etc.).	
d. Weather conditions.			
e. Monitoring of response activities.			

	10	Coordinate dispersant operations when permitted.	
	11	Seek for necessary means for aerial observation, containment and recovery actions and vessel dispersant spraying operations.	
	12	Inform in-charge of pollution response cell of anticipated waste quantity and type.	
<b>Response Termination</b>	13	Advise for termination of response operation.	
	14	Ensure safe return of response personnel.	
	15	Ensure that all equipment is cleaned and returned to stores.	
	16	Attend debriefing.	
	17	Ensure that all records are collated and stored.	

**END SP CHECKLIST**

<b>CHECKLIST-10</b>		<b>MATERIAL MANAGER</b>	
<b>Phase</b>		<b>Action</b>	<b>Time</b>
<b>Mobilization / Activation</b>	1	Communicate with	
		a   CIC/SIC	
		b   Engineering Department	
		c   Maintenance Coordinator	
<b>Initial Action</b>	2	Arrange for material and equipment	
	3	Ensure stock of emergency equipment such as diesel, petrol and such other oils, fire-fighting items such as foam, damage control stores such as cement and other stores required to keep plants, machinery road vehicles and water-craft running.	
	4	One officer to liaise with suppliers of all items mentioned above, so that they can be procured as and when required.	
<b>Response Termination</b>	5	Terminate response if conditions are met on permission of CIC/SIC.	
	6	Ensure that all records are collated and stored.	

**END MM CHECKLIST**

<b>CHECKLIST-11</b>		<b>COMMANDANT - CISF (SECURITY)</b>	
<b>Phase</b>		<b>Action</b>	<b>Time</b>
<b>Mobilization / Activation</b>	1	Obtain details of incident and of any mitigative actions taken.	
	2	Start recording of pertinent facts and figures in the Personal Log.	
	3	Communicate and coordinate with	
		a.   CIC	

*Disaster Management Plan*

		b. SIC	
		c. Kolkata Police Authorities	
		d. State Relief and Rehabilitation department	
<b>Establishing Control</b>	4	Authorize any immediate action required by on site staff.	
	5	Establish a special task force for the rescue operation.	
	6	Establish radio and telephone contact with CIC and SIC	
<b>Initial Action</b>	7	Obtain necessary instructions from SIC.	
<b>Ongoing Response</b>	8	Keep extra vigilance on the location or sites which are likely to be affected by cyclone for e.g. store, workshop, cargo berth, transit shed, warehouse, dry dock, administration building etc.	
	9	Control entry of unauthorized persons.	
	10	Facilitate entry of authorized persons, agencies.	
	11	Facilitate entry of emergency vehicles such as ambulance etc.	
	12	Assist in Search and Rescue operation.	
<b>Response Termination</b>	13	Ensures that residents within port area are notified about disaster and instructions to evacuate if necessary.	
	14	Carry out a reconnaissance of the evacuated area before declaring the same as evacuated.	
	15	Terminate response if conditions are met on permission of CIC or SIC.	
	16	Ensure that all records are collated and stored.	

**END CISF-S CHECKLIST**

<b>CHECKLIST -12</b>		<b>CHIEF MEDICAL OFFICER</b>	
<b>Phase</b>		<b>Action</b>	<b>Time</b>
<b>Mobilization / Activation</b>	1	Start recording of events in the Personal Log.	
	2	Communicate and coordinate with	
		a. CIC	
		b. SIC	
		c. ICLO, Nearby Hospitals, Medical department of Gov. of West Bengal and Health care professionals.	
		d. Port Signal Station	
e. CISF			
<b>Establishing Control</b>	3	Activate Hospital Emergency Action Plan and depute doctors on-site to give first aid to the injured.	

	4	Establish radio or telephone contact with CIC and SIC and understand the emergency situation.	
	5	Advise CIC/SIC on industrial hygiene and make sure that the frontline personnel are not exposed to unacceptable levels of toxic substances.	
	6	Inform hospitals of the situation in case of a toxic release and apprise them of the antidotes necessary for the treatment	
	7	Coordinate with ICLO. Along with the District Administration and health care professionals, ICLO will facilitate infection control programme in the event of a natural disaster.	
<b>Initial Action</b>	8	Maintain sufficient stock of medicines, antidotes, oxygen, stretchers etc and arrange for ambulance.	
	9	Suggest and provide an antidote in the event of toxic release	
	10	Coordinate with nearby hospitals and doctors.	
<b>Ongoing Response</b>	11	Provide necessary advice and supports for appropriate treatment of the injured persons.	
<b>Response Termination</b>	12	Terminate response if conditions are met on permission of CIC/SIC.	
	13	Ensure that all records are collated and stored.	

**END CMO CHECKLIST**

<b>CHECKLIST -13</b>		<b>TRAFFIC MANAGER</b>		
<b>Phase</b>		<b>Action</b>	<b>Time</b>	
<b>Mobilization / Activation</b>	1	Start recording of events in the Personal Log.		
	2	Communicate and coordinate with		
		a.	CIC	
		b.	SIC	
	c.	Terminal and Berth Managers		
<b>Establishing Control</b>	3	Prepares vessels to vacate from berth.		
	4	Establish radio or telephone contact with CIC and SIC.		
<b>Initial Action</b>	5	Prepare consolidated list of dangerous goods including tankers in port and provide details to SIC.		
	6	Arranges to protect cargo in vicinity from damage.		
	7	Arranges to segregate and shift cargo in sheds.		
	8	Provide necessary advice and supports.		
<b>Response Termination</b>	9	Terminate response if conditions are met on permission of CIC/SIC.		

	10	Ensure that all records are collated and stored.	
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**END TM CHECKLIST**

<b>CHECKLIST -14</b>		<b>TERMINAL/BERTH MANAGER</b>		
<b>Phase</b>		<b>Action</b>	<b>Time</b>	
<b>Mobilization / Activation</b>	1	Start recording of events in the Personal Log.		
	2	Communicate and coordinate with		
		a.	CIC	
		b.	SIC	
		c.	Ship owners / Agents / C & F agents / stevedores.	
	d.	Terminal Managers		
<b>Establishing Control</b>	3	Prepares vessels to vacate from berth.		
	4	Establish radio or telephone contact with CIC and SIC.		
<b>Initial Action</b>	5	Prepare consolidated list of dangerous goods including tankers in port.		
	6	Arranges to protect cargo in vicinity from damage.		
	7	Arranges to segregate and shift cargo in sheds.		
<b>Ongoing Response</b>	8	Coordinate with ship owners/agents/C & F Agents/stevedores.		
	9	Provide necessary advice and supports with manpower and equipment including fire-fighting aids.		
<b>Response Termination</b>	10	Terminate response if conditions are met on permission of CIC/SIC.		
	11	Ensure that all records are collated and stored.		

**END T/BM CHECKLIST**

<b>CHECKLIST -15</b>		<b>SECRETARY (GENERAL ADMINISTRATION)</b>		
<b>Phase</b>		<b>Action</b>	<b>Time</b>	
<b>Mobilization / Activation</b>	1	Communicate and coordinate with		
		a.	CEC	
		b.	Media (preparing brief)	
		c.	Administration Department	
		d.	Material Management Department	
		e.	Legal and Finance Department	
<b>Initial</b>	2	Will remain in-charge of the Admin. department.		

*Disaster Management Plan*

<b>Action</b>	3	In the event of evacuation, assist Management Group to co-ordinate with State Transport Authority and the Kolkata or West Bengal Police authority for evacuation. Arrange for food and water and accommodation.	
	4	Liaise with Kolkata Corporation and the Civil Defence Organisation for arrangements for shelters for the evacuated persons, food for them and later for their rehabilitation.	
	5	Keep in close liaison with the evacuating authority and collect all details regarding the evacuated people. This will be necessary to settle claims, if any, at a later date.	
	6	Mobilise all vehicles for the transportation needs of the Management Team, the Action Team and support services.	
	7	Keep the Legal Advisor of the Port informed of the situation at all times and obtain his advice for legalising all the port's actions.	
	8	Draw lists of Port Personnel affected and involved in an incident, and keep their families informed correctly through Information Centre.	
	9	Make proper arrangements for the Port's personnel engaged in combating an emergency for their food and rest.	
<b>Response Termination</b>	10	Liaises with media under guidelines provided by the CEC.	

**END SEC CHECKLIST**

<b>CHECKLIST -16</b>		<b>CHIEF LAW OFFICER</b>	
<b>Phase</b>		<b>Action</b>	<b>Time</b>
<b>Mobilization / Activation</b>	1	Communicate and coordinate with	
		a. CEC	
		b. CIC	
<b>Initial Action</b>	2	Gather information	
<b>Ongoing Response</b>	3	To provide legal opinion/advise to the competent authority and/ or concerned committee/department, based on facts and inputs provided by the concerned department/division/officers handling the core disaster-related issues.	

**END CLO CHECKLIST**

<b>CHECKLIST -17</b>		<b>FINANCIAL ADVISOR &amp; CHIEF ACCOUNT OFFICER</b>	
<b>Phase</b>		<b>Action</b>	<b>Time</b>
<b>Mobilization / Activation</b>	1	Communicate and coordinate with	
		a. CEC	
		b. CIC/SIC	
<b>Initial Action</b>	2	Gather information	
<b>Ongoing Response</b>	3	Process agreements and/or arrange payments to all departments for their requirements such as leasing/ immediate procuring of equipment.	
	4	Take appropriate action for hiring of specialist services, food, and shelter and transport arrangements, as the situation demands.	
	5	Depute a senior officer to each department involved in combating action, to look after its needs.	
	6	Monitor the expenditure, and services rendered by outside agencies to the Port and vice versa, to avoid disputes later and to facilitate smooth working of mutual aid.	
	7	Depute senior officer of this department assisted by an officer from the General Administration Department, Engineering, Marine Department to document all events, damages and claims.	
<b>Response Termination</b>	8	Liases with media under guidelines provided by the CEC.	

**END FA&CAO CHECKLIST**

<b>CHECKLIST -18</b>		<b>SR. ASST. SECRETARY (PUBLIC RELATIONS)</b>	
<b>Phase</b>		<b>Action</b>	<b>Time</b>
<b>Mobilization / Activation</b>	1	Communicate and coordinate with	
		a. CEC	
		b. CIC	
<b>Initial Action</b>	2	Set up an Information Centre.	
<b>Ongoing Response</b>	3	Liase between the Control Room and outside agencies participating in the emergency.	
	4	Provide information to the Kolkata Police regarding developments as authorised.	
<b>Response Termination</b>	5	Liases with media under guidelines provided by the CEC.	

**END S(PR) CHECKLIST**

## **9.2 EARLY WARNING/ ALERT SYSTEM**

### **9.2.1 Receiving and managing alerts**

Information of the occurrence of incidents in and around port area may come from a variety of sources. On receipt of information designated personnel must carry out investigation to confirm the incident and gather as many details and as quickly as possible:

- Prepare an incident report.
- Immediately forward the report to and inform the Director-Marine/Dy. DMD I/II.

The information so collected shall be maintained by making hourly log entry in a register.

### **9.2.2 Activation of EOC and initial resource coordination**

#### **9.2.2.1 Establishing the Emergency Operational Centre**

##### **9.2.2.1.1 Location**

The EOC will be located in the Port Control room or as directed by the Chairman/Dy. Chairman.

For small scale or short duration responses, the local EOC will be used inside the port. For larger scale responses, where external help is needed the main office area or as directed by the Chairman, will be utilized along with local EOC.

##### **9.2.2.1.2 Muster Point**

IRT personnel will muster at the nominated EOC unless otherwise directed by the SIC.

##### **9.2.2.1.3 First Person On-Site**

The person who arrives first at the EOC premises will commence preparation for the meeting.

##### **9.2.2.1.4 Responsibility**

The designated CIC/SIC will mobilize IRT members.

##### **9.2.2.1.5 Resource mobilization**

The CIC/SIC will ensure mobilization of sufficient equipment and personnel resources required to manage the response.

##### **9.2.2.1.6 Direction, control and coordination – Function coordination amongst IRT**

The overall responsibility of the Emergency management lies with the Director-Marine. He assumes the responsibility of CIC on receipt of the information of an impending emergency.

Some of the critical functions are:

- Activation of the EOC,
- An ongoing emergency assessment, including upgrading or downgrading of the emergency alarm level,
- Notification of outside governmental agencies,
- The decision to ask for outside help and resources,

- The decision to evacuate people,
- Decisions involving the safety of offsite vulnerable points (e.g. recommendations to evacuate or take shelter, in the case of a toxic vapour release).

<b>PROCEDURE-A</b>		<b>ESTABLISHING THE EMERGENCY OPERATION CENTRE (EOC)</b>		
<b>Task</b>	<b>Action</b>		<b>Status</b>	
1.0	Obtain and/or assign EOC equipment.			
1.1	<b>Communications</b>			
	a	Telephone lines. (1 Hot line linking Dy. Commissioner of the district)		
	b	Fax lines.		
	c	Radio frequency (as required).		
1.2	Information Display.			
	a	Set of forms (minimum of 5 sets).		
	b	Regional Maps and Charts:		
		i	Nautical charts.	
	ii	Topographic maps		
	c	Overhead projector (in nominated briefing room).		
d	Whiteboards.			
1.3	Copy(s) of the SMP DMP and OSCP.			
1.4	Computer and Printer.			
1.5	Stationary: Markers, Pens, Pencils and A4 white paper.			
1.6	Tables and chairs			
1.7	Order and obtain any items needed (1.1-1.6)			
1.8	Advise reception to direct incoming calls to the EOC.			

**Table 9.2:** Procedure for Establishing EOC

### 9.2.3 Competent Agencies

<b>Disaster</b>	<b>Agencies</b>
Earthquakes	IMD
Floods	Central Water Commission (CWC)
Cyclones	IMD, Regional Specialized Meteorological Centre (RSMC) – Arabian Sea
Tsunami and Storm Surge	INCOIS

**Table 9.3:** Competent agencies for issuing warnings

These agencies shall be responsible for keeping track of developments in respect of specific hazards assigned to them and inform the designated authorities/agencies at National, State and District levels about the impending disasters. All these agencies have developed guidelines for early warning of disasters.

**9.2.3.1 Cyclone**

Indian Meteorological Department (IMD) has a developed detailed procedure for Four Stage Warning of Cyclone

1. **Pre-Cyclone Watch:** Pre-cyclone watch is an early warning issued about 72 hrs. in advance of the commencement of bad weather. This is issued by the IMD Headquarters to all designated authorities including the Cabinet Secretary and other senior officers of Govt. of India and the Chief Secretaries of concerned Maritime States, media and all Cyclone Warning Centers (CWS) of IMD.
2. **Cyclone Alert:** Cyclone Alert is issued to all designated authorities/Agencies as far as possible, 48 hours before the expected commencement of adverse weather.
3. **Cyclone Warning:** Cyclone warning are issued to all designated Authorities/Agencies including the Chief Secretaries of the maritime States and the District Magistrates/Collectors of the coastal districts and the immediate interior districts expected to be affected by the cyclone. Cyclone Warning is also issued to the designated railway officials and defense personnel. After initial warning, cyclone warning is issued to above officials twice a day by high priority telegrams based on 0830 IST and 1730 IST charts till the weather improves.
4. **Post Landfall Outlook:** Post landfall outlook is issued at least 12 hours in advance of the landfall by concerned CWCs. On the basis of this outlook, the concerned Meteorological Centre will also issue cyclone warnings for the interior areas.

**9.2.3.1.1 Cyclone Warning Dissemination System (CWDS)**

Cyclone Warning Dissemination System (CWDS) receivers have been established in vulnerable coastal areas using INSAT/METSAT. The system is being used extensively on operational basis during cyclone. The cyclone warning message is originated from Cyclone Warning Centre (CWC) Kolkata whenever a storm is observed.

In addition, Cyclone Warning is disseminated through the following means:

- a. Police Wireless network,
- b. Warnings through All India Radio (AIR) Bulletins,
- c. Television,
- d. Press Bulletins,
- e. Aviation Warning,
- f. Telephone and Fax,
- g. Telex,
- h. Telegrams.

**9.2.3.2 Tsunami**

In the aftermath of the Indian Ocean Tsunami of 26 December 2004, the Ministry of Earth Sciences has set up an Indian Tsunami Early Warning Center at the Indian National Centre for Ocean Information Services (INCOIS) Hyderabad. The Center provides advance warnings to the port on Tsunamis likely to affect the port area and the adjoining coastline in general.

**Tsunami Warning (RED)** contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected. This is the highest level wherein immediate actions are required to move public to higher grounds. Message also contains information on the travel times and tsunami grade (based on run-up estimates) at various coastal locations.

**Tsunami Alert (ORANGE)** contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected. This is the second highest level wherein immediate public evacuation is not required. Public should avoid beaches since strong current are expected. Local officials should be prepared for evacuation if it is upgraded to warning status. Message also contains information on the travel times and tsunami grade at various coastal locations.

**Tsunami Watch (YELLOW)** contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected. This is the third highest level wherein immediate public evacuation is not required, Local officials should be prepared for evacuation if it is upgraded to warning status. Message also contains information on the travel times and tsunami grade at various coastal locations.

**Tsunami cancellation (GREEN)** will be issued if the tsunami warning was issued on the basis of erroneous data or if the warning center determines from subsequent information that only an insignificant wave has been generated. In addition, tsunami warning may be cancelled on a selective basis when a significant wave that has been generated clearly poses no threat to one or more of the areas the warning center warns, either because of intervening continents or islands which screen them or because the orientation of the generating area causes the tsunami to be directed away from these areas.

**Tsunami All Clear (GREEN)** bulletin indicates that the ‘Tsunami Threat’ is passed and no more dangerous waves are expected.

**9.2.3.3 Flood**

Central Water Commission has developed a network of flood forecasting stations and issues Daily Flood Bulletins to all designated Authorities/Agencies of the Central Government and State Governments/ district Administration during the South East Monsoon season for all the major river basins in the following categories:

**Category IV:**

Low Flood (Water level between Warning Level and Danger Level)

**Category III:**

Moderate Flood (Water Level below 0.50m. less than HFL and above Danger Level)

**Category II:**

High Flood (Water Level less than Highest Flood Level but still within 0.50m. of the HFL)

**Category I:**

Unprecedented Flood (Water Level equal and above Highest Flood Level (HFL))

**9.2.4 PUBLIC WARNING**

The capabilities and processes the Port has in place to information collection and disseminates warning messages to the stakeholders and all the personnel as to the nature of the hazard, the timing, and the recommended or required protective/preventive actions which are to be implemented by the action group are described in the following sections.

**9.2.4.1 Message content**

The message needs to be announced at least in local language which may be for example Evacuate, Assemble etc.

**9.2.4.2 Public Warning System**

The various types of warnings through hooters/sirens with indication locally and in control room, depending on the location of emergency as specified below:

**➤ Siren for declaring Emergency**

1. On receipt of the information about the Emergency, the control station will authorize CISF at Gate to actuate the Emergency Siren as follows: -
  - Siren to be sounded continuously for 10 Seconds with an interval of 5 seconds for one minute.

**➤ Siren declaring All Clear and returning to the work**

1. On receipt of the information from the Director- Marine or in his absence Harbour Master the port control room will authorize CISF at Gate to actuate the Siren as follows:
  - Continuous ringing of siren for 1 minutes

### 9.3 HAZARD SPECIFIC RESPONSE PLAN

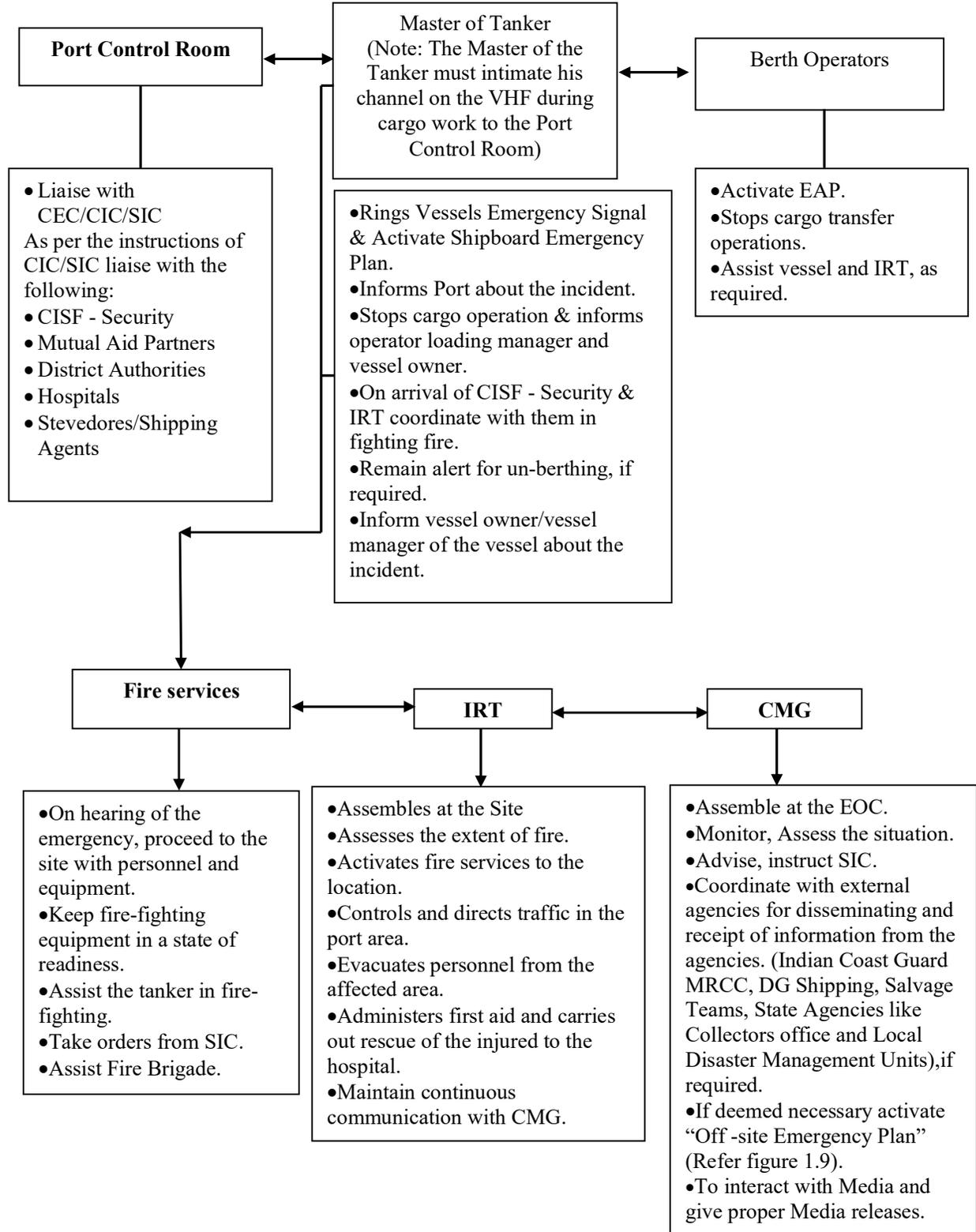
Following potential accidental scenarios have been identified in accordance with the risk assessment for the port. The action flowchart and action plan for each scenario has been prepared in accordance with the Incident Response System (IRS-NDMA).

SR. NO.	SCENARIOS	PAGE NO.
<b>DISASTER DURING CARGO STORAGE /TRANSFER</b>		
1.	Fire due to rupture/leakage of POL/Chemical from pipeline/hose at NSD oil jetty (berth no.12) – on vessel or ashore	156
2.	Fire due to rupture/leakage of POL/Chemical from pipeline/hose at budge-budge wharf– on vessel or ashore	164
3.	Toxic product (e.g. toluene) leak from pipeline/hose at budge-budge wharf during operation – on Vessel or Ashore	173
4.	Corrosive Acid - Leakage (e.g. Sulphuric acid) at budge-budge wharf during operation – on Vessel or Ashore	182
5.	Fire /leakage due to Crane Accidents (Container drop/crane fall) at container berth – secondary event.	190
6.	Fire on vessel (non-tankers) at berth at KPD/NSD	196
7.	Fire in Coal Stackyard at KPD/NSD	204
<b>NAVIGATIONAL DISASTERS</b>		
8.	Vessel Grounding/Collision within port limit	210
9.	Blockage of Navigational Channel due to Grounding/Sinking of vessel (Wreckage)	217
<b>DISASTER IN SERVICE AND ADMINISTRATION FACILITIES</b>		
10.	Fire in Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard	226
<b>HUMAN RELATED DISASTERS</b>		
11.	War and Terrorism	232
12.	Bomb Threat	238
<b>NATURAL DISASTERS</b>		
13.	Natural Disaster (Cyclone)	243
14.	Natural Disaster (Flood due to high tide and/or heavy rains)	255
15.	Natural Disaster (Tsunami)	265
16.	Natural Disaster (Earthquake)	275

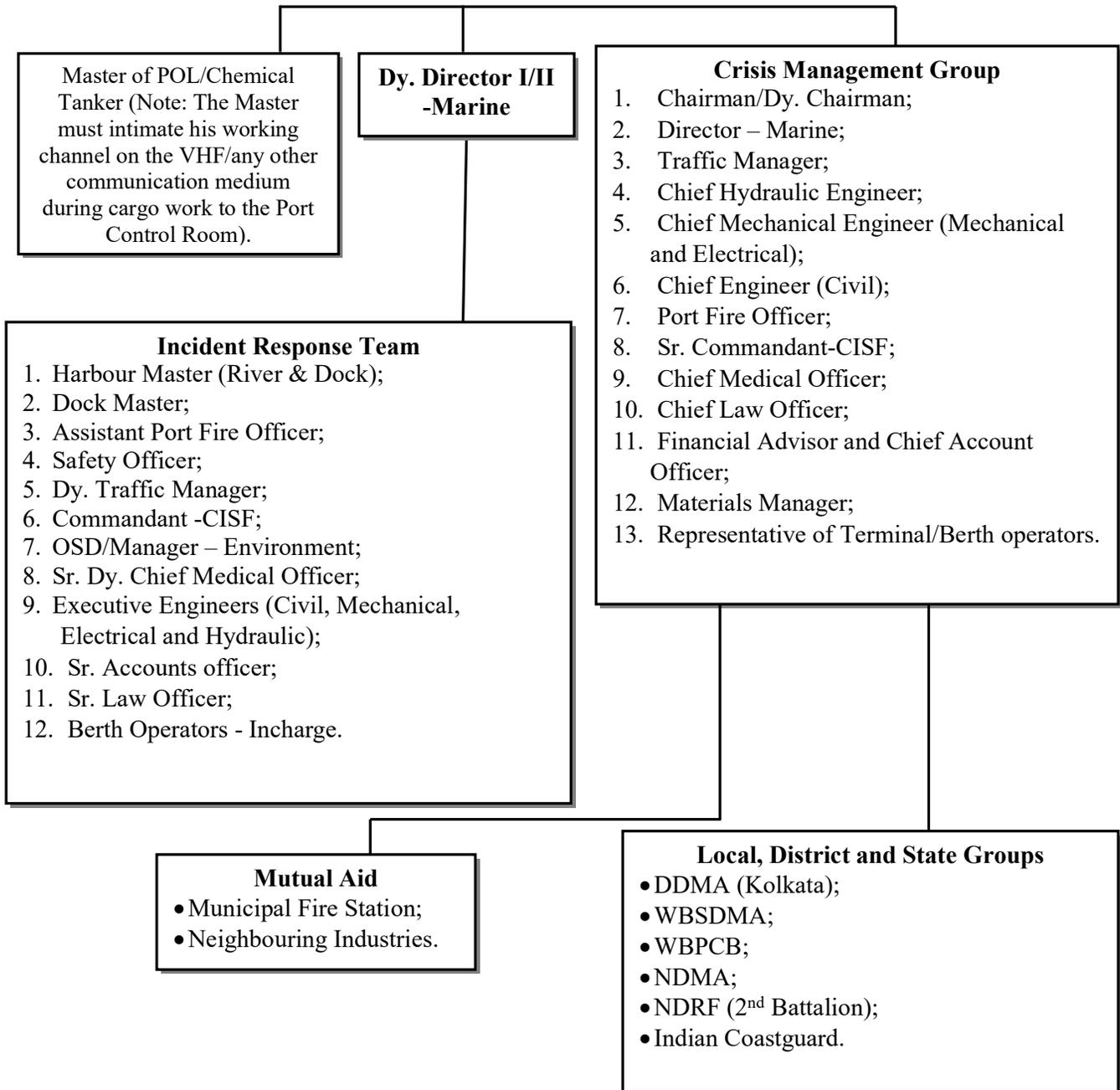
**S1: Scenario 1****Part A**

- 1. Fire due to rupture/leakage of POL/Chemical from pipeline/hose at NSD oil jetty (berth no. 12)– on vessel or ashore**
- 2. Precautions:** MSDS, SOP of operator and berthing and un-berthing procedure, Periodic inspection and maintenance of hoses and pipelines.
- 3. Impact Zone:** Oil Jetty and surrounding area.
- 4. Resources required:** Organizational setup enumerated in Figure S1.2 and material and equipment resources as given in **Appendix D.**

Figure S1.1: Action Flow Chart



**Figure S1.2: Action group**



**Part B: Action Plan**

The vessel upon berthing, berth operator will follow standard procedures. However, in a less likely scenario a leak from the pipeline system may occur at the jetty or from the jetty along the route to the terminal (within the port area) leading to self-detection by vessel personnel or by the terminal/operator automatic alarm system. Further in a more unlikely situation due to a possible ignition the leakage might catch fire. The following action will be required:

**1. The Master of the Vessel (Alternate: Chief Officer)**

Response Action	Contact
a. Should raise vessels emergency alarm and activate vessel board emergency action plan.	
b. Stop POL/Chemical transfer operation (as per SOP).	
c. Berth operator, Vessel in the vicinity and Port should be informed of any incident on the vessel without delay.	<ul style="list-style-type: none"> <li>• Berth operator</li> <li>• Port Control Room</li> </ul>
d. Personnel to remain stand by to disconnect hoses.	
e. Shall be responsible for fighting the fire with vessels own resources as well as with the available support from IRT.	
f. Also, to remain prepared to un-berth the vessel to the safe area.	
g. The siren should be continued till the vessel is taken to a safe location as per CIC instructions.	

**2. The berth operator tasked with POL/Chemical cargo operations at the Jetty should**

Response Action	Contact
a. Activate EAP and inform Port.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
b. Shut off isolation valve on POL/Chemical pipeline at the berth/wharf (action as per SOP).	
c. Area should be cordoned off.	
d. Pour foam/dry chemical powder on POL/Chemical spillage to reduce rate of vaporization.	
e. Assist IRT and provide all necessary equipment.	
f. He will direct operation staff. Coordinate with the vessel in-charge/C & F Agents/stevedores.	

**3. Director -Marine (Alternate: Dy. Director I/II - Marine)**

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC and Port Control Room & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Assess the condition of site and of potential affected area and take decision on evacuation in consultation with SIC.	<ul style="list-style-type: none"> <li>• SIC</li> </ul>
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

**4. The Port Control Room**

Response Action	Contact
a. Gather information related to the weather conditions and accordingly convey the message to CIC/SIC and Fire team.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Fire Team</li> </ul>
b. Liaise with Master of the Vessel/Pilot.	<ul style="list-style-type: none"> <li>• Master of the Vessel</li> <li>• Pilot</li> </ul>
c. Listening watch to be maintained on VHF channel-16.	
d. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> </ul>
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	<ul style="list-style-type: none"> <li>• Coastguard</li> <li>• Stakeholders</li> </ul>
f. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel.	

**5. The Fire-fighting personnel should**

Response Action	Contact
a. Raise Alarm (siren)	
b. Use water sprays and portable nozzles to maintain curtain.	
c. Ensures availability of the fire tenders and fire-fighting tugs.	

d. In case of fire onboard assist Master in fighting fire as per Masters Instructions.	
e. Ensure all the ignition sources in the vicinity are extinguished if fire has not occurred.	
f. If the fire is under control and extinguished, give all clear signal.	

**6. Duties of IRT**

<b>Designated Officer</b>	<b>Role</b>	<b>Duties</b>	<b>Alternate Officer</b>
Dy. Director I - Marine	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the Master of the Tanker and berth operator.	Dy. Director II - Marine
		Conduct initial Briefing.	
		Report the situation to the CIC and assist in assessing the incident.	
		Alert vessels within the vicinity.	
		Assess the condition of site and of potential affected area and take decision on evacuation in consultation with CIC.	
		Extend all necessary help to the Master of the vessel to fight the fire.	
		Instruct the Fire Team to keep the water tenders in a state of readiness & activate if required.	
		Instruct pilots to keep tugs ready for fire-fighting.	
Harbour Master (River)	Port Control Room Coordinator	Coordinate with all functional heads to take actions.	Dock Master/Pilots
		Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC /SIC.	
		Responsible for organizing tugs, mooring boats and pilots for combating the fire and rescue.	
		Hire additional crafts as necessary.	
		Maintain Log of events.	

*Disaster Management Plan*

Berth operator	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with Port and rendering necessary assistance to the SIC by providing additional fire-fighting & emergency equipment as required.	Alternate Officer
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	<p>Shall take orders from the SIC.</p> <p>Lead the fire-fighting team and mobilize fire tenders, men &amp; fire-fighting equipment to the scene &amp; extend all necessary support to the Master of the vessel/berth operator for fire-fighting.</p> <p>Assist CISF in evacuation of workers to the assembly points.</p> <p>Inform SIC for arrangement of any additional equipment as required.</p>	Alternate Officer
Commandant-CISF	Security and Evacuation	<p>Shall take orders from the SIC.</p> <p>Cordon off the area.</p> <p>Controls &amp; Directs gate security and traffic in the area.</p> <p>Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency.</p> <p>Control the entry of unauthorized persons and vehicles.</p> <p>Check for entry of emergency vehicles.</p> <p>Liaise with the Police authorities.</p> <p>Responsible the head count of the personnel.</p>	Dy. Commandant-CISF
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	<p>Shall take orders from SIC and assist Shift Incharge.</p> <p>Submits consolidated list of dangerous goods in port.</p> <p>Coordinates with vessel owners/ agents/C &amp; F agents/stevedores and with labour officer to arrange and ensure evacuation.</p>	Alternate Officer

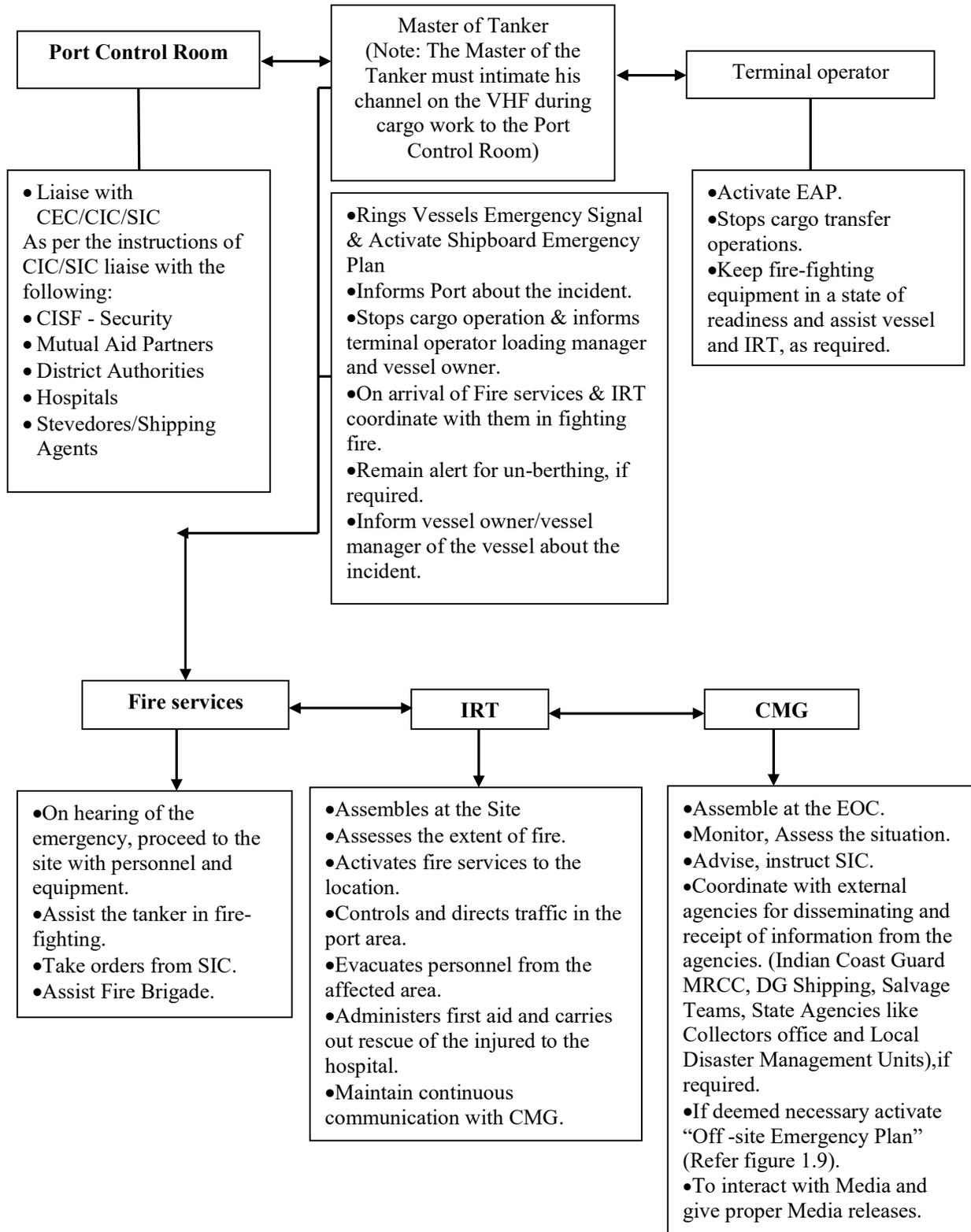
*Disaster Management Plan*

Safety Officer	Safety Coordinator	Inform WBPCB and other environmental agencies and take necessary guidance. Coordinate with OSD-Environment.	Alternate Officer
		Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	
		Assist in evacuation of the personnel to the assembly point or as directed by SIC.	
Executive Engineer	Civil Coordinator	Shall be responsible to carry out urgent civil works as required.	Alternate Executive Engineer
Executive Engineer	M & E Coordinator	Shall be responsible for uninterrupted electrical supply to vital equipment and utility at the berth.	Alternate Executive Engineer
		Shall remain alert on duty for any electrical isolation of equipment during emergency.	
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
		Make arrangements for transportation and treatment of injured persons.	
		Check updated list of Blood group of employees is available.	
		Shall coordinate with the local hospitals.	
Duty Pilot	In Charge of Pilotage	Shall be ready for taking the vessel out of berth and be ready for providing any assistance on site.	Standby Pilot
OSD Environment	Pollution Control Coordinator	Ensure clean- up work conducted by terminal personnel after spill containment.	Alternate Officer
		Coordinate with SIC and WBPCB and agencies.	

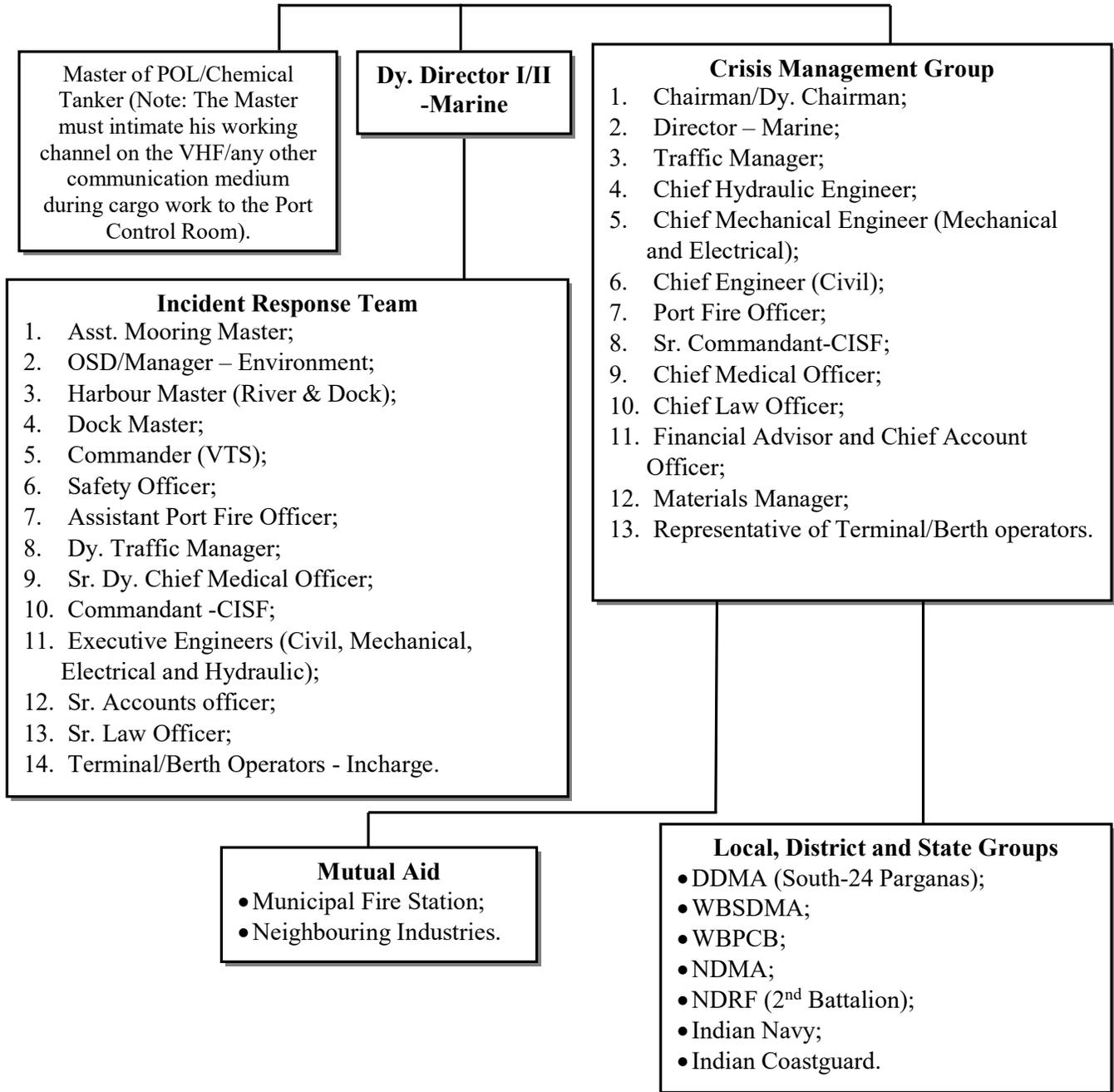
**S2: Scenario 2****Part A**

- 1. Fire due to rupture/leakage of POL/Chemical from pipeline/hose at budge-budge wharf– on vessel or ashore**
- 2. Precautions:** MSDS, SOP of terminal, berthing and un-berthing procedure and Periodic inspection and maintenance of hoses and pipelines.
- 3. Impact Zone:** Consequence analysis indicates that the MTBE leak from transfer pipeline will affect upto 900 meters in case of Vapor cloud explosion (VCE).
- 4. Resources required:** Organizational setup enumerated in Figure S2.2 and major material and equipment resources as given in **Appendix D**.

Figure S2.1: Action Flow Chart



**Figure S2.2:** Action group



**Part B: Action Plan**

The vessel upon berthing, terminal operator will follow standard procedures. However, in a less likely scenario a leak from the pipeline system may occur at the jetty or from the jetty along the route to the terminal (within the port area) leading to self-detection by vessel personnel or by the berth operator automatic alarm system. Further in a more unlikely situation due to a possible ignition the leakage might catch fire and can lead to explosion. The following action will be required:

**1. The Master of the Vessel (Alternate: Chief Officer)**

Response Action	Contact
a. Should raise vessels emergency alarm and activate vessel board emergency action plan.	
b. Stop POL/Chemical transfer operation (as per SOP).	
c. Terminal operator, Vessel in the vicinity and Port should be informed of any incident on the vessel without delay.	<ul style="list-style-type: none"> <li>• Terminal operator</li> <li>• Port Control Room</li> </ul>
d. Personnel to remain stand by to disconnect hoses.	
e. Shall be responsible for fighting the fire with vessels own resources as well as with the available support from IRT.	
f. Also, to remain prepared to un-berth the vessel to the safe area.	
g. The siren should be continued till the vessel is taken to a safe location as per CIC instructions.	

**2. The terminal operator persons tasked with POL/Chemical cargo operations at the Jetty/wharf should**

Response Action	Contact
a. Activate EAP and inform Port.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
b. Shut off isolation valve on POL/Chemical pipeline at the berth (action as per SOP).	
c. Area should be cordoned off.	
d. Pour foam/dry chemical powder on POL/Chemical spillage to reduce rate of vaporization.	
e. Assist IRT and provide all necessary equipment.	
f. He will direct operation staff. Coordinate with the vessel in-charge/Storage tank owners/stevedores.	

**3. Director -Marine (Alternate: Dy. Director I/II - Marine)**

<b>Response Action</b>	<b>Contact</b>
a. Assess the level of disaster and activate the DMP.	
b. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC/ Asst. Mooring Master and Port & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Assess the condition of site and of potential affected area and take decision on evacuation in consultation with SIC/Asst. Mooring Master.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Asst. Mooring Master</li> </ul>
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

**4. The Port Control Room**

<b>Response Action</b>	<b>Contact</b>
a. Gather information related to the weather conditions and accordingly convey the message to CIC/SIC and Fire Team.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Fire Team</li> </ul>
b. Liaise with Master of the Vessel/Pilot.	<ul style="list-style-type: none"> <li>• Master of the Vessel</li> <li>• Pilot</li> </ul>
c. Listening watch to be maintained on VHF channel-16.	
d. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC, Asst. Mooring Master informed of all the messages received by telephone, VHF sets or by messenger.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> </ul>
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	<ul style="list-style-type: none"> <li>• Coastguard</li> <li>• Indian Navy</li> <li>• Stakeholders</li> </ul>
f. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel.	

**5. The Fire-fighting personnel should**

<b>Response Action</b>	<b>Contact</b>
a. Raise Alarm (siren)	
b. Use water sprays and portable nozzles to maintain curtain.	
c. Open the valves of the monitors and direct the jet on the seat of fire.	
d. Ensures availability of the fire tenders and fire-fighting tugs.	
e. In case of fire onboard assist Master in fighting fire as per Masters Instructions.	
f. Ensure all the ignition sources in the vicinity are extinguished if fire has not occurred.	
g. If the fire is under control and extinguished, give all clear signal.	

**6. Duties of IRT**

<b>Designated Officer</b>	<b>Role</b>	<b>Duties</b>	<b>Alternate Officer</b>
Dy. Director I/II - Marine	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the Master of the Tanker and berth operator.	Asst. Mooring Master
		Conduct initial Briefing.	
		Report the situation to the CIC and assist in assessing the incident.	
		Alert vessels within the vicinity.	
		Assess the condition of site and of potential affected area and take decision on evacuation in consultation with CIC.	
		Extend all necessary help to the Master of the vessel to fight the fire.	
		Instruct the Fire Team to keep the fire-fighting installation and tenders in a state of readiness & activate if required.	
		Instruct pilots to keep tugs ready for fire-fighting.	
Coordinate with all functional heads to take actions.			

*Disaster Management Plan*

Harbour Master (River)	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC /SIC/ Asst. Mooring Master.	Dock Master/Pilots
		Responsible for organizing tugs, mooring boats and pilots for combating the fire and rescue.	
		Hire additional crafts as necessary.	
		Maintain Log of events.	
Terminal operator	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with Port and rendering necessary assistance to the SIC/Asst. Mooring Master by providing additional fire- fighting & emergency equipment as required.	Alternate Officer
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Alternate Officer
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to the Master of the vessel/Terminal operator Manager/Shift Incharge for fire- fighting.	
		Assist CISF in evacuation of workers to the assembly points.	
Commandant-CISF	Security and Evacuation	Inform SIC/ Asst. Mooring Master for arrangement of any additional equipment as required.	Dy. Commandant-CISF
		Shall take orders from the SIC/ Asst. Mooring Master.	
		Cordon off the area.	
		Controls & directs gate security and traffic in the area.	
		Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency.	
		Control the entry of unauthorized persons and vehicles.	

*Disaster Management Plan*

		Check for entry of emergency vehicles.	
		Liaise with the Police authorities.	
		Responsible the head count of the personnel.	
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Shall take orders from SIC and assist Shift Incharge.	Alternate Officer
		Submits consolidated list of dangerous goods in port.	
		Coordinates with vessel owners/ agents/C & F agents/stevedores and with labour officer to arrange and ensure evacuation.	
Safety Officer	Safety Coordinator	Inform WBPCB and other environmental agencies and take necessary guidance. Coordinate with OSD-Environment.	Alternate Officer
		Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	
		Assist in evacuation of the personnel to the assembly point or as directed by SIC/ Asst. Mooring Master.	
Executive Engineer	Civil Coordinator	Shall be responsible to carry out urgent civil works as required.	Alternate Executive Engineer
Executive Engineer	M & E Coordinator	Shall be responsible for uninterrupted electrical supply to vital equipment and utility at the wharf.	Alternate Executive Engineer
		Shall remain alert on duty for any electrical isolation of equipment during emergency.	
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
		Setup casualty receiving center and arrange for first aid.	
		Make arrangements for transportation and treatment of	

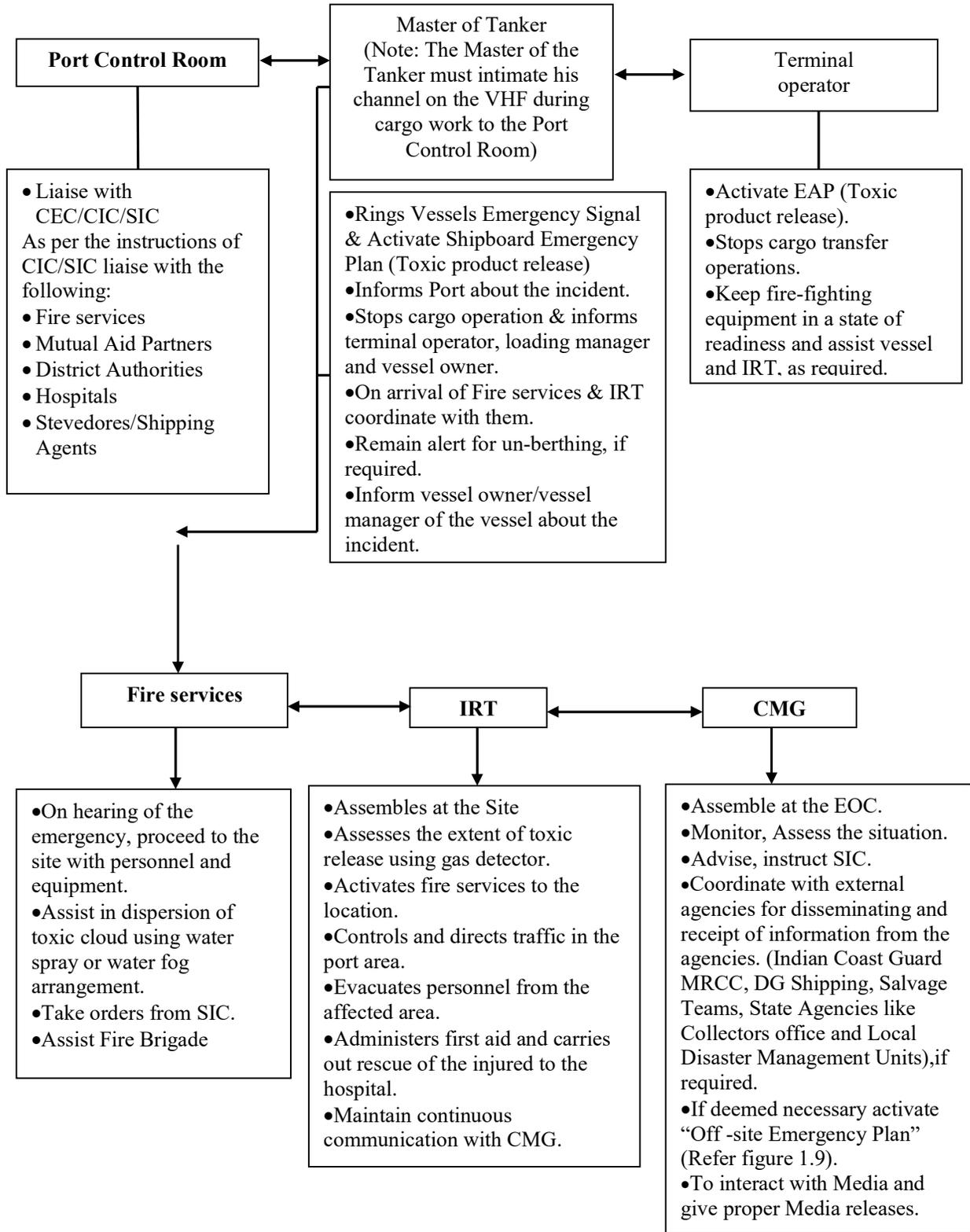
*Disaster Management Plan*

		injured persons.	
		Check updated list of Blood group employees is available.	
		Shall coordinate with the local hospitals.	
Duty Pilot	In Charge of Pilotage	Shall be ready on site for taking the vessel out of jetty and be ready for providing any assistance on site.	Standby Pilot
OSD Environment	Pollution Control Coordinator	Ensure clean- up work conducted by terminal personnel after spill containment.	Alternate Officer
		Coordinate with SIC/ Asst. Mooring Master and WBPCB and agencies.	

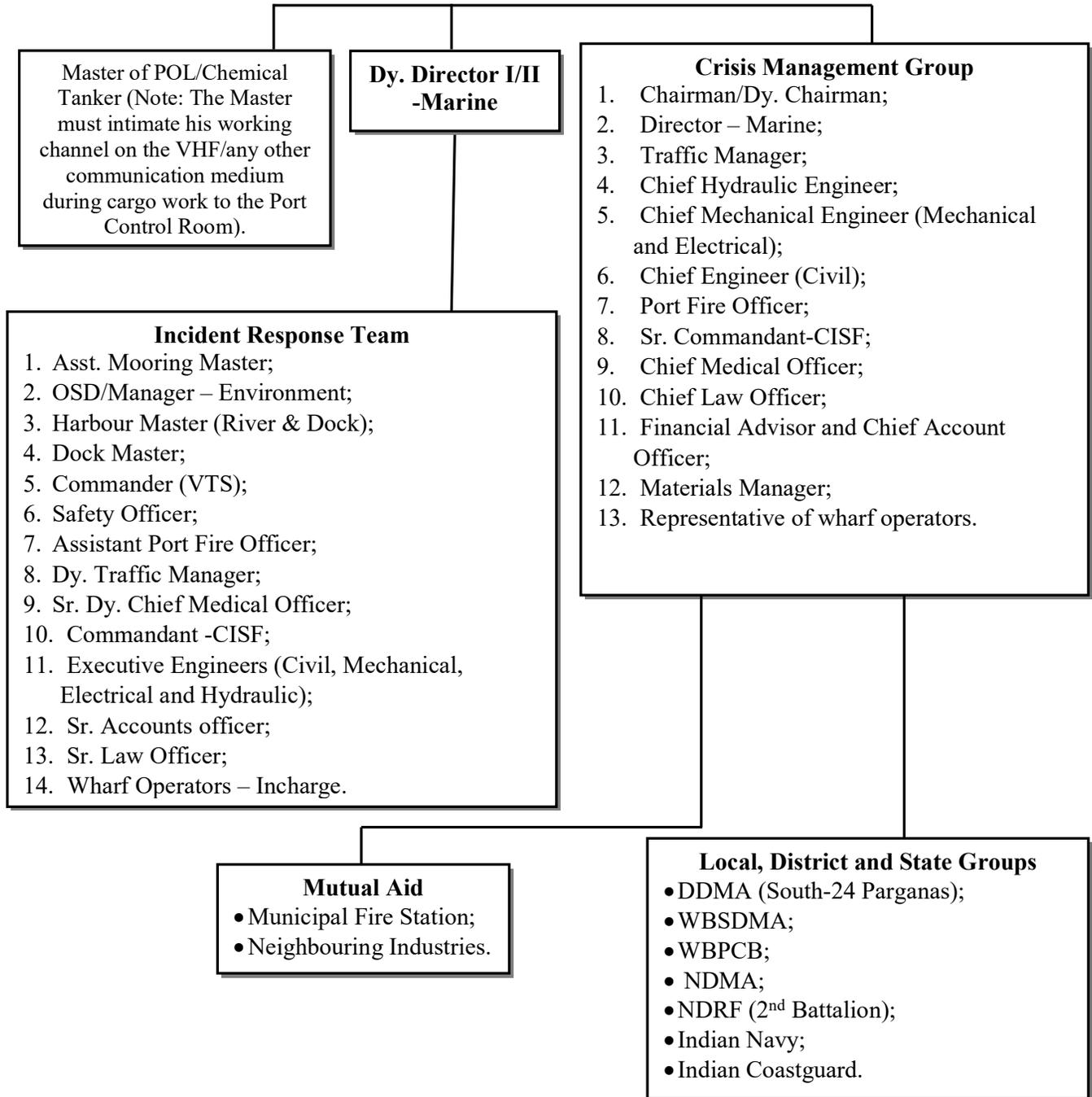
**S3: Scenario 3****Part A:**

- 1. Toxic product (e.g. Toluene) leak from pipeline/hose at budge-budge wharf during operation – on Vessel or Ashore**
- 2. Precautions:** MSDS, SOP, berthing and un-berthing procedures and Periodic inspection and maintenance of hoses and pipelines.  
Stay upwind and wear positive-pressure breathing apparatus and full protective clothing, as necessary.
- 3. Impact Zone:** Consequence analysis indicates that the Toluene leak from transfer pipeline would cover 300 meters for toxic dispersion with IDLH level of 500 ppm.
- 4. Resources required:** Organizational setup enumerated in Figure S3.2 and major material and equipment resources as given in **Appendix D**.

Figure S3.1: Action Flow Chart



**Figure S3.2: Action group**



**Part B: Action Plan**

The vessel upon berthing, operator will follow standard procedures. However, in a less likely scenario a leak from the pipeline system may occur at the jetty or from the jetty along the route to the terminal (within port area) leading to self-detection by personnel or by the terminal/operator automatic alarm system. The following action will be required

**Spill handling:** Evacuate and restrict person’s not wearing protective equipment from area of spill or leak until cleanup is complete. Remove all ignition sources. Stop the flow of gas if it can be done safely. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and full protective clothing.

**1. The Master of the Vessel (Alternate: Chief Officer)**

Response Action	Contact
a. Should raise vessels emergency alarm and activate vessel board emergency action plan.	
b. Stop cargo transfer operation (as per SOP).	
c. Terminal operator, Vessel in the vicinity and Port should be informed of any incident on the vessel without delay.	<ul style="list-style-type: none"> <li>• Terminal operator</li> <li>• Vessel in the vicinity</li> <li>• Port Control Room</li> </ul>
d. Personnel to remain stand by to disconnect hoses.	
e. Shall be responsible to arrest the leak and for fighting the fire with vessels own resources as well as with the available support from IRT.	
f. Also, to remain prepared to un-berth the vessel to the safe area.	
g. The siren should be continued till the vessel is taken to a safe location as per CIC instructions.	

**2. The terminal operator tasked with cargo operations at the wharf should**

Take personal precautions, protective equipment and follow emergency procedures. Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Environmental precautions: Prevent further leakage or spillage if safe to do so.

Contain spillage, and then collect with an electrically protected vacuum cleaner (vehicle mounted in some cases) or by wet-brushing and place in container for disposal.

Response Action	Contact
a. Activate EAP and inform Port.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
b. Shut off isolation valve on pipeline at the jetty (action as per SOP).	

c. Area should be cordoned off.	
d. Assist IRT and provide all necessary equipment.	
e. He will direct operation staff. Coordinate with the vessel in-charge/C & F Agents/stevedores.	

**3. Director - Marine (Alternate: Dy. Director I/II - Marine)**

<b>Response Action</b>	<b>Contact</b>
a. Assess the level of disaster and activate the DMP.	
b. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC/ Asst. Mooring Master and Port Control Room & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Consult with Chairman / Dy. Chairman and decide on clearing of vessels in close proximity to the incident location or to sail the tanker to the safe area and evacuating the people from the likely affected zone.	
f. Take decision on evacuation in consultation with SIC/ Asst. Mooring Master.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Asst. Mooring Master</li> </ul>
g. Be in constant touch with District and Local Administration for rescue and relief operation.	
h. Terminate the response and debrief before allowing normal operation.	

**4. The Port Control Room**

<b>Response Action</b>	<b>Contact</b>
a. Gather information related to the weather conditions. Monitor the wind directions and accordingly convey the message to Master of the vessel, CIC/SIC, Asst. Mooring Master and Fire Team.	<ul style="list-style-type: none"> <li>• Master of the vessel,</li> <li>• CIC</li> <li>• SIC</li> <li>• Fire Team</li> </ul>
b. Liaise with Master of the Vessel/Pilot.	<ul style="list-style-type: none"> <li>• Master of the Vessel</li> <li>• Pilot</li> </ul>
c. Listening watch to be maintained on VHF channel-16.	
d. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC informed of all the	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> </ul>

messages received by telephone, VHF sets or by messenger.	
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	<ul style="list-style-type: none"> <li>• Navy</li> <li>• Coastguard</li> <li>• Stakeholders</li> </ul>
f. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel.	

### 5. The Fire-fighting Personnel should

Response Action	Contact
a. Raise Alarm (siren).	
b. Start the pumps as per the requirement.	
c. Use water sprays and portable nozzles to maintain curtain and dilution.	
d. Open the valves of the monitors and direct the jet on the seat of fire, in case of fire.	
e. Inform fire officers to arrange for fire-fighting tug and pilots to arrange for tugs, as required.	<ul style="list-style-type: none"> <li>• Fire Team</li> <li>• Pilots</li> </ul>
f. In case of leakage/fire onboard assist Master in arresting the leak/diluting the vapour/ fighting fire as per Masters Instructions.	
g. Make use of portable DCP, CO2, Foam extinguisher (alcohol-resistant foam) from upwind position.	
h. Announce in mobile van with PA system in the effecting zones to evacuate the zone. Ensure complete evacuation and report to the EOC.	
i. Ensure all the ignition sources in the vicinity is extinguished if fire has not occurred.	
j. If the situation is under control, give all clear signals.	

### 6. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I/II - Marine	Site Incident Controller	<p>During Emergency shall proceed to the scene &amp; communicate &amp; collect all information from the Master of the Tanker and terminal operator.</p> <p>Conduct initial briefing.</p> <p>Report the situation to the CIC/CMG and assist CIC in assessing the incident.</p>	Asst. Mooring Master

		Alert vessels within the vicinity.	
		Shall assess and decide on the evacuation of the personnel considering the direction of wind and dispersion and will instruct CISF-Security to carry out the evacuation in a safe manner.	
		He will extend all necessary help to the Master of the vessel to fight the fire.	
		Instruct the Fire Team to keep the fire-fighting installation and tenders in a state of readiness & activate if required to fight fire or for disperse the vapour cloud.	
		Instruct Pilots to keep tugs ready for fire-fighting.	
		Coordinate with all functional heads to take actions.	
Harbour Master (River)	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC /SIC.	Dock Master/ Pilots
		Responsible for organizing tugs, mooring boats and Pilots for combating the fire and rescue.	
		Hire additional crafts as necessary.	
		Maintain Log of events.	
Terminal Operator	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with Port and rendering necessary assistance to the SIC by providing additional emergency equipment as required.	Alternate officer
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Alternate Officer
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to the Master of the vessel/Terminal operator for fire-fighting or cloud dispersion.	

		Assist CISF-Security in evacuation of workers to the assembly point.	
		Inform SIC for arrangement of any additional equipment as required.	
Commandant-CISF	Security and Evacuation	Shall take orders from the SIC.	Dy. Commandant-CISF
		Cordon off the area.	
		Controls & directs gate security and traffic in the area.	
		Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency.	
		Control the entry of unauthorized persons and vehicles.	
		Check for entry of emergency vehicles.	
		Liaise with the Police authorities.	
		Responsible for the head count of the personnel.	
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Shall take orders from SIC.	Alternate Officer
		Submits consolidated list of dangerous goods in port.	
Safety Officer	Safety Coordinator	Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	Alternate Officer
		Assist in evacuation of the personnel to the assembly point or as directed by SIC/ Asst. Mooring Master.	
Executive Engineer	Civil Coordinator	Shall be responsible to carry out urgent civil works as required.	Alternate Executive Engineer
Executive Engineer	M & E Coordinator	Shall be responsible for uninterrupted electrical supply to vital equipment and utility at the berth.	Alternate Executive Engineer
		Shall remain alert on duty for any electrical isolation of equipment during emergency.	

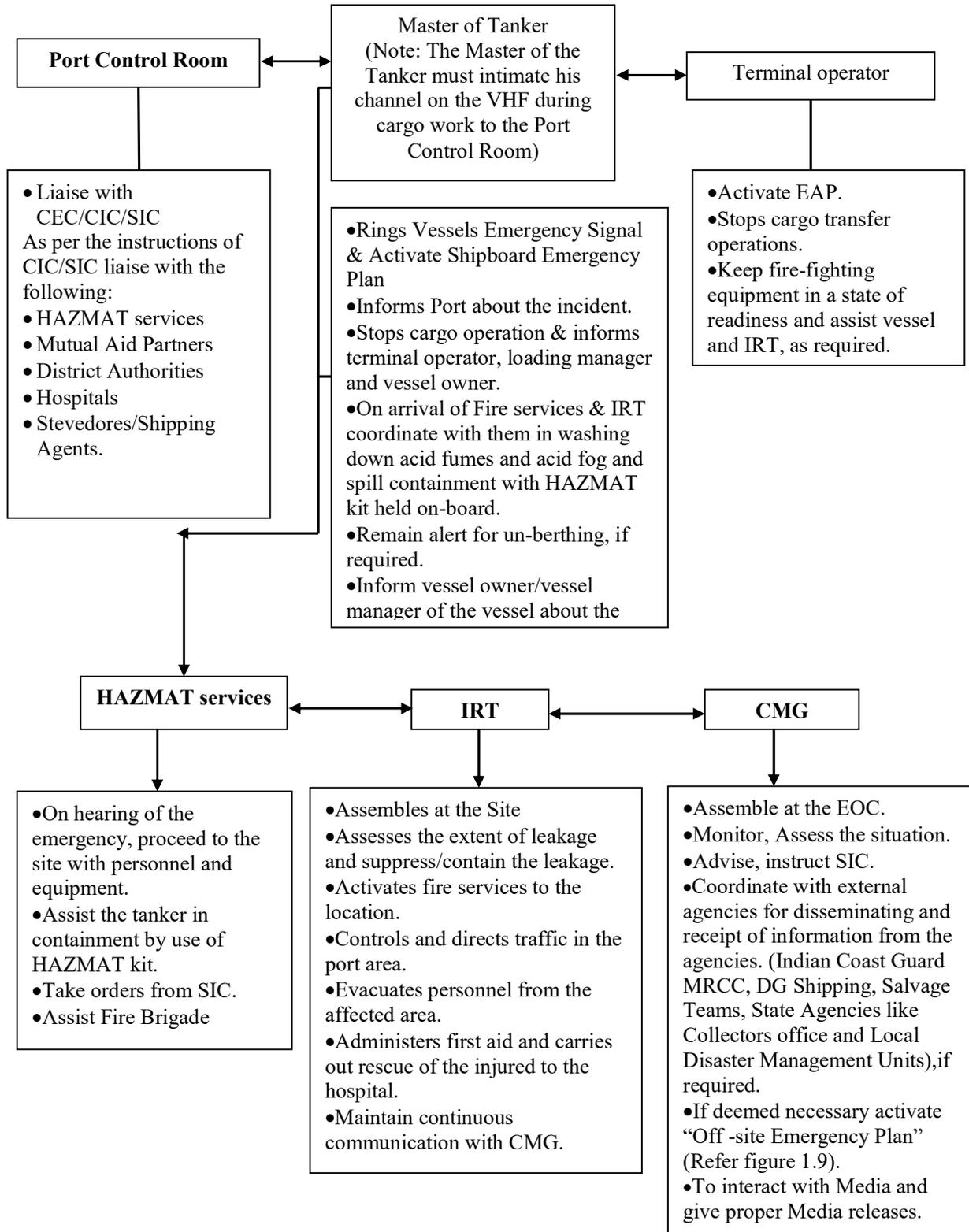
*Disaster Management Plan*

Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
		Setup casualty receiving center and arrange for first aid.	
		Make arrangements for transportation and treatment of injured persons.	
		Check updated list of Blood group of each employee available.	
		Shall coordinate with the local hospitals.	
Duty Pilot	In Charge of Pilotage	Shall be ready on site for taking the vessel out of berth and be ready for providing any assistance on site.	Standby Pilot
OSD Environment	Pollution Control Coordinator	Inform WBPCB and other environmental agencies and take necessary guidance.	Alternate Officer
		Ensure clean- up work conducted by terminal personnel after spill containment.	
		Coordinate with SIC/Asst. Mooring Master and WBPCB and other agencies.	

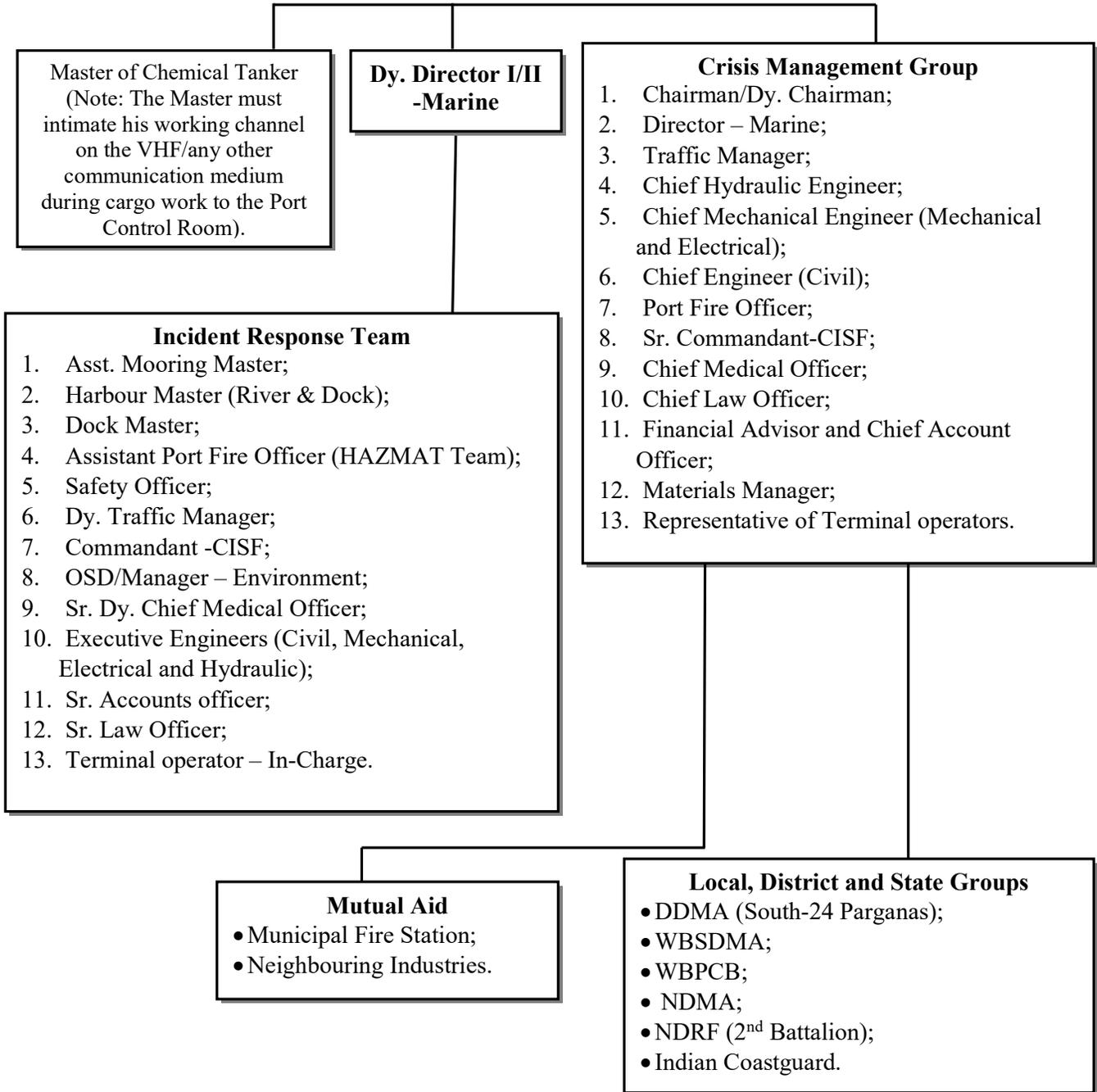
**S4: Scenario 4****Part A**

1. **Corrosive Acid - Leakage (e.g. Sulphuric acid) from pipeline/hose at budge-budge wharf during operation – on Vessel or Ashore**
2. **Precautions:** MSDS, HAZMAT kit, SOP of terminal/operator and berthing and un-berthing procedures, periodic inspection and maintenance of hoses and pipelines, PPE and Eye wash station.
3. **Impact Zone:** Respective Jetty/wharf.
4. **Resources required:** Organizational setup enumerated in Figure S4.2 and major material and equipment resources as given in **Appendix D**.

Figure S4.1: Action Flow Chart



**Figure S4.2:** Action group



**Part B: Action Plan**

The vessel upon berthing, berth operator will follow standard procedures. However, in a less likely scenario a leak from the pipeline system may occur leading to detection by vessel personnel or by the terminal/operator alarm system. The following action will be required.

**1. The Master of the Vessel (Alternate: Chief Officer)**

Response Action	Contact
a. Should raise vessels emergency alarm and activate vessel board emergency action plan.	
b. Stop transfer operation (as per SOP).	
c. Terminal operator, Vessel in the vicinity and Port should be informed of any incident on the vessel without delay.	<ul style="list-style-type: none"> <li>• Terminal operator</li> <li>• Vessel in the vicinity</li> <li>• Port Control Room</li> </ul>
d. Personnel to remain stand by to disconnect hoses;	
e. Shall be responsible to arrest the leak with vessels own resources as well as with the available support from IRT.	
f. Also, to remain prepared to un-berth the vessel to the safe area (high sea).	
g. The siren should be continued till the vessel is taken to a safe location as per CIC instructions.	

**2. Terminal operator persons tasked with cargo operations at the wharf should**

Response Action	Contact
a. Activate EAP and inform Port.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
b. Shut off isolation valve on pipeline at the berth (action as per SOP of the terminal).	
c. Area should be cordoned off.	
d. Assist IRT and provide all necessary equipment.	
e. Responsible for diluting and neutralizing the acids and disposal of the neutralized liquids.	
f. He will direct operation staff. Coordinate with the vessel in-charge/C & F Agents/stevedores.	

**3. Director - Marine (Alternate: Dy. Director I/II - Marine)**

<b>Response Action</b>	<b>Contact</b>
a. Assess the level of disaster and activate the DMP.	
b. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC/ Asst. Mooring Master and Port and arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Decide on clearing of vessels in close proximity to the incident location and evacuating the people.	
f. Assess the condition of site and take decision on evacuation in consultation with SIC/Asst. Mooring Master.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Asst. Mooring Master</li> </ul>
g. Be in constant touch with District and Local Administration for rescue and relief operation.	
h. Terminate the response and debrief before allowing normal operation.	

**4. The Port Control Room**

<b>Response Action</b>	<b>Contact</b>
a. Gather information related to the vessel type, cargo quantity and position.	
b. Gather information related to the weather conditions and accordingly convey the message to Master of the vessel, SIC, Asst. Mooring Master and Fire Team.	<ul style="list-style-type: none"> <li>• Master of the vessel</li> <li>• SIC</li> <li>• Fire Team</li> </ul>
c. Liaise with Master of the Vessel/Pilot.	<ul style="list-style-type: none"> <li>• Master of the Vessel</li> <li>• Pilot</li> </ul>
d. Listening watch to be maintained on VHF channel-16.	
e. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC/ Asst. Mooring Master informed of all the messages received by telephone, VHF sets or by messenger.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Asst. Mooring Master.</li> </ul>
f. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	<ul style="list-style-type: none"> <li>• Coastguard</li> <li>• Navy</li> <li>• Stakeholders</li> </ul>

## 5. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I/II -Marine	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the Master of the Tanker and terminal operator.	Asst. Mooring Master
		Conduct initial briefing.	
		Report the situation to the CIC/CMG and assist CIC in assessment of the incident.	
		Assess the condition of site and take decision on evacuation in consultation with CIC.	
		Alert vessels within the vicinity.	
		Extend all necessary help to the Master of the vessel.	
		Instruct the Fire team to keep the fixed fire-fighting installation in a state of readiness & activate if required.	
		Instruct Pilots to keep tugs ready for fire-fighting.	
Harbour Master (River)	Port Control Room Coordinator	Coordinate with all functional heads to take actions.	Dock Master/Pilots
		Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC /SIC/Asst. Mooring Master.	
		Responsible for organizing tugs for rescue.	
		Hire additional crafts as necessary.	
		Maintain Log of events.	
Terminal operators	Cargo Work	Shall unberth the vessel as per the instruction of SIC, if required.	Alternate Officer
		Shall be responsible of shutting down of cargo operation & coordinating with Port and rendering necessary assistance to the SIC by providing additional emergency equipment as required.	

*Disaster Management Plan*

Asst. Port Fire Officer	Fire, Search and Rescue Coordinator/ HAZMAT Coordinator	Shall take orders from the SIC/ Asst. Mooring Master.	Alternate Officer
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to the Master of the vessel/terminal operator.	
		Assist CISF-Security in evacuation of workers to the assembly points.	
		Inform SIC/ Asst. Mooring Master for arrangement of any additional equipment as required.	
Commandant-CISF	Security and Evacuation	Shall take orders from the SIC/ Asst. Mooring Master.	Dy. Commandant-CISF
		Cordon off the area.	
		Controls & directs gate security and traffic in the area.	
		Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency.	
		Control the entry of unauthorized persons and vehicles.	
		Check for entry of emergency vehicles. Liaise with the State Police.	
Responsible the head count of the personnel.			
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Shall take orders from SIC/ Asst. Mooring Master.	Alternate Officer
		Coordinates with vessel owners/ agents/C & F agents/stevedores and with labour officer to arrange and ensure evacuation.	
Safety Officer	Safety Coordinator	Shall mobilize and dispatch vehicles containing HAZMAT kit to the site of emergency.	Alternate Officer
Executive Engineer	Civil Coordinator	Shall be responsible to carry out urgent civil works as required.	Alternate Executive Engineer

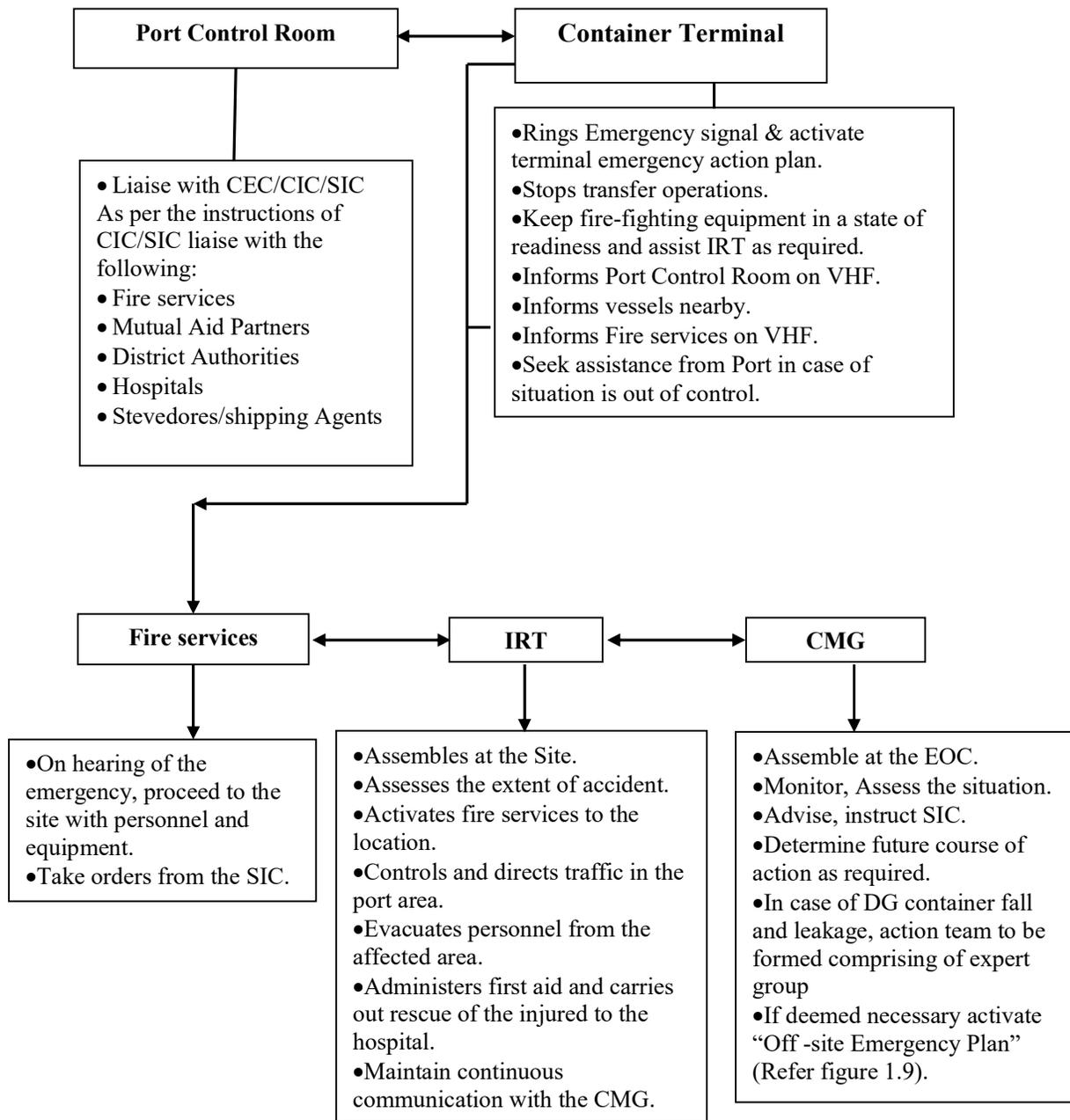
*Disaster Management Plan*

Executive Engineer	M & E Coordinator	Shall be responsible for uninterrupted electrical supply to vital equipment and utility at the jetty.	Alternate Executive Engineer
		Shall remain alert on duty for any electrical isolation of equipment during emergency.	
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
		Setup casualty receiving center and arrange for first aid.	
		Make arrangements for transportation (ambulance) and treatment of injured persons.	
		Check updated list of Blood group of employees is available.	
Duty Pilot	In Charge of Pilotage	Shall coordinate with the local hospitals.	Standby Pilot
		Shall be ready on site for taking the vessel out of berth and be ready for providing any assistance on site.	
OSD Environment	Pollution Control Coordinator	Inform WBPCB and other environmental agencies and take necessary guidance.	Alternate Officer
		Ensure clean- up work conducted by terminal personnel after spill containment.	
		Coordinate with SIC and WBPCB and agencies.	

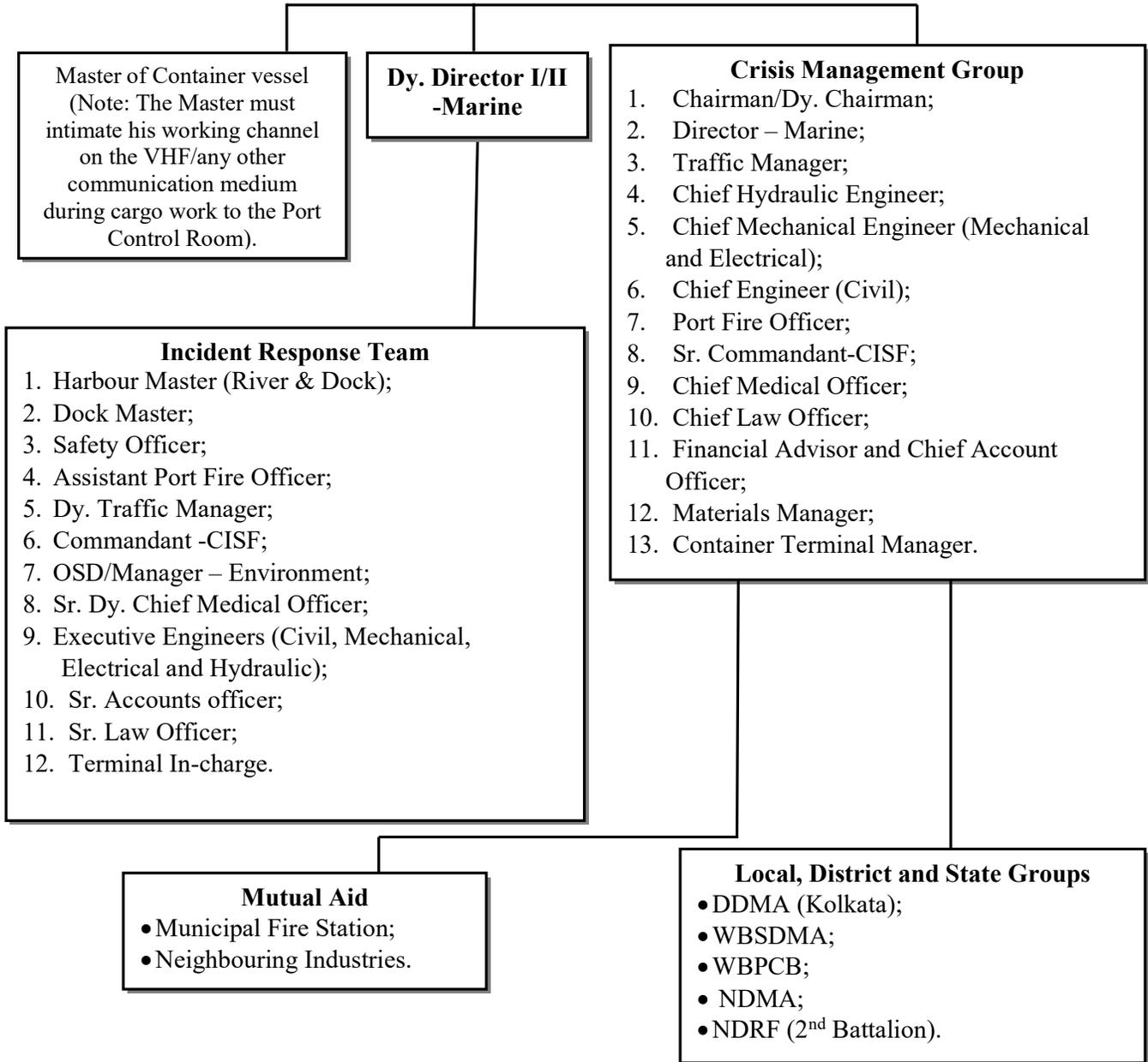
**S5: Scenario 5****Part A**

1. **Fire /leakage due to Crane Accidents (Container drop/crane fall) at container berth/yard – secondary event.**
2. **Precautions:** Trained personnel for operation of crane, SOP of the container terminal, HAZMAT training and MSDS.
3. **Impact Zone:** Incident location and surrounding area.
4. **Resources required:** Organizational setup enumerated in Figure S5.2 and major material and equipment resources as given in **Appendix D**.

Figure S5.1: Action Flow Chart



**Figure S5.2: Action group**



**Part B: Action Plan****1. The crane operator**

- a. Should raise emergency alarm and inform Terminal operator and Port.

**2. The terminal person at the berth/yard should**

Response Action	Contact
a. Activate EAP and inform Port and ask for assistance.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
b. Area should be cordoned off.	
c. Stop transfer operations at the berth.	
d. Manage Truck movements.	
e. Assist IRT and Master of the Vessel and provide all necessary equipment.	
f. He will direct operation staff.	
g. Interview operator and witnesses.	
h. Contact expert agency in case of DG container fire/explosion.	

**3. The Master of the Vessel (Alternate: Chief Officer)**

Response Action	Contact
a. Should raise vessels emergency alarm and activate vessel board emergency action plan.	
b. Stop transfer operation (as per SOP).	
c. Terminal operator, Vessel in the vicinity and Port should be informed of any incident on the vessel without delay.	<ul style="list-style-type: none"> <li>• Terminal operator</li> <li>• Vessel in the vicinity</li> <li>• Port Control Room</li> </ul>
d. Remain prepared to un-berth the vessel to the safe area (high sea).	
e. The siren should be continued till the vessel is taken to a safe location as per CIC instructions.	

**4. Director - Marine (Alternate: Dy. Director I/II - Marine)**

Response Action	Contact
a. Will be stationed at the EOC to review & assess possible developments to determine the most necessary course of action.	
b. He will give necessary instructions to SIC & arrange for external aid as necessary.	
c. Provide assistance to the Terminal.	

**5. The Port Control Room**

Response Action	Contact
a. Gather information regarding the incident and accordingly convey the message to CIC/SIC and Fire Team.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Fire Team</li> </ul>
b. Liaise with terminal operator and Master of the vessels/pilot.	<ul style="list-style-type: none"> <li>• Terminal operator</li> <li>• Master of the Vessels</li> </ul>
c. Listening watch to be maintained on VHF channel-16.	
d. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> </ul>
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	<ul style="list-style-type: none"> <li>• Stakeholders</li> </ul>

**6. Duties of IRT**

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I -Marine	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the crane operator/terminal manager and coordinate actions.	Dy. Director II -Marine
		Assess and report the situation to the CIC/CMG (if required).	
		Alert vessels/trucks within the vicinity.	
		Instruct the Fire Team to keep the fire-fighting installation in a state of readiness & activate if required.	
Safety Officer	Safety Coordinator	Investigate the incident and provide necessary guidance.	Alternate Officer
		Assist in Rescue.	
Harbour Master (River)	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Master /Pilots
		Shall prepare vessels to vacate from berth (if required).	
		Responsible for organizing tugs for rescue.	

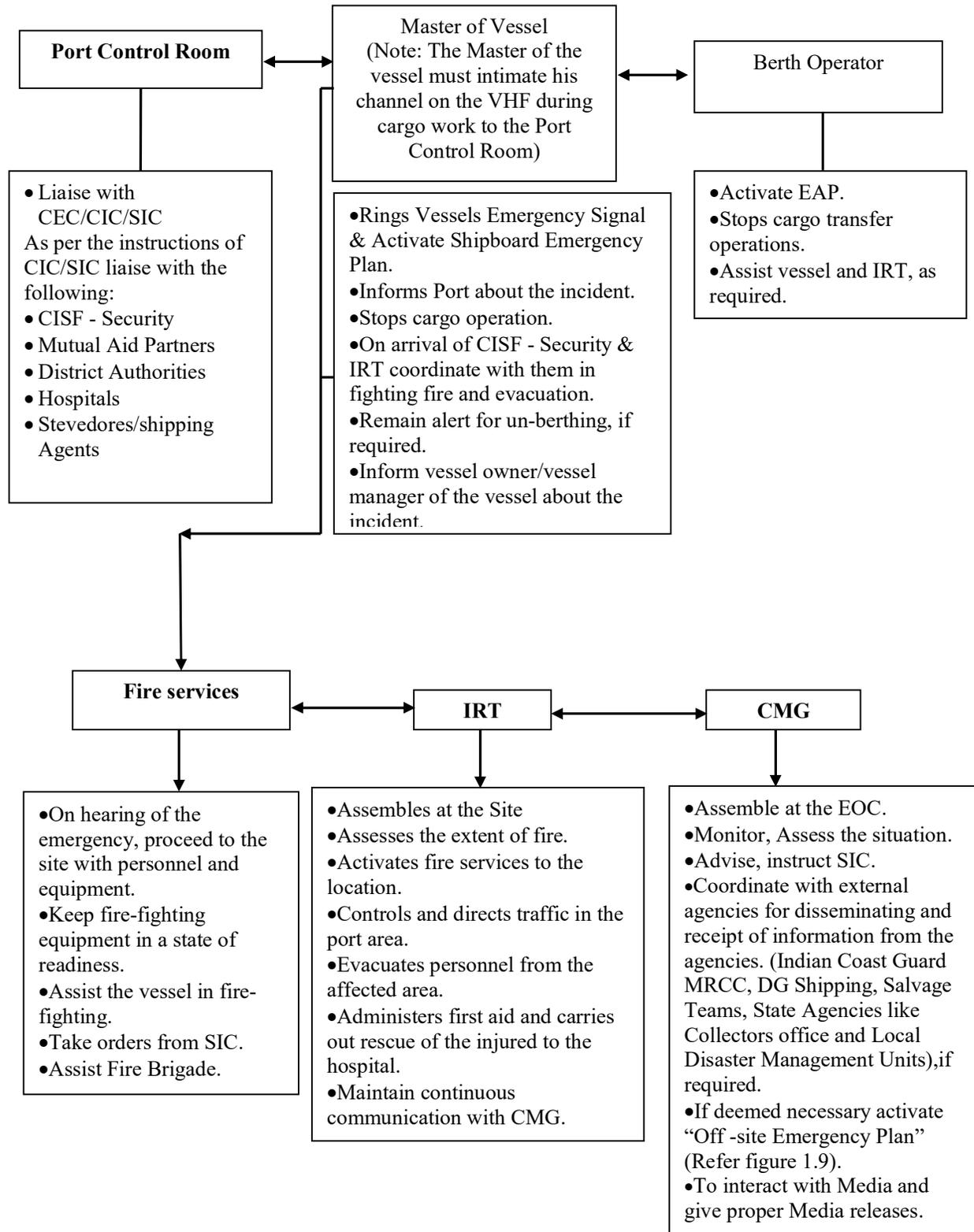
*Disaster Management Plan*

		Hire additional crafts as necessary.	
		Maintain Log of events.	
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC. Mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support in case of fire. Assist the terminal operator and CISF-Security in evacuation.	Alternate Officer
Commandant-CISF	Security and Evacuation	Controls & directs traffic in the area. Shall supervise evacuation of personnel from the scene at the time of emergency.	Dy. Commandant-CISF
Executive Engineer	Civil Coordinator	Assist terminal, if required on emergency basis.	Alternate Executive Engineer
Executive Engineer	M & E Coordinator	Assist terminal, if required on emergency basis.	Alternate Executive Engineer
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Shall mobilize and dispatch sufficient number of vehicles to the site of emergency. Coordinates with SIC and Terminal.	Alternate Officer
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for providing any assistance.	Standby Pilot

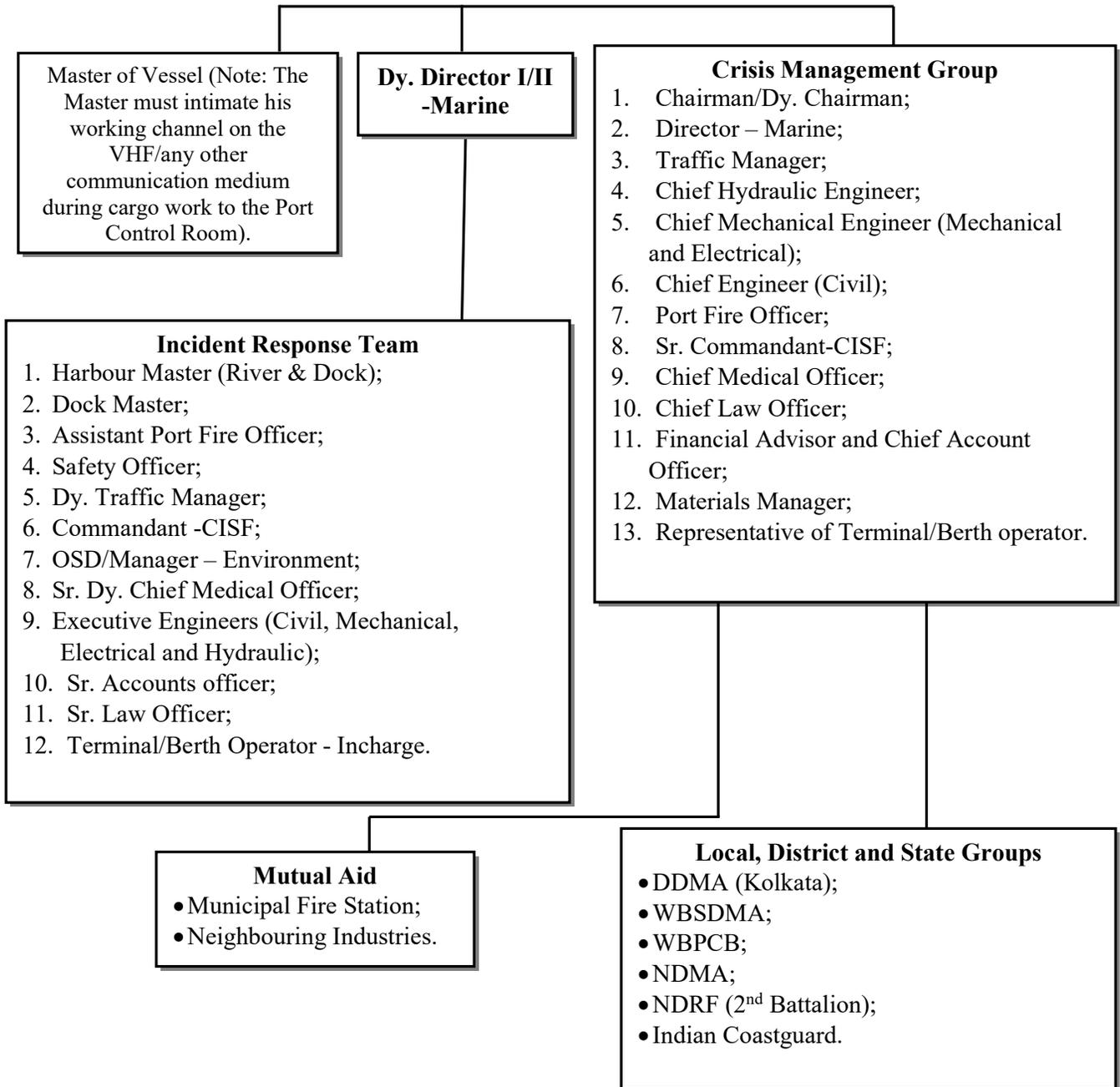
**S6: Scenario 6****Part A:**

- 1. Fire on vessel (non-tankers) at KPD/NSD berth.**
- 2. Precautions:** Vessel fire-fighting system, Port fire station, SOP of the berth operator.
- 3. Impact Zone:** Incident location and vicinity of the vessel involved.
- 4. Resources required:** Organizational setup enumerated in Figure S6.2 and major material and equipment resources as given in **Appendix D**.

Figure S6.1: Action Flow Chart



**Figure S6.2:** Action group



**Part B: Action Plan**

The vessel upon berthing, terminal/berth operator will follow standard procedures. However, in a less likely scenario a fire may occur on the vessel during transfer operation. The following action will be required:

**1. The Master of the Vessel (Alternate: Chief Officer)**

Response Action	Contact
a. Should raise vessels emergency alarm and activate vessel board emergency action plan.	
b. Stop transfer operation (as per SOP).	
c. Terminal/Berth operator, Vessel in the vicinity and Port should be informed of any incident on the vessel without delay.	<ul style="list-style-type: none"> <li>• Terminal/Berth operator</li> <li>• Port Control Room</li> </ul>
d. Shall be responsible for fighting the fire with vessels own resources as well as with the available support from IRT.	
e. Also, to remain prepared to un-berth the vessel to the safe area.	
f. The siren should be continued till the vessel is taken to a safe location as per CIC instructions.	

**2. The berth operator tasked with cargo operations should**

Response Action	Contact
a. Activate EAP and inform Port.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
b. Area should be cordoned off.	
c. Assist IRT and provide all necessary equipment.	
d. He will direct operation staff. Coordinate with the vessel in-charge/C & F Agents/stevedores.	

**3. Director -Marine (Alternate: Dy. Director I/II - Marine)**

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC and Port & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Assess the condition of site and of potential affected area and take decision on evacuation in consultation with SIC.	<ul style="list-style-type: none"> <li>• SIC</li> </ul>

f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

**4. The Port Control Room**

<b>Response Action</b>	<b>Contact</b>
a. Gather information related to the weather conditions and accordingly convey the message to CIC/SIC and Fire team.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Fire Team</li> </ul>
b. Liaise with Master of the Vessel/Pilot.	<ul style="list-style-type: none"> <li>• Master of the Vessel</li> <li>• Pilot</li> </ul>
c. Listening watch to be maintained on VHF channel-16.	
d. Notify to CIC, SIC and the vessels moving into, through and inside the dock. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> </ul>
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	<ul style="list-style-type: none"> <li>• Coastguard</li> <li>• Stakeholders</li> </ul>
f. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel.	

**5. The Fire-fighting personnel should**

<b>Response Action</b>	<b>Contact</b>
a. Raise Alarm (siren)	
b. Ensures availability of the fire tenders and fire-fighting tugs.	
c. In case of fire onboard assist Master in fighting fire as per Masters Instructions.	
d. If the fire is under control and extinguished, give all clear signal.	

## 6. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I - Marine	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect information from the Master of the vessel and berth operator.	Dy. Director II - Marine
		Conduct initial Briefing.	
		Report the situation to the CIC and assist in assessing the incident.	
		Alert vessels within the vicinity.	
		Assess the condition of site and of potential affected area and take decision on evacuation in consultation with CIC.	
		Extend all necessary help to the Master of the vessel to fight the fire.	
		Instruct the Fire Team to keep the water tenders in a state of readiness and activate if required.	
		Instruct pilots to keep tugs ready for fire-fighting.	
Harbour Master (River)	Port Control Room Coordinator	Coordinate with all functional heads to take actions.	Dock Master/Pilots
		Shall monitor the communication on VHF/any other communication medium and convey and relay messages on the advice from CIC /SIC.	
		Responsible for organizing tugs and pilots for combating the fire and rescue.	
		Hire additional crafts as necessary.	
Berth operator	Cargo Work	Maintain Log of events.	Alternate Officer
		Shall be responsible of shutting down of cargo operation & coordinating with Port and rendering necessary assistance to the SIC by providing additional fire-fighting and emergency equipment as required.	

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Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Alternate Officer
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to the Master of the vessel/berth operator for fire-fighting.	
		Assist CISF in evacuation of workers to the assembly points.	
		Inform SIC for arrangement of any additional equipment as required.	
Commandant-CISF	Security and Evacuation	Shall take orders from the SIC.	Dy. Commandant-CISF
		Cordon off the area.	
		Controls & Directs gate security and traffic in the area.	
		Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency.	
		Control the entry of unauthorized persons and vehicles.	
		Check for entry of emergency vehicles.	
		Liaise with the Police authorities.	
Responsible for the head count of the personnel.			
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Shall take orders from SIC and assist Shift Incharge.	Alternate Officer
Safety Officer	Safety Coordinator	Inform WBPCB and other environmental agencies and take necessary guidance. Coordinate with OSD-Environment.	Alternate Officer
		Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	
		Assist in evacuation of the personnel to the assembly point or as directed by SIC.	
Executive Engineer	Civil Coordinator	Shall be responsible to carry out urgent civil works as required.	Alternate Executive Engineer

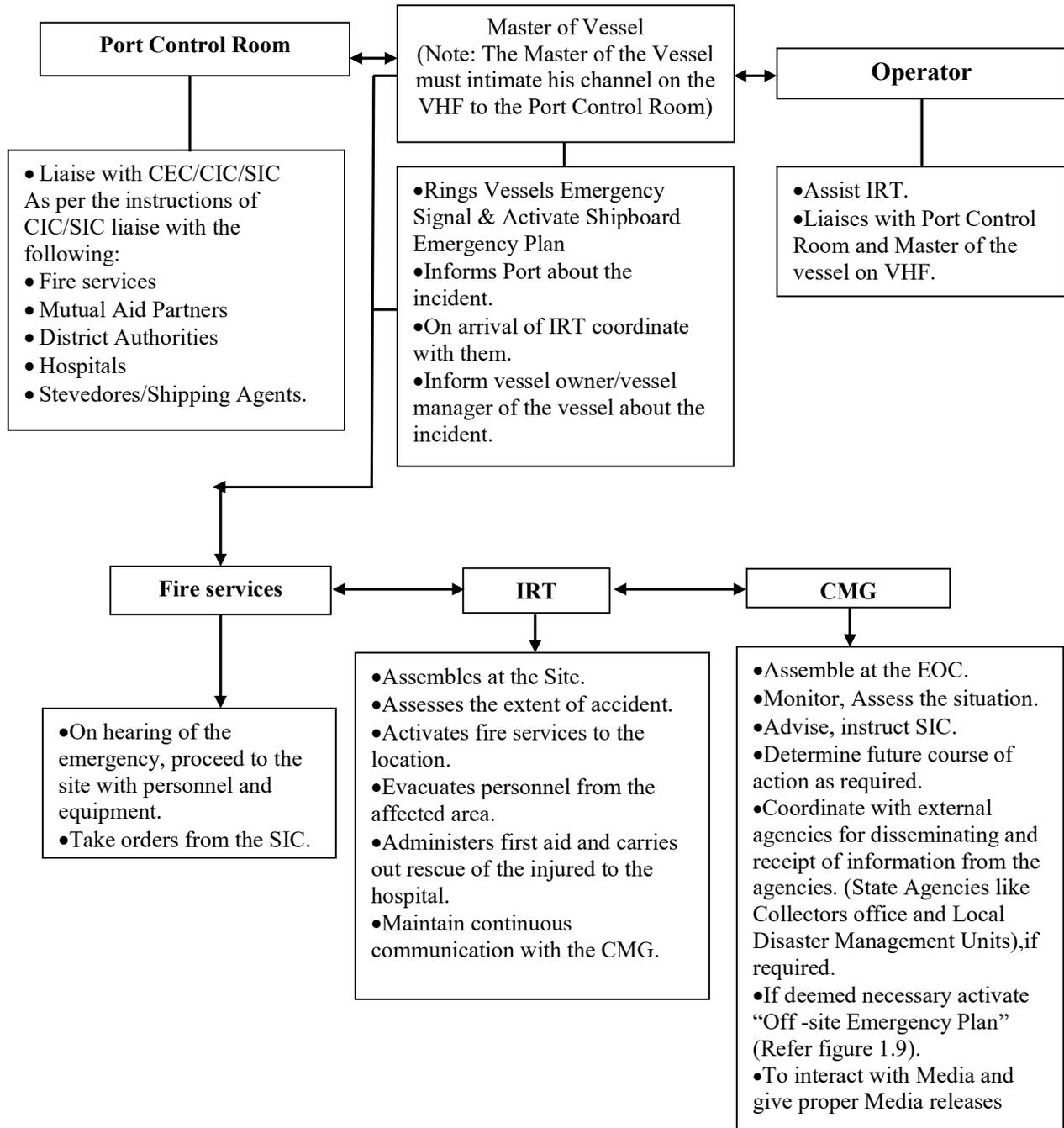
*Disaster Management Plan*

Executive Engineer	M & E Coordinator	Shall be responsible for uninterrupted electrical supply to vital equipment and utility at the berth.	Alternate Executive Engineer
		Shall remain alert on duty for any electrical isolation of equipment during emergency.	
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
		Make arrangements for transportation and treatment of injured persons.	
		Check updated list of Blood group of employees is available.	
		Shall coordinate with the local hospitals.	
Duty Pilot	In Charge of Pilotage	Shall be ready for taking the vessel out of berth and be ready for providing any assistance on site.	Standby Pilot
OSD Environment	Pollution Control Coordinator	Ensure clean- up work conducted by berth operator after spill containment.	Alternate Officer
		Coordinate with SIC and WBPCB and agencies.	

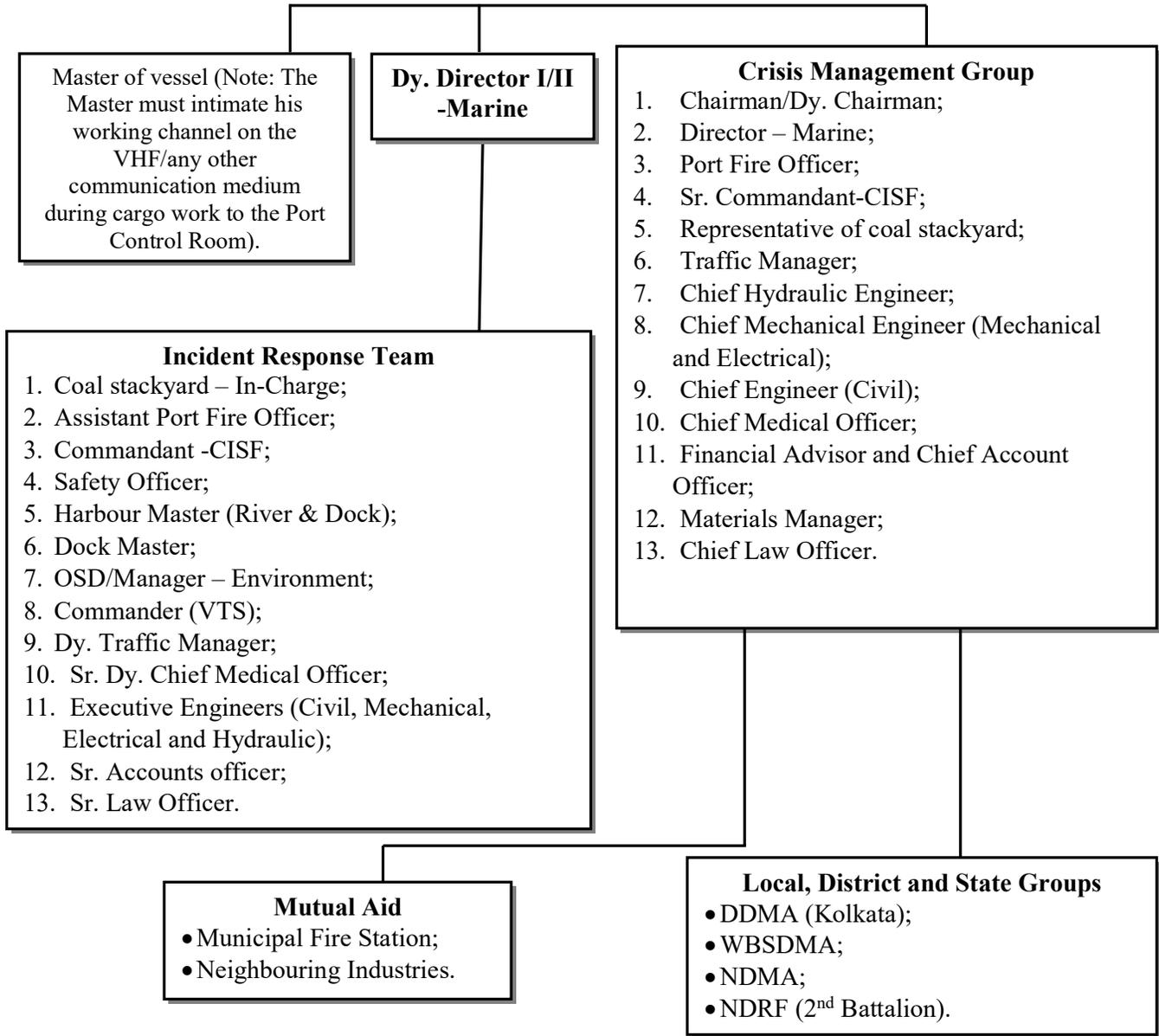
**S7: Scenario 7****Part A:**

1. **Fire in coal stack yard at NSD/KPD.**
2. **Precautions:** Water tenders.
3. **Impact Zone:** Incident Location and vicinity of the area involved.
4. **Resources required:** Organizational setup enumerated in Figure S7.2 and major material and equipment resources as given in **Appendix D.**

Figure S7.1: Action Flow Chart



**Figure S7.2: Action group**



**Part B: Action Plan****1. Port Control Room should**

Response Action	Contact
a. Gather information related to the coal stack yard fire and time of incident.	
b. Notify to CIC, SIC and the nearby vessels through general alert.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> </ul>
c. Gather information about the wind speed and directions and notify CIC/SIC.	

**2. Director - Marine (Alternate: Dy. Director I/II - Marine)**

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC and Port & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Decide on clearing of vessels in close proximity to the incident location.	
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

**3. Duties of IRT**

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I -Marine	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the coal operator.	Dy. Director II -Marine
		Assess and report the situation to the CIC/CMG (if required).	
		Alert vessels within the vicinity.	
		Extend all necessary help to the operator.	
		Instruct Pilot to keep tugs ready.	

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		He will coordinate with all functional heads to take actions.	
Safety Officer	Safety Coordinator	Assist SIC and CISF and maintain Log of events.	Alternate Officer
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Mobilize fire tenders, men & firefighting equipment to the scene & extend all necessary support.	Alternate Officer
		Assist the coal stack yard operator and CISF-Security in evacuation, if required.	
Harbour Master (River)	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Master/ Pilot
		Shall prepare vessels to vacate from berth (if required).	
		Responsible for organizing tugs and Pilots.	
		Assist SIC and maintain Log of events.	
Person In-charge/ Licensee	Fire, Search and Rescue Coordinator	Provide assistance to port and vessel.	Alternate Officer
Commandant-CISF	Security and Evacuation	Controls & directs traffic in the area.	Dy. Commandant-CISF
		Shall supervise evacuation of personnel from the scene at the time of emergency.	
Executive Engineer	Civil Coordinator	Liaise with SIC.	Alternate Executive Engineer
Executive Engineer	M & E Coordinator	Arrange for specialized equipment if required as per the instruction of the SIC and requirement of operator.	Alternate Executive Engineer
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
Dy. Traffic Manager	Cargo Storage, Shed	Coordinates with Coal Stack yard Operator.	Alternate Officer

*Disaster Management Plan*

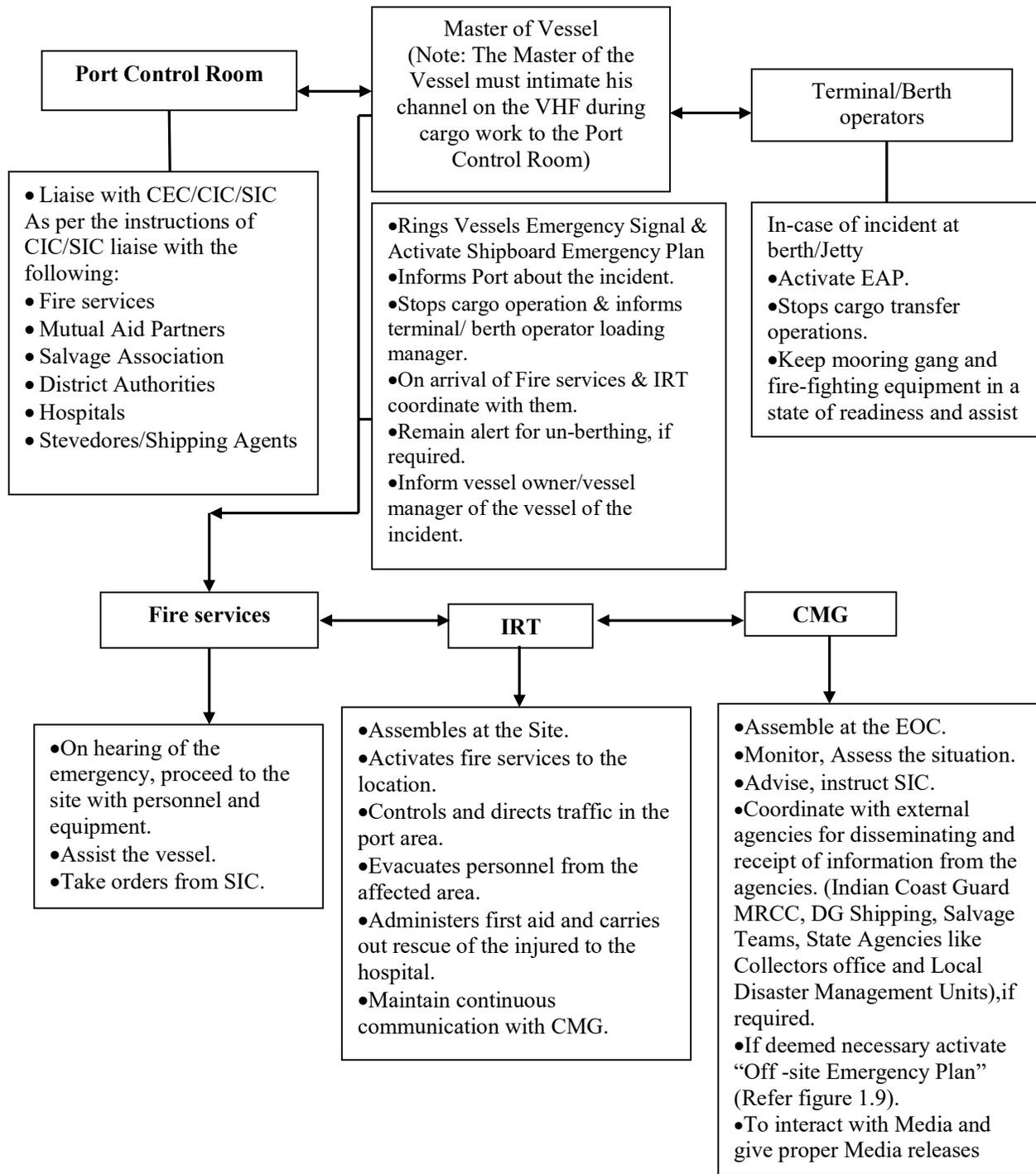
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	and Labour Coordinator	Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for providing any assistance on site.	Standby Pilot

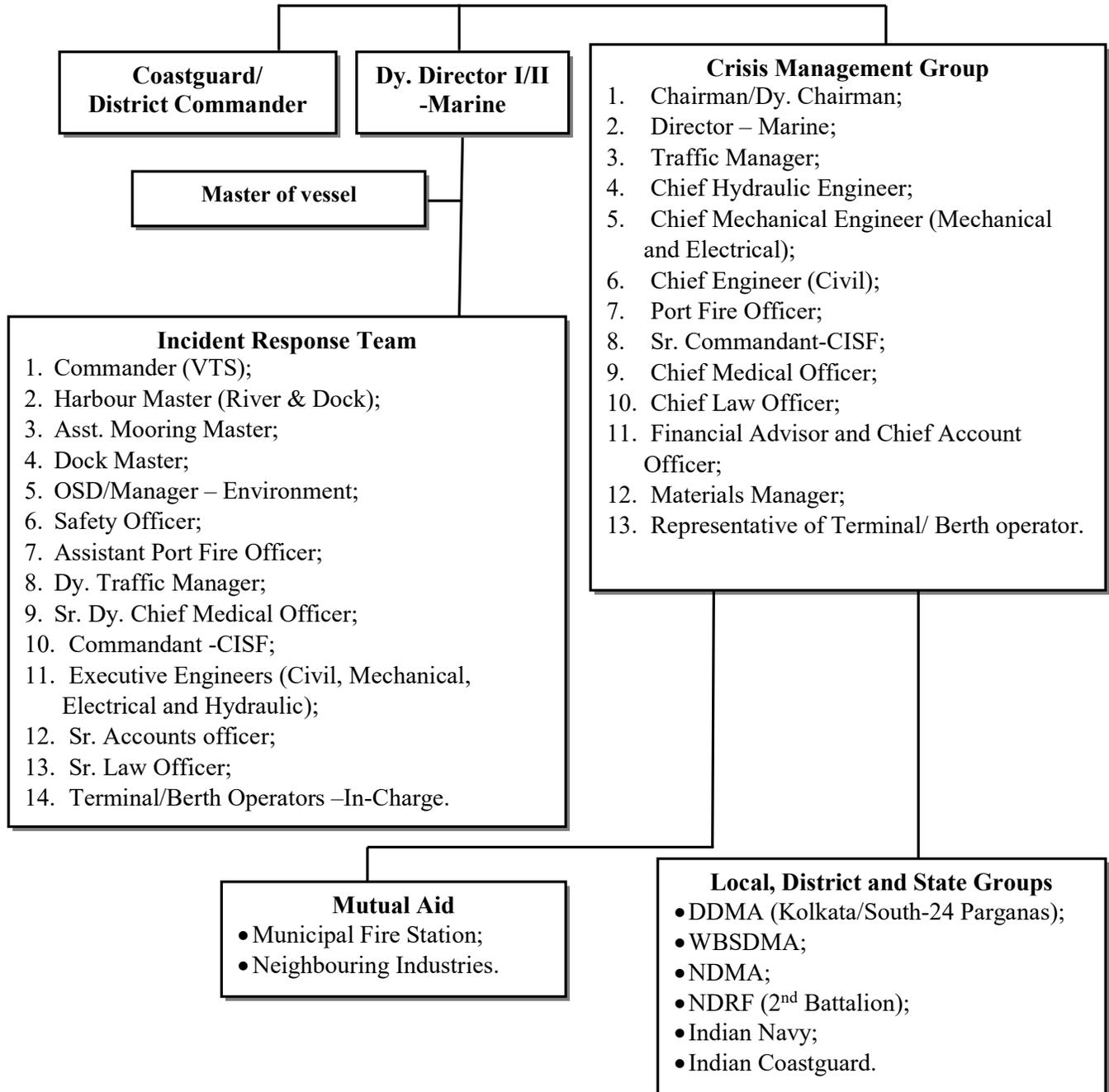
**S8: Scenario 8****Part A**

- 1. Vessel Grounding/Collision within port limit.**
- 2. Precautions:** Navigational Aid, Designated Pilots, Continuous monitoring and communication with the Port Control Room and Pilot.
- 3. Impact Zone:** Navigational and river Channel, Anchorage area, Dock basin.
- 4. Resources required:** Organizational setup enumerated in Figure S8.2 and major material and equipment resources as given in **Appendix D**.

Figure S8.1: Action Flow Chart



**Figure S8.2:** Action group



**Part B: Action Plan****1. The Master of the Vessels (Alternate: Chief Officers)**

<b>Response Action</b>	<b>Contact</b>
a. Should raise vessels emergency alarm and activate vessel board emergency action plan including evacuation of the personnel.	
b. Vessel in the vicinity, Terminal/berth operator and Port should be informed of any incident without delay.	<ul style="list-style-type: none"> <li>• Berth operator</li> <li>• Vessel in the vicinity</li> <li>• Port Control Room</li> </ul>
c. Shut down transfer operation (if at berth).	
d. Take appropriate damage control measures in case of flooding including leak stoppage and pumping out, vessel list correction etc.	
e. Estimate the extent of under water damage, sounding of tanks and actions for the refloating of the vessel.	
f. Shall be responsible for fighting the fire (in case of fire) with vessels own resources as well as with the available support from IRT.	

**2. The Port Control Room KDS, VTS Sandhead and HDC**

<b>Response Action</b>	<b>Contact</b>
a. Liaise with Master of the Vessel/Pilot and gather the information about the type of vessels involved in the incident, cargo and location of the incident and convey the message to CIC/SIC.	<ul style="list-style-type: none"> <li>• Master of the vessel</li> <li>• Pilot</li> <li>• CIC</li> <li>• SIC</li> </ul>
b. Gather information related to the weather conditions. Monitor the wind directions and accordingly convey the message to CIC/SIC and Fire Team.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Fire Team</li> </ul>
c. Listening watch to be maintained on VHF channel-16.	
d. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> </ul>
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	<ul style="list-style-type: none"> <li>• Indian Navy</li> <li>• Coastguard</li> <li>• Stakeholders</li> </ul>
f. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel.	

**3. Director - Marine (Alternate: Dy. Director I/II - Marine)**

Response Action	Contact
a. Assess the level of disaster and activate the DMP and OSCP.	
b. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC and Port & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Decide on clearing of vessels in close proximity to the incident location.	
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

**4. Duties of IRT**

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I-Marine	Site Incident Controller	During emergency, he shall proceed to the affected location (if vessel is in impound dock basin/ riverine jetty area) & communicate & collect all necessary information's from the Master of the vessel.	Dy. Director II -Marine
		Report the situation to the CIC/CMG.	
		In case of fire on board the vessel after collision or contact, he will extend all necessary help to the Master of the vessel.	
		Instruct Pilot to keep tugs ready for fire-fighting.	
		Alert other vessels within the vicinity.	
		Ascertain oil pollution- leak source, if any.	

		Obtain information regarding stability and hull stress of the vessel.	
		If vessels have blocked or a possibility of blocking the channel, in co-ordination with the Master, the vessel shall be taken to berth / anchorage.	
		In case of grounding, make arrangements through Harbour Master/Dock Master/Pilots to proceed to the spot and to take soundings, plot them in a chart and to ascertain the location of grounding damage on the hull.	
		Depending on the way the vessel is grounded and the available high tide on the day, all advance preparations should be made to commence the towing operation at least two hours before the high water or as advised by CIC/SIC.	
		Inform MoEF and WBPCB approved parties for safe disposal and providing reception facilities for Oil/Sludge. Also, inform Salvage association.	
Harbour Master (River)	Port Control Room Coordinator	Shall be ready for taking the instructions from CIC/SIC and evacuate/move/shift the vessel from the area.	Dock Master/ Pilot
		If possible, accompany SIC to inspect the vessel.	
		Plot exact location of the incident in coordination with the hydrographic surveyor.	
		Responsible for organizing tugs for rescue. Instruct pilots.	
		Hire additional crafts as necessary.	
OSD Environment	Marine Pollution Control	Supervise and direct personnel to follow the instructions given by SIC.	Alternate officer

*Disaster Management Plan*

	Coordinator	Coordinate with the party involved in disposal of the Oil/sludge in a safe manner. Maintain records of the claims.	
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC. Mobilize fire tenders, men & firefighting equipment to the scene & extend all necessary support to the master of the vessel for firefighting.	Alternate officer
Commandant-CISF	Security and Evacuation	Shall take orders from the SIC. Cordon off the area. Controls & directs gate security and traffic in the area. Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency. Control the entry of unauthorized persons and vehicles. Check for entry of emergency vehicles. Liaise with the Police authorities. Responsible the head count of the personnel.	Dy. Commandant-CISF
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
Executive Engineer	Civil Coordinator	Instruct the contractors to carry out urgent civil works as required. Hire the barges for collecting the spilled oil and coordinate with the parties involved in the safe disposal of the oil/sludge.	Alternate Executive Engineer
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Coordinates with vessel owners/agents/stevedores.	Alternate Officer
Duty Pilot	In Charge of Pilotage	Shall monitor the communication on VHF & convey and relay messages on the advice from CIC/SIC. He will maintain Log of events.	Standby Pilot

**S9: Scenario 9****Part A****1. Blockage of Navigational/ river Channel due to Grounding/sinking of vessel (Wreckage).**

*Note: It is assumed in this case all actions to rescue safely the vessel in channel have not been successful and the vessel has touched bottom in the channel.*

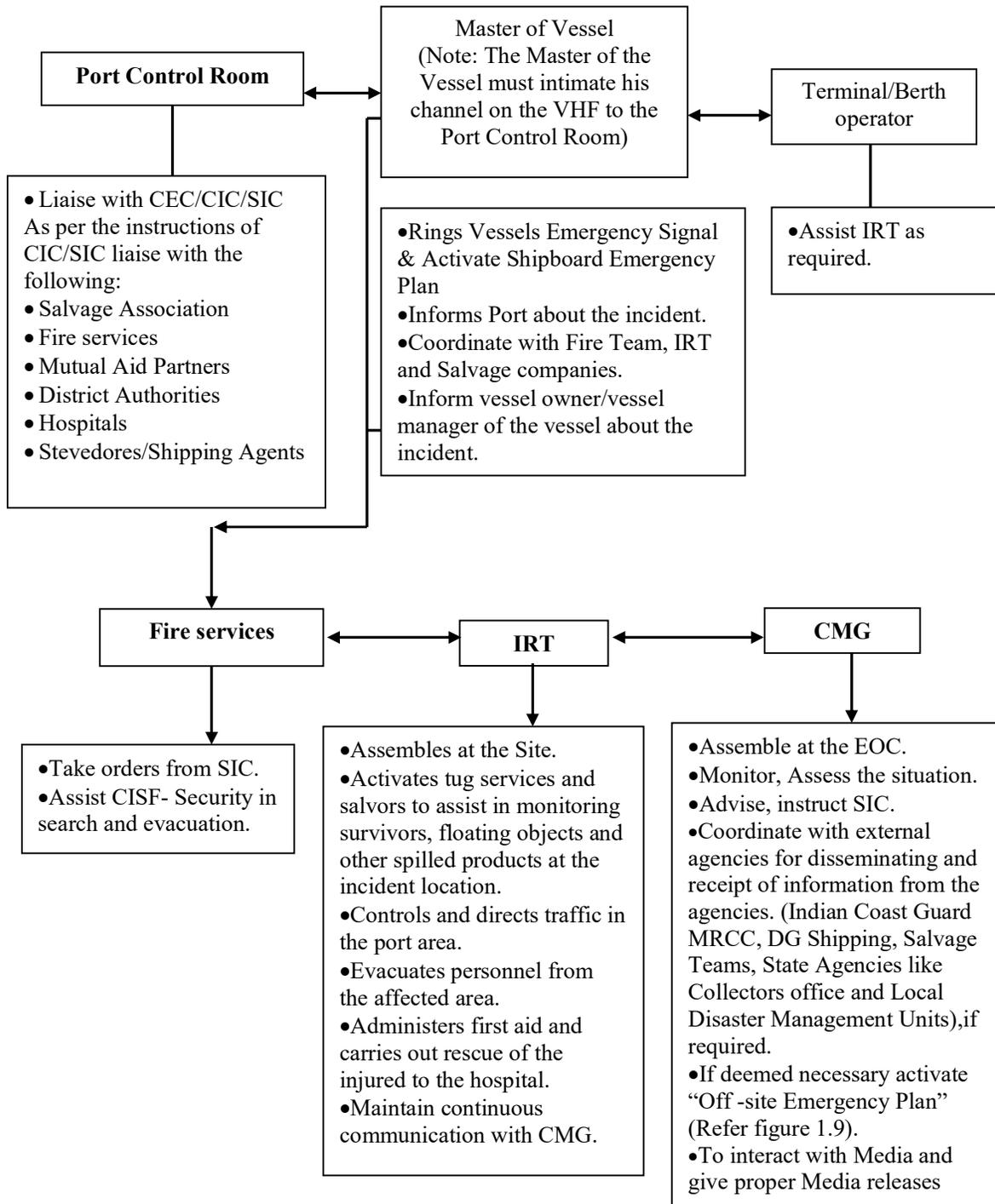
**2. Precautions:** Navigational Aid, Designated Pilots, Continuous monitoring and communication with the Port Control Room.

**3. Impact Zone:** Navigational/River Channel.

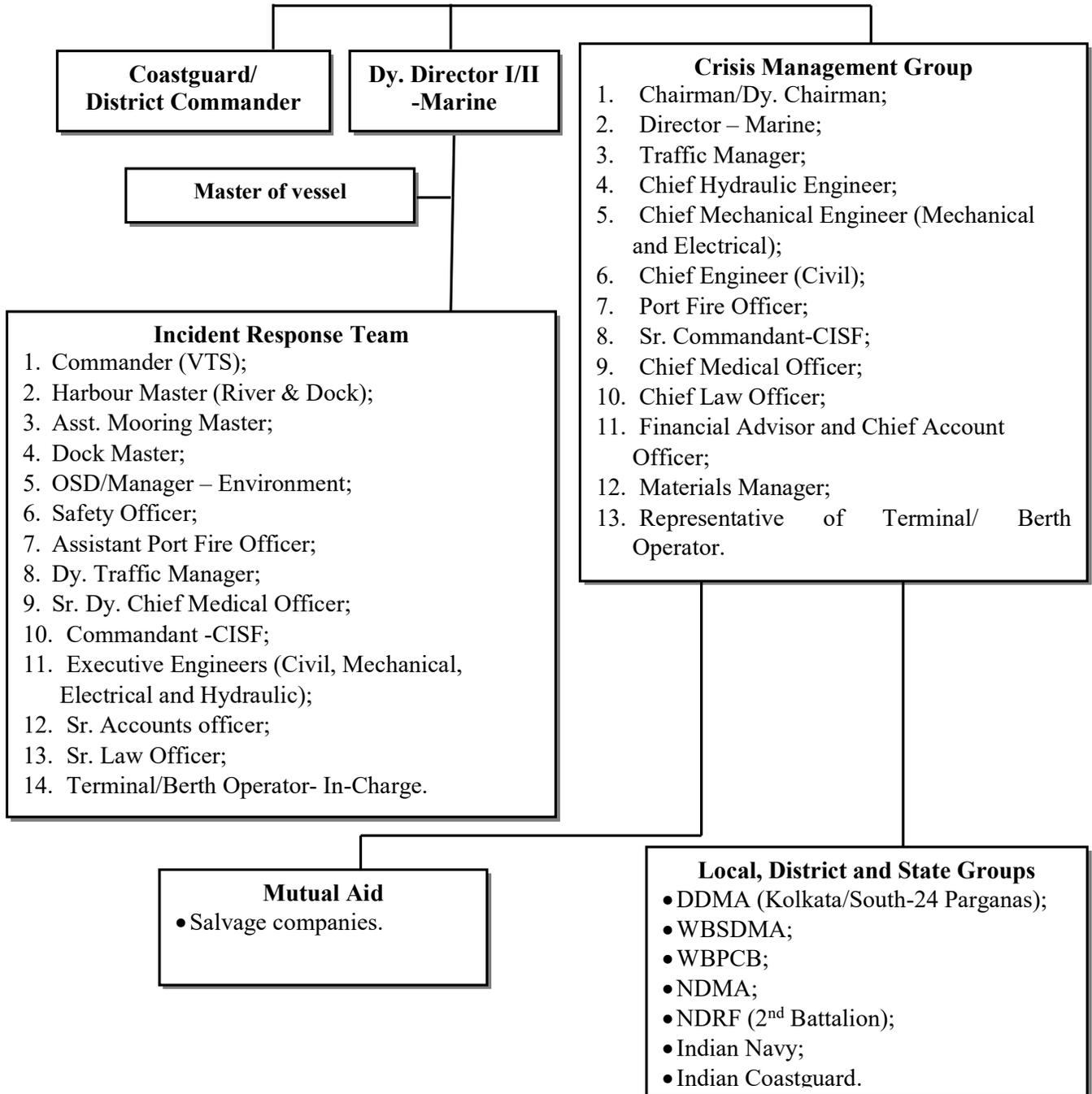
**4. Resources required:** Organizational setup enumerated in Figure S9.2 and major material and equipment resources as given in **Appendix B**.

**5. Note:** *Under the Indian Ports Act, 1908, if a vessel is wrecked, stranded or sunk within the port limits, the Conservator of the Port or in the absence of such an office, the Harbour master may give notice to the owner of the vessel “to raise, remove or destroy the vessel within such period as may be specified in the notice and to furnish such adequate security to the satisfaction of the conservator to ensure that the vessel shall be raised, removed or destroyed within the said period”. If the owner does not comply and act upon the notice, the conservator may raise, remove or destroy the property and claim the compensation from the owner. Mostly, the salvage activity will be done by private salvors in agreement with the Port Trust. Within the port limits, the capacity of the party to carry out salvage, the methods used to raise or remove or destroy the vessel is subjected to the expert opinion of the deputy conservator of the port. Normally, the court will not interfere with these technical decisions.*

Figure S9.1: Action Flow Chart



**Figure S9.2: Action Group**



**Part B: Action Plan****1. The Master of the Vessel (Alternate: Chief Officer) – Before abandonment**

Response Action	Contact
a. Having raised the alarm, the Master will be responsible for taking all immediate steps to safeguard his vessel. As soon as possible he is to establish the extent of grounding and damage to the vessel. He is to ascertain whether the hull has been breached and likely risk of pollution and flooding.	
b. The Master will provide the Port Authority with details of the incident as quickly as possible and will make regular and frequent reports on the progress of the incident. This is to include position of grounding, damage sustained, pollution or risk of pollution, draft of the vessel prior to grounding and soundings at grounding area, cargo on board and location, and any further information that may be at hand.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>

**2. Port Control Room KDS, VTS Sandhead and HDC should**

Response Action	Contact
a. Gather information related to the vessel type, position and time of incident.	
b. Liaise with Master of the Vessel/Pilot.	<ul style="list-style-type: none"> <li>• Master of the vessel</li> <li>• Pilot</li> </ul>
c. Notify to CIC, SIC and the vessels moving into, through and near the casualty and inside the port.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Navy</li> <li>• Coastguard</li> </ul>
d. Notify the information to the owner of the vessel.	

**3. Director - Marine (Alternate: Dy. Director I/II - Marine)**

Response Action	Contact
a. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action.	
b. Assess the level of disaster.	
c. Give necessary instructions to SIC and Port Control Room & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Provide instruction to launch rescue craft to be sent to	<ul style="list-style-type: none"> <li>• Pilot</li> </ul>

scene of Emergency. If required they will bring necessary personnel and equipment to site.	
f. <b>Oil Pollution:</b> He will be responsible to activate the Port OSCP on receipt and assessment of the information gathered. He will instruct the IRT and Master of Vessel about the precautionary measures and necessary actions to limit the extent of pollution.	<ul style="list-style-type: none"> <li>• Coastguard</li> </ul>
g. <b>Evacuation:</b> Assessment of condition of site of potential affected area and decision taken for evacuation should be taken in consultation with SIC and Master of Vessel.	
h. <b>Salvage and or floating of the vessel</b> will be controlled by either the CIC or person assigned by him. All operations will have to be sanctioned by the CIC before implementation.	<ul style="list-style-type: none"> <li>• Salvage Company</li> </ul>
i. Coordinate with external agencies/authorities.	<ul style="list-style-type: none"> <li>• Indian Navy</li> <li>• Coastguard</li> </ul>
j. Be in constant touch with District and Local Administration for rescue and relief operation.	
k. CIC, once the DMP is activated and underway will ensure that, at frequent intervals, issue, through Radio and via the telephone and Media, situation reports and information updates.	
l. <b>Press Liaison</b> A press office will be set up and regular briefings organized and promulgated. The CIC and representatives from each emergency service will attend as circumstances permit to brief media concerns. Where necessary, the P.R. teams from Port will be alerted to ensure fullest briefings on all aspects of the emergency.	
m. Terminate the response and debrief before allowing normal operation.	

**NOTES ON SALVAGE:**

- *If required inform a reputable Salvage Company;*
- *Thoughts should be given to adding ballast to secure vessel in bad weather;*
- *Secure topside openings;*
- *Topside survey;*
- *Underwater survey with a diver noting all damage on plan of vessel;*
- *Information on the seabed using diver and soundings;*
- *Based on survey, draft, stability, condition of vessel openings, cargo, fuel, water etc.;*
- *Other removable weights;*

- Refloating plan must be agreed taking into consideration, draft, stability, a clear passage off (may have to dredge a channel); safety of personnel, fire, pollution (may have to remove bunkers and cargo);
- Availability of tugs, bunkering vessels, divers, salvage companies;
- CIC in control of salvage, Salvor in command, all plans approved by CIC.

#### 4. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I -Marine	Site Incident Controller	During Emergency, proceed to the affected location & communicate & collect all necessary information's from the Master of the vessel.	Dy. Director II -Marine
		Discuss with the Master or owner for refloating or salvaging of the vessel. Endeavour to obtain from owners/agents a General Arrangement Plan of the vessel and, if appropriate the Cargo Plan.	
		Gather information from Port Control Room regarding position and time.	
		He will report the situation to the CIC/CMG.	
		Commence search and rescue operation immediately.	
		He will instruct Harbour Master/Dock Master/ Pilots to keep tugs ready.	
		Alert other vessels within the vicinity and the movement of other vessels into, through and near the location should be stopped.	
		Assistance may be sought from other suitable and available vessels.	
		Inform Salvage association and instruct Harbour Master/Dock Master/ Pilots and Chief Hydraulic Engineer to coordinate.	
In the case of a capsized vessel, make arrangements to hold the vessel in position if drifting would			

		<p>place her in grave danger and, on completion of rescue operations, secure the vessel in position or remove and secure her at some other safe location, whichever is safest and possible, until such time as salvage operations can be undertaken.</p> <p>When clear to do so, arrange for the capsized or sunken vessel to be marked with appropriate buoy(s) and lights, to warn other vessels of her position.</p> <p>Discuss with the Master, owner or agent plans for righting, refloating or salvaging the vessel. Action in this regard is particularly important where the vessel is obstructing fairways, channels or approaches to berths/jetties.</p> <p>Ascertain oil pollution- leak source, if any.</p> <p>Inform the MoEF &amp; WBPCB approved private parties for safe disposal and providing reception facilities for Oil/Sludge.</p>	
<p>Harbour Master (River)</p>	<p>Port Control Room Coordinator</p>	<p>Plot exact location of the incident.</p> <p>Assist in monitoring of other vessels and communicating with the Master and restricting them to enter the emergency location.</p> <p>Allow vessels directly involved in rescue operations within the vicinity.</p> <p>Responsible for Organizing tugs for search and rescue.</p> <p>Hire additional crafts as necessary.</p> <p>Arrange for the marking arrangements with appropriate buoy(s) and lights.</p> <p>Instruct the oil pollution response team to maintain a state of readiness and standby. Coordinate with the team in combating the</p>	<p>Dock Master/ Pilot</p>

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		<p>disaster by taking necessary actions as per the OSCP.</p> <p>Hire the barges for collecting the spilled oil and coordinate with the parties and Pollution response cell involved in the safe disposal of the oil/sludge.</p> <p>Assist Salvage association and SIC.</p>	
Pilot	In-Charge of Pilotage	<p>Shall be ready for taking the instructions from CIC/SIC and evacuate/move/shift the vessel from the area.</p> <p>Shall monitor the communication on VHF &amp; convey and relay messages on the advice from CIC/SIC.</p> <p>Responsible for organizing tugs for shifting the vessel to the anchorage area if required.</p>	Standby Pilot
Executive Engineer	Hydraulic Coordinator	Assist SIC with the river hydrography.	Alternative Executive Engineer
OSD Environment	Marine Pollution Control Coordinator	<p>Shall take orders from the SIC and prepare reports about impending pollution, pollution response, actions by concerned parties. Liaise with traffic and legal dept. for pollution damage claims.</p> <p>Inform WBPCB as per the instruction of CIC/SIC and other environmental agencies about the incident for getting necessary guidance.</p> <p>Coordinate with the party involved in disposal of the Oil/sludge in a safe manner.</p>	Alternate Officer
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Alternate Officer
Sr. Dy. CMO	First Aid and Medical	Shall be responsible to organize and dispatch first aid team with	Alternate Medical

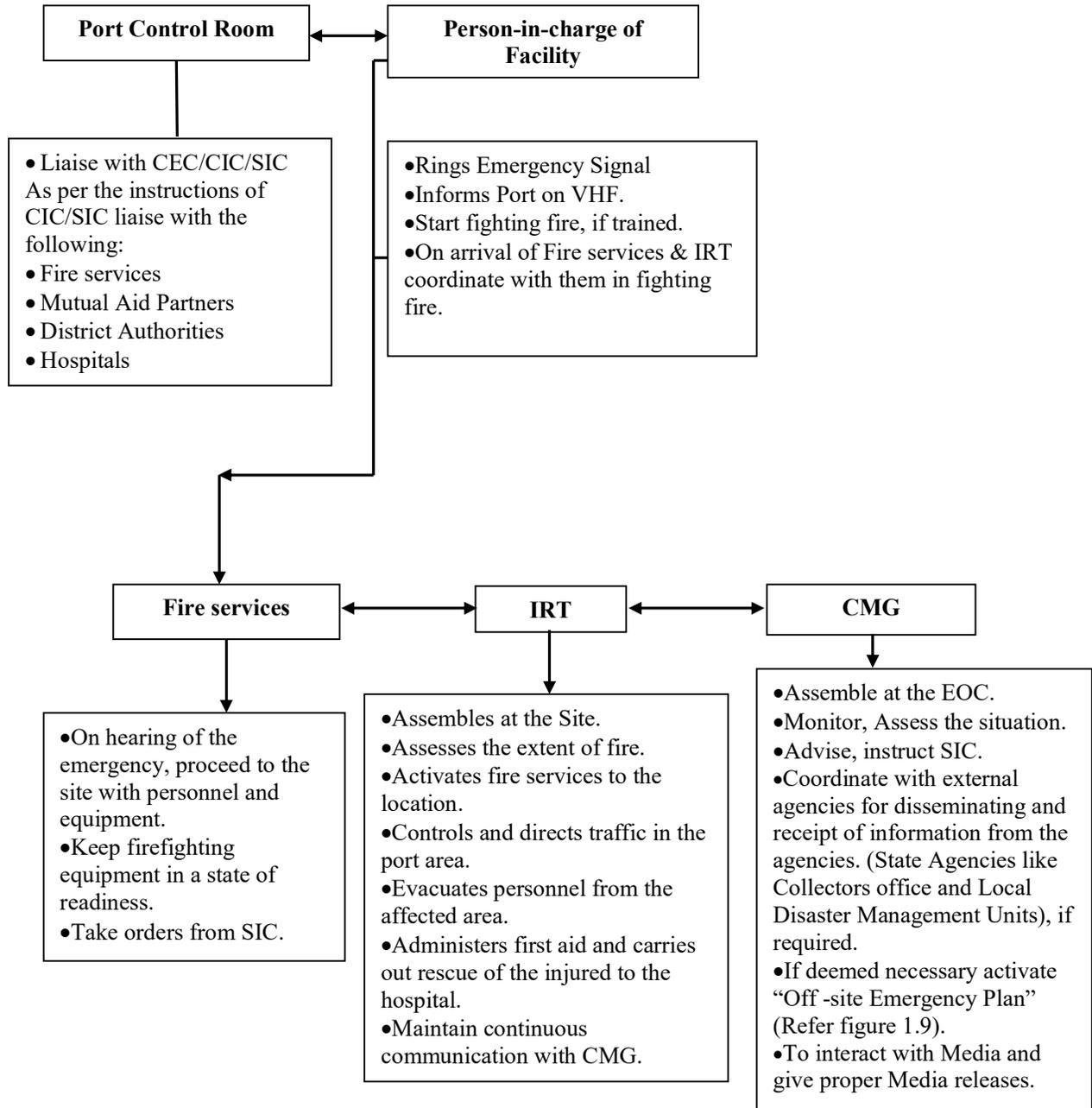
*Disaster Management Plan*

	Coordinator	ambulance as required.	Officer
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Coordinates with vessel owners/agents/stevedores.	Alternate Officer
Commandant-CISF	Security and Evacuation	Shall supervise evacuation of personnel from the scene at the time of emergency. Allow vehicles which are directly involved in rescue operations within the vicinity of the rescue operations.	Dy. Commandant-CISF

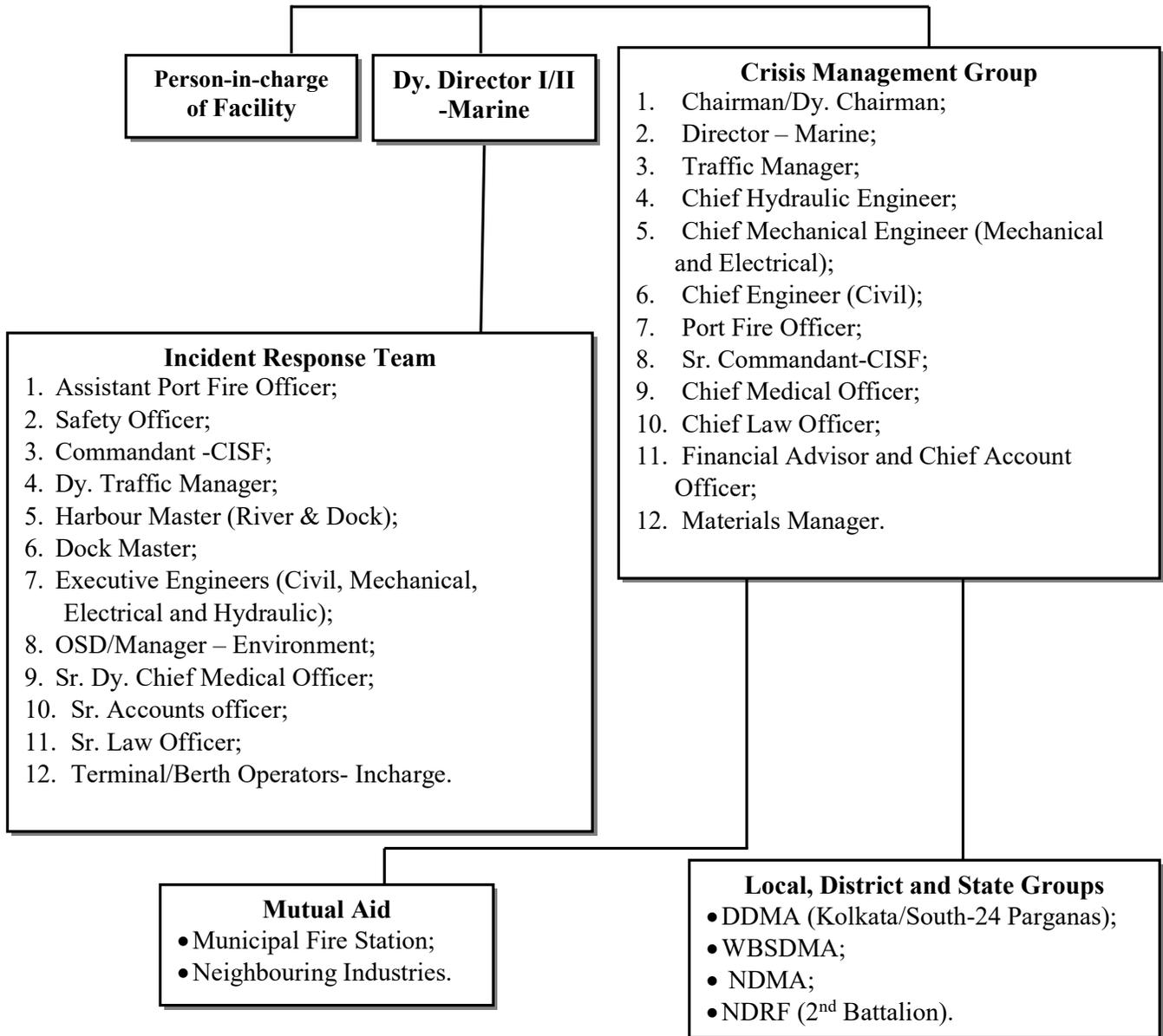
**S10: Scenario 10****Part A**

1. **Fire in Warehouses, Dry docks, Electrical substations, Control rooms for Lock gate and bridges, Pump houses, Office buildings.**
2. **Precautions:** Periodic Maintenance and Inspection, Protected/covered Electrical installations, protection from flood (equipment raising from ground level), Fire-fighting systems, trained personnel to combat fire, No-smoking zone, House Keeping.
3. **Impact Zone:** Incident location and immediate surroundings.
4. **Resources required:** Organizational setup enumerated in Figure S10.2 and major material and equipment resources as given in **Appendix D**.

Figure S10.1: Action Flow Chart



**Figure S10.2:** Action group



**Part B: Action Plan****1. The Person-in-charge of Facility**

Response Action	Contact
a. Should raise emergency alarm.	
b. Port should be informed of any incident without delay.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
c. Shall be responsible for fighting the fire with resources available as well as with the available support from IRT.	

**2. Port Control Room should**

Response Action	Contact
a. Gather information related to the time of incident.	
b. Notify to CIC, SIC and the CME.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• CME</li> </ul>
c. Gather information about the wind and notify CIC/SIC and Fire Team.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Fire Team</li> </ul>

**3. Director - Marine (Alternate: Dy. Director I/II - Marine)**

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC, CME and Port Control Room & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> <li>• CME</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Decide on clearing of vehicles in close proximity to the incident location.	
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

**4. The Fire-fighting Personnel (Fire Team) should**

Response Action	Contact
a. Collect the information from Port Control Room and SIC.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
b. Assist person-in-charge of facility in fighting fire as per SIC/CME Instructions.	
c. He will mobilize personnel & fire-fighting equipment to the scene & extend all necessary support in case of fire, if required.	
d. Assist in evacuation of the personnel as directed by SIC.	
e. Inform SIC for arrangement of any additional equipment as required.	

**5. Duties of IRT**

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I -Marine	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the person-in-charge.	Dy. Director II -Marine
		He will report the situation to the CIC/CMG.	
		Alert vehicles within the vicinity.	
		Extend all necessary support to the Fire Team to fight the fire.	
		Instruct the Fire Team to keep the fire-fighting installation and fire-fighting tugs in a state of readiness & activate if required.	
Executive Engineer	M & E Coordinator	Assist SIC or lead the IRT in coordination with SIC.	Alternate Executive Engineer
		Coordinate with Electricity board.	
		Shall be responsible for Electrical connections and disconnections to vital equipment and systems and provide alternate supply if required.	
Safety Officer	Safety Coordinator	Shall take orders for SIC.	Alternate Officer
		Ensure safely rescue of personnel and labors.	

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		Ensure cleanup work during and after the emergency as quick as possible.	
Harbour Master (River)	Port Control Room Coordinator (for control rooms of lock gate, bridges)	Shall take orders from the SIC.	Dock Master/ Pilot
		Maintain Log of events.	
Asst. Port Fire Officer	Port Control Room Coordinator	Shall take orders from the SIC.	Alternate Officer
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene for fire-fighting.	
		Assist in safely rescuing of the personnel, if trapped.	
		Inform SIC/CME for the arrangement of any additional equipment as required.	
Commandant-CISF	Security and Evacuation	Controls & directs traffic in the area.	Dy. Commandant-CISF
		Cordon off the area.	
		Shall supervise evacuation of personnel from the scene at the time of emergency.	
Executive Engineer	Civil Coordinator	Liaise with SIC.	Alternate Executive Engineer
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Shall prepare vehicles in the vicinity to vacate.	Alternate Officer
		Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	
		Coordinates with vessel owners/agents/stevedores.	
Duty Pilot	In-Charge of Pilotage	Shall be ready for providing any assistance on site.	Standby Pilot

**S11: Scenario 11****Part A:****1. War and Terrorism.**

- 2. Precautions:** Protection of the port facilities receiving seagoing vessels from terrorist attacks is as per the provision of the “The International Vessel and Port Facility Security Code (ISPS Code)”.

Security of the KDS is being provided by CISF.

The measures for port security include "installation of VTMS, CCTVs, Biometric Access Control System, patrolling of port areas by vehicles, creation of deterrence by creating proper perimeter wall, illuminating port area, cancelling access to ports and vessels, conducting physical verification etc.”

- 3. Impact Zone:** Entire port.

- 4. Resources required:** Intelligence inputs from agencies and organizational setup enumerated in Figure S11.2 and major material and equipment resources as given in **Appendix D**.

**Part B: Action Plan**

When war like situation is developed or during the declaration of war the priority is to be given to all important/critical areas to remain vigilant to prevent sabotage, to remain ready to combat emergency and to keep normal operation going.

**B.1 Prior Emergency Situation (after warnings/inputs)**

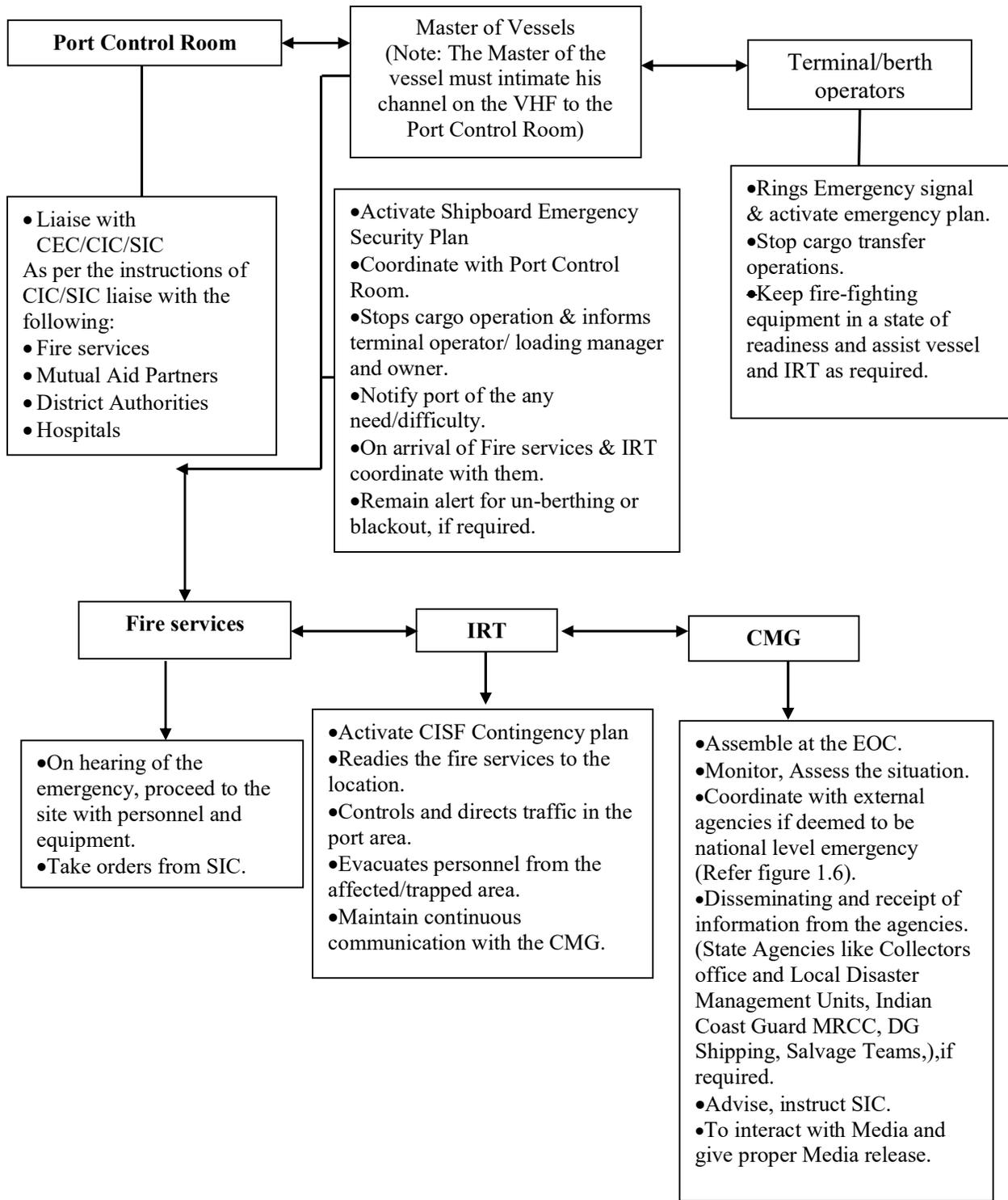
- Set up Crisis management centre and manned continuously.
- CMG to declare plan/guideline to be followed which could be based on CISF Contingency Plan/Government of India/Statutory bodies/Indian Navy/Air Force/Government of West Bengal etc. instructions.
- CMG to ensure utmost vigilance in identified area to ensure the adequate resources in terms of security personnel, experts in handling equipment, trained manpower, and flood lights, earth moving equipment, mobile cranes, and rescue crafts are available to guard all gates, roads etc. In case of any unidentified/unauthorized person is found, he must be handed over to police.
- CMG to ensure that evacuation plan is prepared and backup systems such as power generator, communication equipment, and safety systems are working. CMG should also ensure that all required manpower such as electricians/technicians/laborer is available all time.
- All terminal/berth operators and sensitive locations should be informed.
- No movement of the vessels in the port vicinity will be allowed.

**B.2 During Emergency**

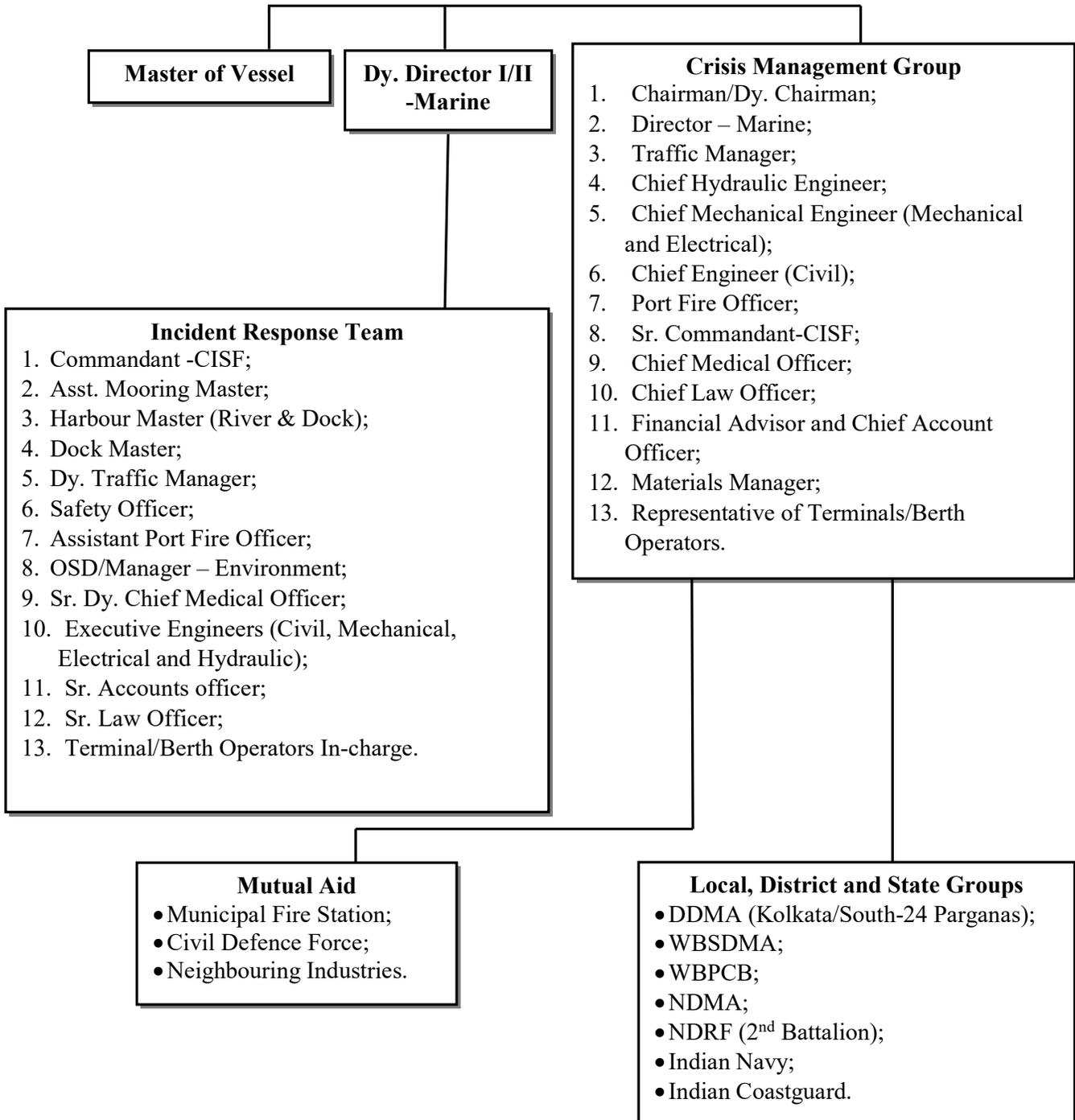
- CMG to adopt relevant DMP to combat the emergency.
- In case of an enemy attack inform relevant authorities & internal security to defend installations till the external support arrives.
- When additional security (State ATF/army/BSF) arrives, situation is to be handled jointly.
- CMG to ensure sufficient supply of food and water.

- All vessels inside the port and at the anchorage will observe blackout as per the instruction of CMG.

Figure S11.1: Action Flow Chart



**Figure S11.2:** Action group



**Part B: Action Plan****1. Commandant - CISF (Alternate: Dy. Commandant- CISF) should**

Response Action	Contact
a. Act as per the CISF Contingency plan.	
b. Controls & directs traffic in the area.	
c. Shall supervise evacuation of personnel from the scene at the time of emergency and shift to shelter stations.	

**1. Director - Marine (Alternate: Dy. Director I/II - Marine)**

Response Action	Contact
d. Assess the situation and activate the DMP and CISF Contingency Plan.	• CISF-Security
e. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action in coordination with CISF-Security.	• CISF-Security
f. Give necessary instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
g. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
h. Be in constant touch with District and Local Administration for rescue and relief operation.	
i. Terminate the response and debrief before allowing normal operation.	

**2. Duties of IRT**

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I - Marine	Site Incident Controller	During Emergency shall communicate & collect all information.	Dy. Director II -Marine
		Report the situation to the CIC/CMG.	
		Extend all necessary help to CISF (Security) as and when required.	
		Ensure that there is blackout at the port and the vessels at the anchorage area as per the guidance and instruction of CMG/CIC.	

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Harbour Master (River)	Port Control Room Coordinator	Shall be ready for taking the instructions from CIC/SIC and evacuate/move/shift the vessel from the area.	Dock Master/ Pilot
Master of the vessel	In-Charge of operation on board vessel	Be ready to take the vessel out of the port as per the instructions of CIC/SIC.	Chief Officer of vessel
		Coordinate with IRT leader and will be responsible for shutting down all cargo operation on board in coordination with terminal/operator In-Charge.	
Terminal/Berth Operators	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with Port and render necessary assistance to the SIC by providing additional fire-fighting & emergency equipment as required.	Alternate Officer
		Arrange to protect cargo in vicinity from damage.	
Safety Officer	Safety Coordinator	Ensure all employees (port and contract) within port shifted to safe locations.	Alternate Officer
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Alternate Officer
		Keep the fire –fighting installation in a state of readiness and be in continuous liaison with SIC/CIC.	
		Ensure all employees (port and contract) within port shifted to safe locations.	
Executive Engineer	Civil Coordinator	Assist SIC.	Alternate Executive Engineer
Executive Engineer	M & E Coordinator	Arrange for specialized equipment if required as per the instruction of the SIC.	Alternate Executive Engineer
		Take orders from CIC/SIC with regards to power supply and shutdown.	
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer

*Disaster Management Plan*

Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Submits consolidated list of dangerous goods in port area.	Alternate Officer
		Coordinates with the truck contractors.	
		Ensure sufficient numbers of vehicles are available.	
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for taking the vessel out of berth and be ready for providing any assistance on site.	Standby Pilot

**S12: Scenario 12****Part A****1. Bomb Threat**

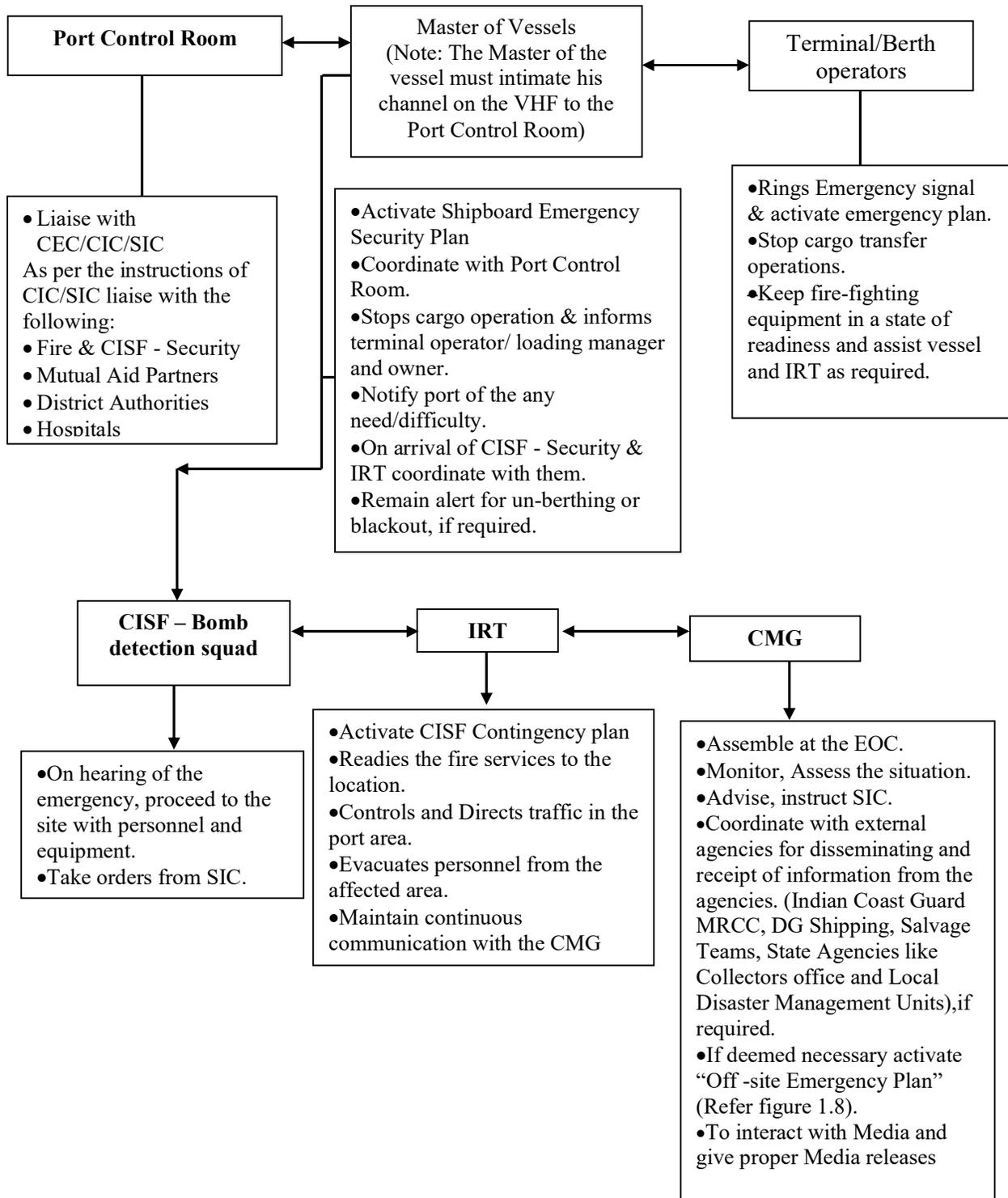
- 2. Precautions:** Protection of the port facilities receiving seagoing vessels from terrorist attacks is as per the provision of the “The International Vessel and Port Facility Security Code (ISPS Code)”.

Security of the KDS is being provided by CISF.

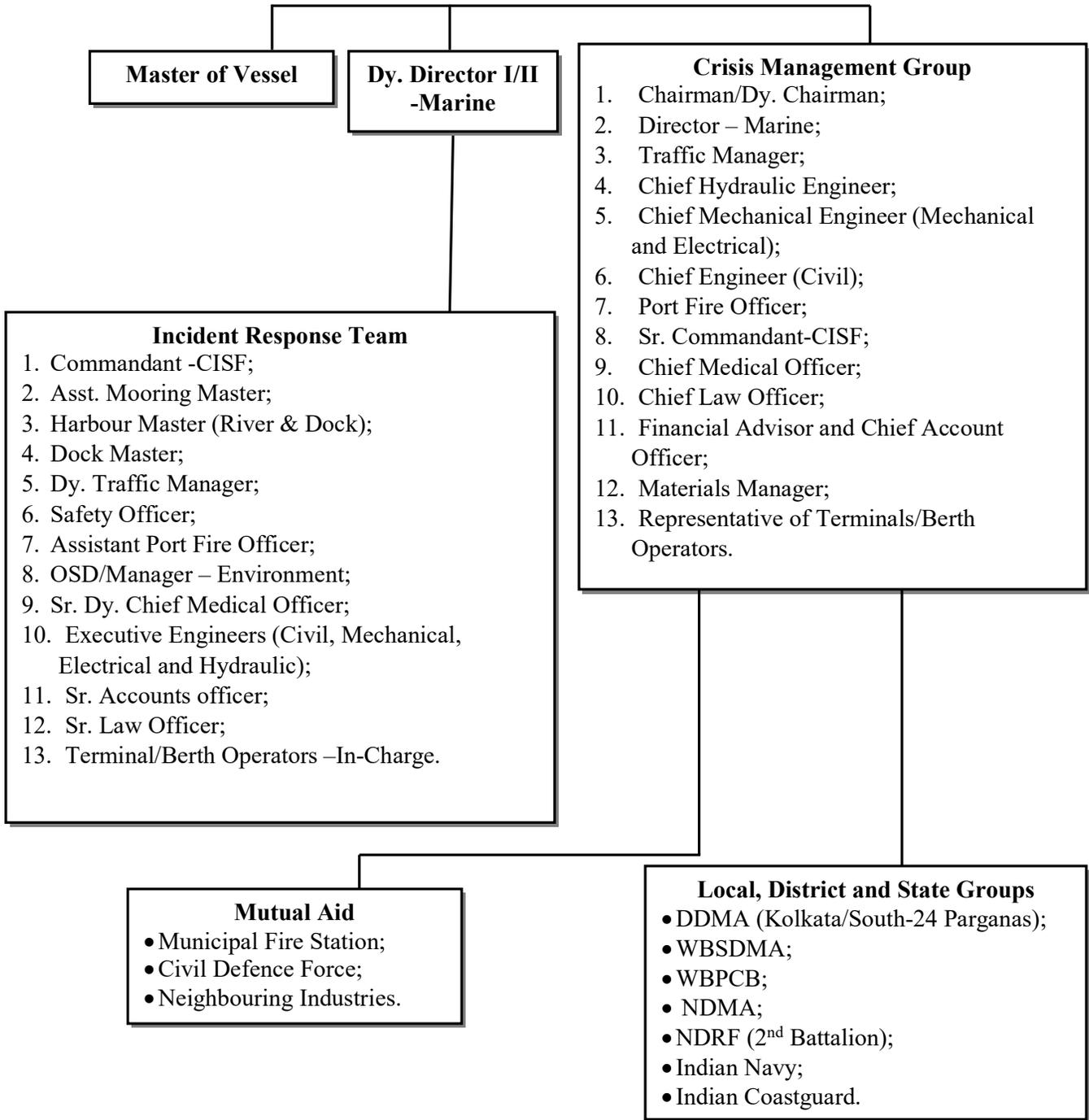
The measures for port security include "installation of VTMS, CCTVs, Biometric Access Control System, patrolling of port areas by vehicles, creation of deterrence by creating proper perimeter wall, illuminating port area, cancelling access to ports and vessels, conducting physical verification etc.”

- 3. Impact Zone:** Entire port .
- 4. Resources required:** Organizational setup enumerated in Figure S12.2 and major material and equipment resources as given in **Appendix D**.

Figure S12.1: Action Flow Chart



**Figure S12.2:** Action group



**Part B: Action Plan****1. The Observer**

<b>Response Action</b>	<b>Contact</b>
a. Port Control Room/CISF should be informed without delay.	<ul style="list-style-type: none"> <li>• Port Control Room</li> <li>• CISF-Security</li> </ul>

**2. Commandant - CISF (Alternate: Dy. Commandant- CISF) should**

<b>Response Action</b>	<b>Contact</b>
a. Gather the information as per CISF bomb threat checklist based on Intelligence inputs.	
b. Should Implement/activate CISF Contingency Plan and search operation as per the message received of the location.	
c. Identify the location and cordon off the area.	
d. Assist District Police and Bomb Squad as required.	
e. All terminal/operators should be informed.	
f. Relevant port area should be shut down and people inside the port should be taken to a safe location.	

**3. Director - Marine (Alternate: Dy. Director I/II - Marine)**

<b>Response Action</b>	<b>Contact</b>
a. Assess the situation and activate the DMP.	
b. Establish EOC and be stationed to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC, CISF and Port Control Room & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• CISF</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Be in constant touch with District and Local Administration for rescue and relief operation.	
f. Terminate the response and debrief before allowing normal operation.	

## 4. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I -Marine	Site Incident Controller	During Emergency shall communicate & collect all information.	Dy. Director II -Marine
		Ensure that the identified location is cordoned off and the people are evacuated.	
		Report the situation to the CIC/CMG.	
		Extend all necessary help to CISF as and when required.	
Harbour Master (River)	Port Control Room Coordinator	Shall be ready for taking the instructions from CIC/SIC and evacuate/move/shift the vessel from the area.	Dock Master/Pilot
Safety Officer	Safety Coordinator	Ensure all employees (port and contract) within port shifted to safe locations.	Alternate Officer
Master of the vessel	In-Charge of operation on board vessel	Be ready to take the vessel out of the port as per the instructions of CIC/SIC.	Chief Officer of vessel
		Coordinate with IRT leader and will be responsible for shutting down all cargo operation on board in coordination with terminal/operator In-Charge.	
Terminal/ Berth operator	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with Port and rendering necessary assistance to the SIC by providing additional equipment as required.	Alternate Officer
		Coordinate with the agencies for screening of their cargoes.	
		Arrange to protect cargo in vicinity from damage.	
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Alternate Officer
		Keep the fire –fighting installation in a state of readiness and be in continuous liaison with SIC/CIC.	
		Ensure all employees (port and	

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		contract) within port shifted to safe locations.	
Executive Engineer	Civil Coordinator	Assist SIC.	Alternate Executive Engineer
Executive Engineer	M & E Coordinator	Arrange for specialized equipment if required as per the instruction of the SIC.	Alternate Executive Engineer
		Take orders from CIC/SIC with regards to power supply and shutdown.	
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Submits consolidated list of dangerous goods in port area.	Alternate Officer
		Coordinates with the truck contractors.	
		Ensure sufficient number of vehicles is available.	
		Controls traffic in the Port area.	
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for taking the vessel out of berth and be ready for providing any assistance on site.	Standby Pilot
		Responsible for organizing tugs for shifting the vessel to the anchorage area.	

**S13: Scenario 13****Part A:****1. Natural Disaster (Cyclone)**

*Note: The action plan will come into force as soon as the storm warning signal no.5 or higher is hoisted.*

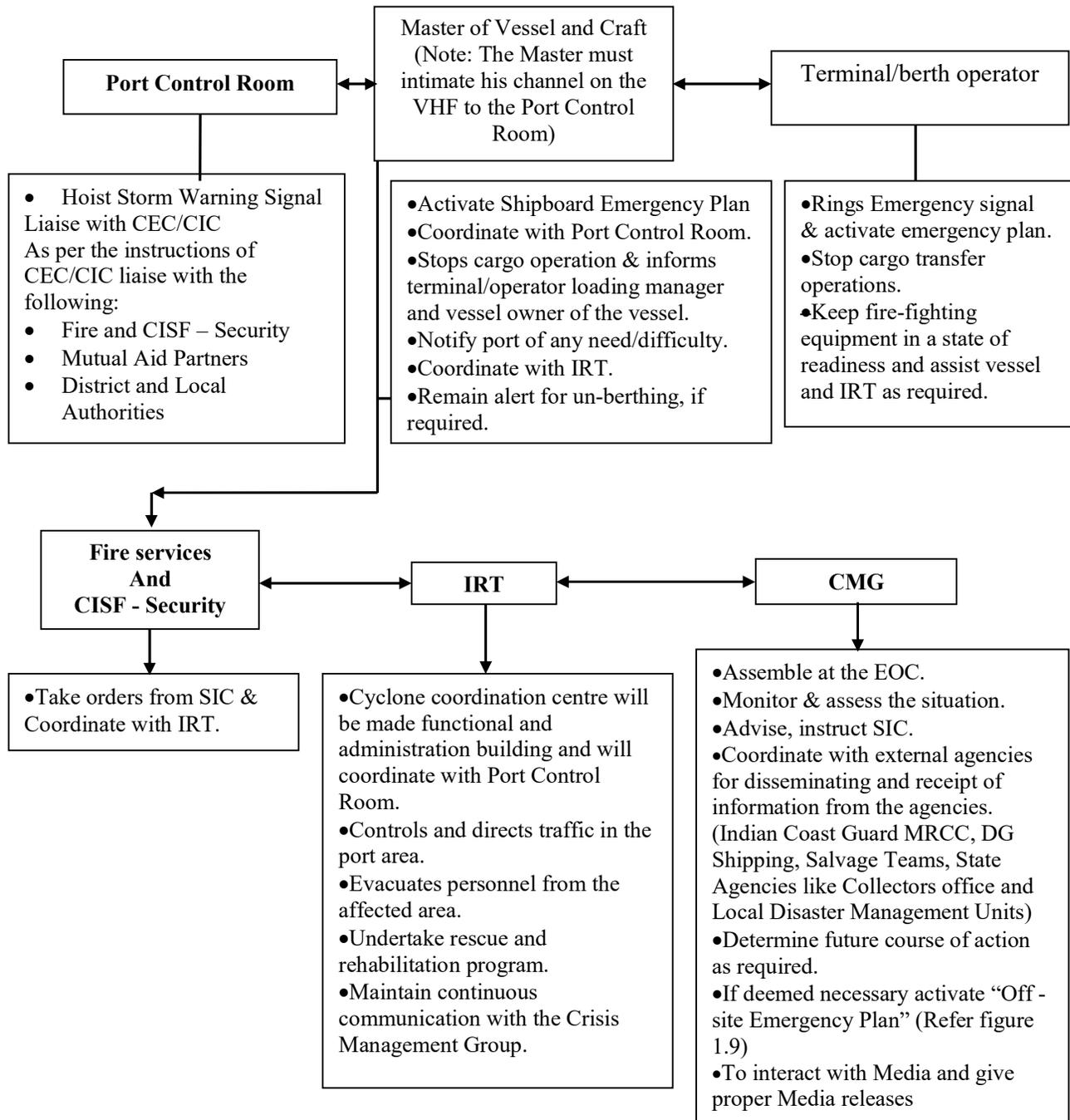
**2. Precautions:** SOP for Cyclone, Continuous weather monitoring, Early warning system, Cyclone Shelters.

**3. Impact Zone:** Entire port.

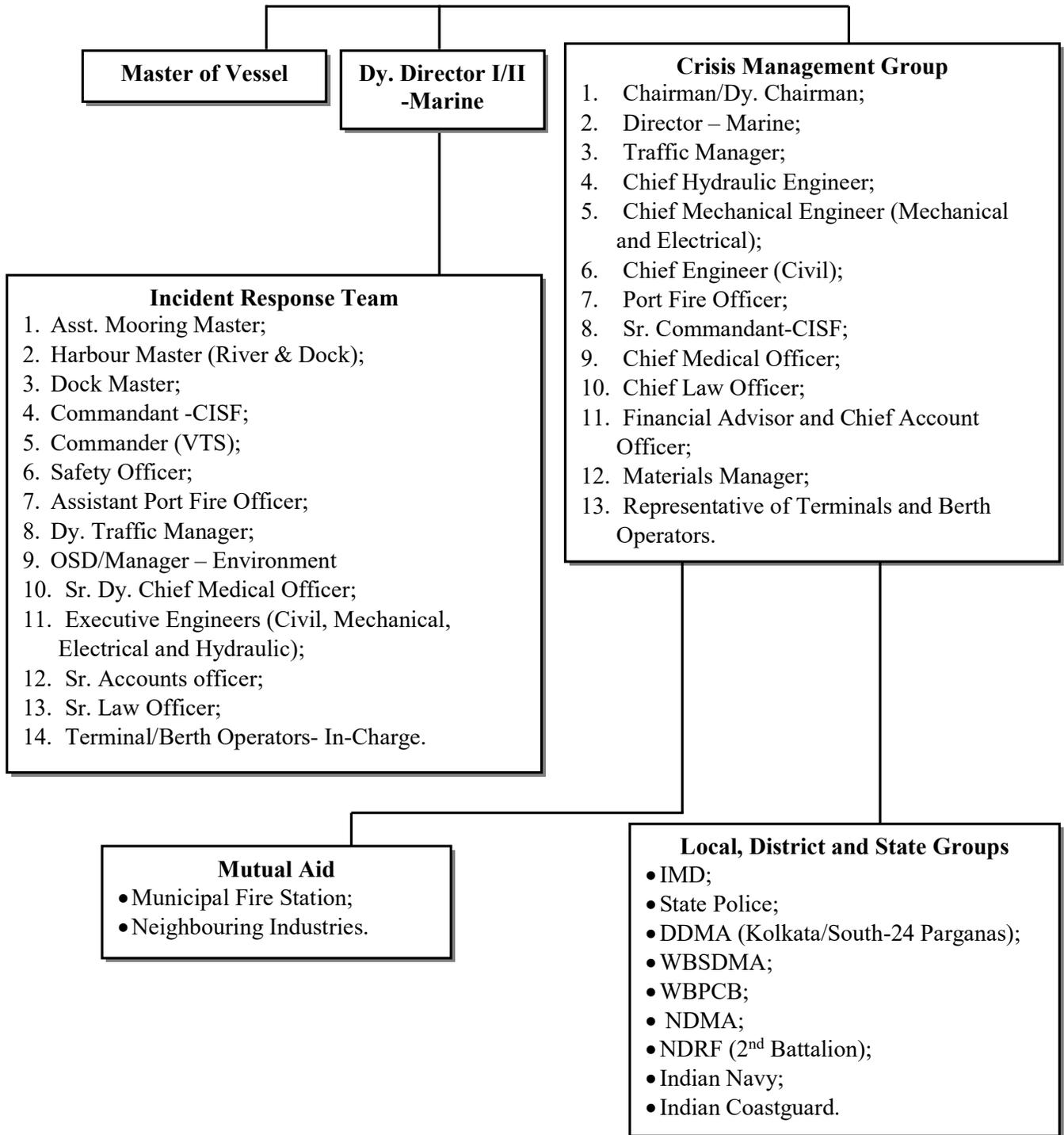
*Note: The Kolkata/ South-24 Parganas districts falls under very high damage risk zone (max. wind speed of 50 m/s) as per the vulnerability hazard map of the region.*

**4. Resources required:** Refer Figure S13.2 and **Appendix D**.

**Figure S13.1:** Action Flow Chart



**Figure S13.2:** Action group



**Part B: Action Plan****1. Port Control - KDS, Port Control - Sagar Island and HDC**

Response Action	Contact
a. Gather information related to the vessel type and position in the port limit.	
b. Gather information related to the weather conditions by liaising with competent agencies for issuing warnings as mentioned in section 9.2.3 and other media. Monitor the weather map either through Internet or Television and record approximate position of the weather and information about its movement as given in the news.	
c. As per instruction of SIC, sufficient number of staff will be detailed. The staff of Port Control Room will remain on duty until they are relieved by next shift staff or till alternative arrangements are made or till the storm has passed and the Harbour Master releases them.	
d. Every two hourly barometer reading will be recorded after cyclone warning signal No. 3 is hoisted but the same will be made hourly if further upward signal is placed.	
e. Liaise with Master of the Vessel/Pilot.	
f. Ensure that telephones, one VHF and one walkie-talkie all are operational. Listening watch to be maintained on VHF channel-16.	
g. Notify to CEC, CIC, Head of the Departments and the vessels moving into, through and inside the port. Keep CIC informed of all the messages received by telephone, VHF sets or by messenger.	<ul style="list-style-type: none"> <li>• CEC</li> <li>• CIC</li> <li>• HOD</li> <li>• Master of the vessel</li> </ul>
h. Notify the other Authorities and stakeholders within Port as per instructions of CEC/CIC.	<ul style="list-style-type: none"> <li>• Navy</li> <li>• Coastguard</li> <li>• Stakeholders</li> </ul>
i. Inform the Harbour Master/Dock Master/ Asst. Mooring Master of any buoys or crafts or any Port installation is seen adrift.	<ul style="list-style-type: none"> <li>• SIC</li> </ul>
j. Hoist signals or raise alarms, as per the warnings received by the competent agencies for issuing warnings. (for warning signals refer section 9.2.3)	

**2. Tidal observatory**

<b>Response Action</b>	<b>Contact</b>
a. The Gauge Clerk will record the range of tide, time and heights of high and low water and will report to Chief Hydraulic Engineer who in turn will apprise the CIC and the SIC of the actual and predicted tides.	<ul style="list-style-type: none"> <li>• Chief Hydraulic Engineer</li> </ul>

**3. The Master of the Vessel (Alternate: Chief Officer)**

<b>Response Action</b>	<b>Contact</b>
a. Should raise vessels emergency alarm and activate ship board emergency action plan.	
b. Having raised the alarm, the Master will be responsible for taking all immediate steps to safeguard his vessel.	
c. The Master will provide the Port Authority with details of the vessel.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
d. Should follow the instruction of the CIC/SIC and be in continuous liaison with the CIC/SIC/Port Control Room.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Port Control Room</li> </ul>
e. Should be in a state of readiness to take the vessel out of the port.	

**4. The terminal/berth operator personnel should**

<b>Response Action</b>	<b>Contact</b>
a. Activate EAP and inform Port.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
b. Shall be responsible of shutting down of cargo operation (as per SOP and/ contingency plan) & coordinate with Port and Master of the Vessel and rendering necessary assistance to the SIC and vessel by providing emergency equipment as required.	
c. Submit consolidated list of dangerous goods in port and Vessels in port. Make arrangements to protect cargo.	
d. Assist IRT and provide all necessary equipment.	<ul style="list-style-type: none"> <li>• SIC</li> </ul>
e. He will direct operation staff. Coordinate with the vessel in-charge/C & F Agents/stevedores.	

**5. Director – Marine (Alternate: Dy. Director I/II -Marine)**

Response Action	Contact
a. He will keep himself apprise of the weather developments. If the storm is observed on the radar screen, the Deputed Officer will inform Chairman/ Dy. Chairman and cyclone station.	
b. He will be stationed in EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation periodically and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Consult with Chairman / Dy. Chairman and decide on berthing of vessels as soon as the cyclone is confirmed to pass in close proximity to the Port.	
f. Plan movements of vessels such that the vessels are cleared in shortest possible time.	
g. Coordinate with external agencies/authorities such as Indian Navy and Coastguard.	<ul style="list-style-type: none"> <li>• Indian Navy</li> <li>• Coastguard</li> </ul>
h. Be in constant touch with District and Local Administration for rescue and relief operation.	
i. Terminate the response and debrief before allowing normal operation.	

**6. Duties of IRT**

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I/II-Marine	Site Incident Controller	During Emergency shall proceed to the Port Control Room & communicate & collect all information.	Asst. Mooring Master
		Take over the charge and ensure the action plan is promulgated as per the instructions of CIC.	
		Inform vessels and Asst. Mooring Master alongside berths to double up their moorings, provide shore gang assistance and ask Masters to keep their vessels ready to proceed to the sea at short notice as per the instruction of CIC.	

		<p>He will keep close liaison will IMD, Radar Station, Police Wireless Station, Coast Guard and Vessels in Port in regard to the likely weather conditions in the near further.</p> <p>Ensure Port Control Room, hoists appropriate storm signal as per the situation.</p> <p>Report the situation to the CIC &amp; the CMG.</p> <p>Keep rescue team ready with rubber boats, Life jackets etc.</p> <p>Ensure that the hazardous cargoes are shifted out of the port or secured/stored in a safe manner.</p> <p>Ensure that the operations are brought back to normal after the termination of the emergency procedure.</p>	
Harbour Master (River)	Port Control Room Coordinator	<p>Shall monitor the communication on VHF/any other communication medium &amp; convey and relay messages on the advice from CIC/SIC.</p> <p>Instruct pilots to secure tugs, crafts and workboats.</p> <p>He will maintain log of events.</p>	Dock Master/ Pilot
Harbour Master for Vessel in Dry Dock	In-Charge of Dry Dock	<p>Securing of loose items.</p> <p>Ensure securing of dock cranes.</p> <p>Engine room entrance doors, sky lights etc. of all the crafts to be kept shut.</p> <p>Master shall be in constant touch with Port Control Room.</p>	Alternate Officer
Safety Officer	Safety Coordinator	<p>Ensure workers within perimeter of safety dangerous / chemical tank farms shifted to sheltered location.</p> <p>All non-essential workers to move out of port area.</p>	Alternate Officer
Asst. Port Fire	Fire, Search	Shall take orders from the SIC.	

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<p>Officer</p>	<p>and Rescue Coordinator</p>	<p>Keep fire tenders and fire-fighting equipment in a state of readiness.</p> <p>Ensure the Fire tugs is properly manned and secured with double ropes and engines running in idling condition.</p> <p>Responsible for mobilizing fire tenders, men &amp; fire-fighting equipment to the scene &amp; extend all necessary support.</p> <p>Ensure hazardous cargo out are kept at a sheltered or safe location.</p> <p>Liaise with State Fire brigade for any assistance.</p>	<p>Officer</p>
<p>Commandant-CISF</p>	<p>Security and Evacuation</p>	<p>Shall be responsible for forming a cyclone task force and will lead the same.</p> <p>Controls &amp; directs traffic in the area.</p> <p>Shall supervise evacuation of personnel from the scene at the time of emergency and Responsible for rescue operation.</p> <p>Till normality is restored, arrangement will be made for thorough checks on all out-going vehicles to guard against pilferage.</p>	<p>Dy. Commandant-CISF</p>
<p>Dy. Traffic Manager</p>	<p>Cargo Storage, Shed and Labour Coordinator</p>	<p>Submits consolidated list of dangerous goods in port area.</p> <p>Coordinate with the truck contractors.</p> <p>Ensure availability of vehicles and mobilize and dispatch sufficient number of vehicles to the site during emergency.</p>	<p>Alternate Officer</p>
<p>Executive Engineer</p>	<p>Civil Coordinator</p>	<p>Shall ensure the standard procedure before the monsoon has been followed and complied with by all the divisions.</p> <p>All types of cranes, forklifts, heavy earth moving equipment to</p>	<p>Alternate Executive Engineer</p>

		be secured in a safe manner.	
		Keep enough number of cement bags ready as per SIC instructions.	
		Pump house equipment and all generator sets shall be tried out and kept ready.	
		Ensure all the drains and obstructions in the creeks/ culverts are cleaned for easy discharge of sludge water.	
Executive Engineer	M & E Coordinator	Shall ensure the standard procedure before the monsoon has been followed and complied with by all the divisions.	Alternate Executive Engineer
		Shall form and head Cyclone mitigation Team comprising of Senior Electrical, Mechanical and Maintenance Engineers.	
		Shall ensure that all the installations and equipment are secured. All division and workshops shall follow their standard procedures for securing the equipment and installations.	
		Shall be responsible for alternate electrical supply to vital equipment and systems at the berth.	
		All Sub Stations, Power Control rooms will be manned round the clock.	
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
Executive Engineer	Hydrographic Survey	Assist SIC.	Alternate Executive Engineer
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for taking the vessel out of berth or will not bring the vessel to berth as per the instruction given by CIC/SIC.	Standby Pilot

		<p>Inform the Masters of all vessels at the berths to double the moorings and to keep engine ready to proceed out to sea if situation warrants.</p> <p>Decision regarding moving vessels to the anchorage will be taken depending on the strength of the wind likely to be encountered and number of vessels in the Port.</p> <p>Maintain a close liaison and co-ordination with the Operations In-charge.</p> <p>Take all necessary steps for the safety of the Port crafts.</p> <p>Fender and extra lengths of ropes/wires will be kept ready so as to attend to any craft whose moorings may part.</p> <p>Inform the Port Control Room immediately in the event any craft is seen adrift or any other Port installation is seen in danger. Arrange an Emergency Maintenance team.</p> <p>Responsible for directing tugs for combating the fire and rescue.</p> <p>Securing of loose items.</p> <p>Ensure securing of dock cranes.</p> <p>Engine room entrance doors, sky lights etc. of all the crafts to be kept shut.</p> <p>Master shall be in constant touch with Port Control Room.</p>	
<p>Material Manager</p>	<p>Material Management</p>	<p>During cyclonic season sufficient stock of stores like corrugated iron sheets, J.Hooks, screw hinges, gunny bags, tarpaulins, ropes and wires for Port Crafts, diesel oil, kerosene oil, hurricane lantern, kerosene lamps, torch lights with batteries and bulbs, electrical items etc. is kept.</p>	<p>Alternate Officer</p>

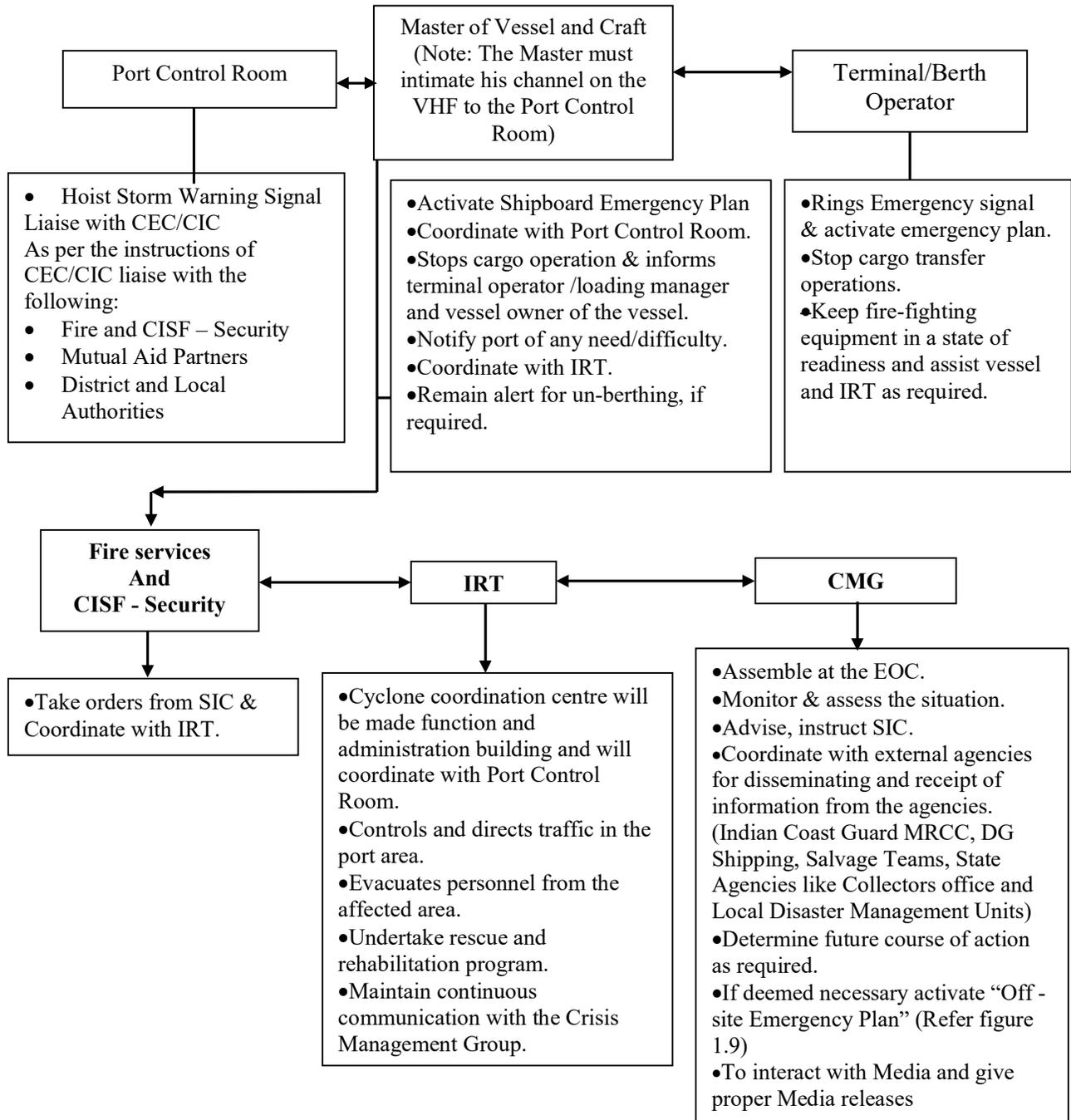
<b>POST-CYCLONE DUTIES</b>	
<b>Sr. no.</b>	<b>Duty</b>
1.	All the Heads of the Departments are required to assess the damage and submit a detailed report indicating the estimate to the Chairman. For this, a team may be formed comprising Officers of Executive Engineer and above in rank at departmental level and may associate one Officer from Finance Department. The preliminary report is to be submitted within 3 hours and detailed report within three days.
2.	Hydrographic survey to be conducted to assess the channel condition and Shipping to resume as early as possible.
3.	In case of any small craft sunk or grounded, the same to be removed to make the channel/ berth safe for navigation. Dy. Director I/II- Marine will detail a salvage party.
4.	A team of Officers to be nominated by Secretary to supervise the rescue and relief operation and disposal of carcasses in co-ordination with the local and District Administration.
5.	Mobile medical service, if required, to be provided by CMO. Preventive measures for epidemics to be taken.
6.	All the operating systems to be attended urgently and made operational as early as possible on war footing basis to resume operation.
7.	Spot tendering procedure can be followed if required in emergency.
8.	Water supply and electricity to be given priority. The CME shall be authorized to extend all assistance for manpower, conveyance, equipment and materials etc. to electrical board, if required, for resuming power supply. The electrical cabling network to be checked area wise.
9.	All the damaged temporary roofed warehouses are to be repaired.
10.	The Material Manager will nominate a team of officers and staff for procurement and supply of essential materials for repair of various structures and equipment as reported.
11.	To assess the progress of repair works, HOD meeting will be held daily till normalcy is restored.
12.	Damage to furniture, building fixtures may be prepared.

**S14: Scenario 14****Part A:****1. Natural Disaster (Flood due to high tide and/or heavy rains)**

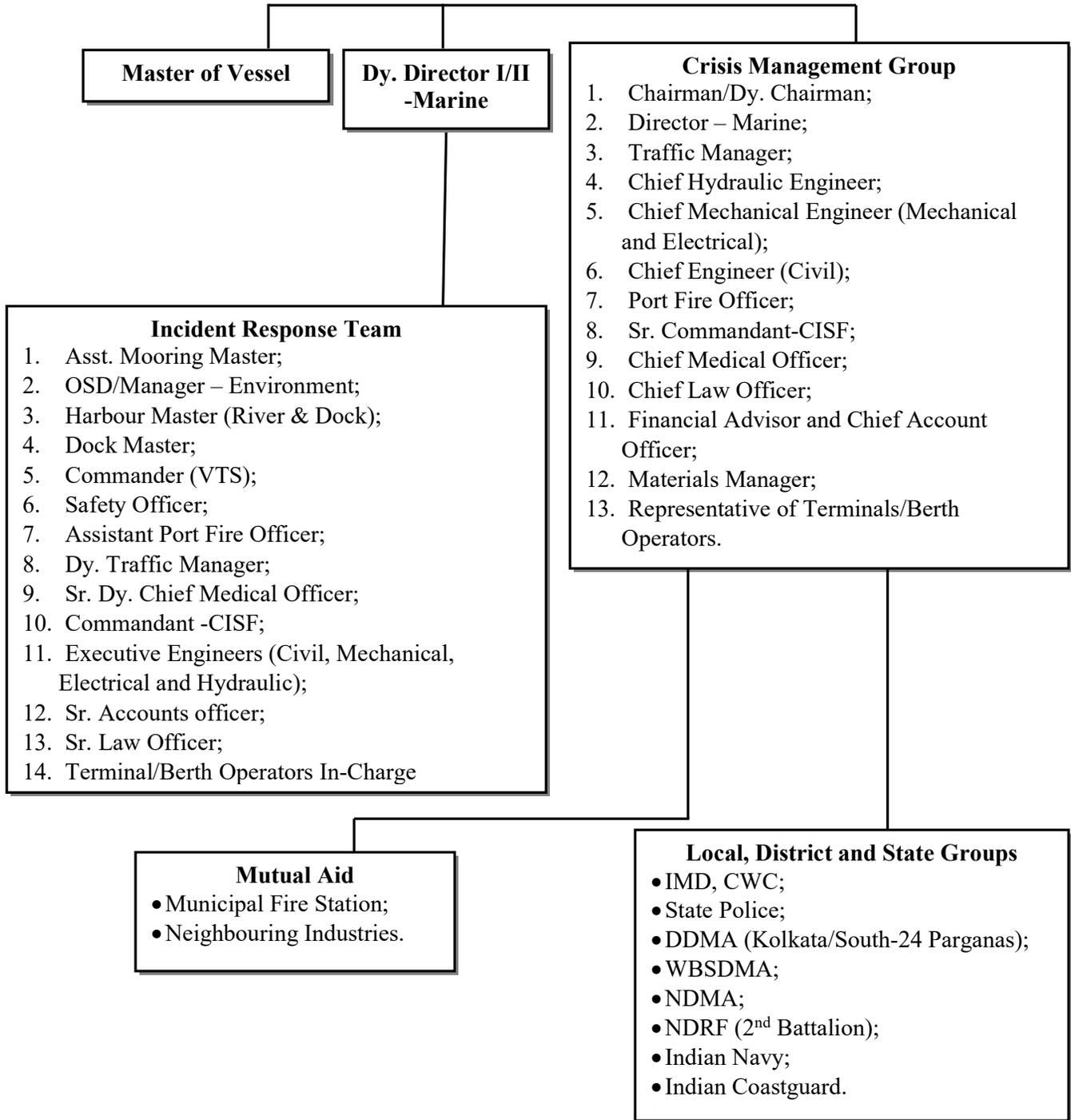
*Note: Instances of flooding increase due to storm/cyclonic conditions coupled with infrastructural challenges such as drainage systems, bulk handling and storage yards, internal roads and natural topography of the area. Instances of flooding can also occur as a result of heavy rainfall coupled with high tide. Similar organizational setup for managing this emergency on the lines of cyclone situation will be required.*

- 2. Precautions:** Pre-monsoon preparation, Continuous weather monitoring, Early warning system.
- 3. Impact Zone:** Entire port.
- 4. Resources required:** Refer Figure S14.2 and **Appendix D**.

Figure S14.1: Action Flow Chart



**Figure S14.2:** Action group



**Part B: Action Plan****1. Port Control – KDS, Port Control – Sagar Island, HDC**

<b>Response Action</b>	<b>Contact</b>
a. Gather information related to the vessel type and position in the port limit.	
b. Gather information related to the weather conditions by liaising with competent agencies for issuing warnings as mentioned in section 9.2.3 and other media. Monitor the weather map either through Internet or Television and record approximate position of the weather and information about its movement as given in the news.	
c. Liaise with Master of the Vessel/Pilot.	
d. Ensure that telephones, one VHF and one walkie-talkie all are operational in the Port control centre. Listening watch to be maintained on VHF channel-16.	
e. Notify to CEC, CIC, Head of the Departments and the vessels moving into, through and inside the port. Keep CIC informed of all the messages received by telephone, VHF sets or by messenger.	<ul style="list-style-type: none"> <li>• CIC</li> </ul>
f. Notify the other Authorities and stakeholders within Port as per instructions of CEC/CIC.	<ul style="list-style-type: none"> <li>• Navy</li> <li>• Coastguard</li> <li>• Stakeholders</li> </ul>
g. Inform the Harbour Master/Dock Master/ Asst. Mooring Master of any buoys or crafts or any Port installation is seen adrift.	<ul style="list-style-type: none"> <li>• SIC</li> </ul>
h. As per instruction of SIC, sufficient number of staff will be detailed. The staff of Port Control Room will remain on duty until they are relieved by next shift staff or till alternative arrangements are made or till the storm has passed and the Harbour Master release them.	

**2. Tidal observatory**

<b>Response Action</b>	<b>Contact</b>
a. The Gauge Clerk will record the range of tide, time and heights of high and low water and will report to Chief Hydraulic Engineer who in turn will apprise the CIC and SIC of the actual and predicted tides.	<ul style="list-style-type: none"> <li>• Senior Hydrographic Surveyor</li> </ul>

**3. The Master of the Vessel (Alternate: Chief Officer)**

Response Action	Contact
a. Should raise vessels emergency alarm and activate vessel board emergency action plan.	
b. Having raised the alarm, the Master will be responsible for taking all immediate steps to safeguard his vessel.	
c. The Master will provide the Port Authority with details of the vessel.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
d. Should follow the instruction of the CIC/SIC and be in continuous liaise with the CIC/SIC/Port Control Room.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Port Control Room</li> </ul>
e. Should be in a state of readiness to take the vessel out of the port.	

**4. The terminal/berth operator should**

Response Action	Contact
a. Activate EAP and inform Port.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
b. Shall be responsible of shutting down of cargo operation (as per SOP and/ contingency plan) & coordinate with Port and Master of the Vessel and rendering necessary assistance to the SIC and vessel by providing emergency equipment as required.	
c. Submit consolidated list of dangerous goods in port and Vessels in port. Make arrangements to protect cargo.	
d. Assist IRT and provide all necessary equipment.	<ul style="list-style-type: none"> <li>• SIC</li> </ul>
e. He will direct operation staff. Coordinate with the vessel in-charge/C & F Agents/stevedores.	

**5. Director – Marine (Alternate: Dy. Director I/II -Marine)**

Response Action	Contact
a. He will apprise himself of weather the developments.	
b. He will be stationed at EOC to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC and Port Control Room & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>

e. Consult with Chairman / Dy. Chairman and decide on clearing of vessels as soon as the cyclone is confirmed to pass in close proximity to the Port.	
f. Plan movements of vessels such that the vessels are cleared in shortest possible time.	
g. Coordinate with external agencies/authorities such as Indian Navy and Coastguard.	<ul style="list-style-type: none"> <li>• Indian Navy</li> <li>• Coastguard</li> </ul>
h. Be in constant touch with District and Local Administration for rescue and relief operation.	
i. Terminate the response and debrief before allowing normal operation.	

**6. Duties of IRT**

<b>Designated Officer</b>	<b>Role</b>	<b>Duties</b>	<b>Alternate Officer</b>
Dy. Director I/II- Marine	Site Incident Controller	During Emergency shall proceed to the Port Control Room and communicate & collect all information.	Asst. Mooring Master
		Take over the charge and ensure the action plan is promulgated as per the instructions of CIC.	
		Inform vessels alongside berths to double up their moorings, provide shore gang assistance and ask Masters to keep their vessels ready to proceed to the safe area at short notice as per the instruction of CIC.	
		He will keep close liaison with IMD, CWC, Radar Station, Police Wireless Station, Coast Guard, and Vessels in Port in regard to the likely weather conditions in the near further.	
		Report the situation to the CIC & the CMG.	
		Keep rescue team ready with rubber boats, Life jackets etc.	
		Ensure that the hazardous cargoes are shifted out in a safe manner.	
		Ensure that the operations are brought back to normal after the termination of the emergency	

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		procedure.	
Harbour Master (River)	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Mater/ Pilot
		Instruct pilots to secure tugs, crafts and workboats.	
		He will maintain log of events.	
Safety Officer	Safety Coordinator	Shall take orders from the SIC.	Alternate Officer
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Alternate Asst. Port Fire Officer
		Keep fire tenders and fire-fighting equipment in a state of readiness.	
		Responsible for mobilizing fire tenders, men & fire-fighting equipment to the scene & extend all necessary support, if required.	
		Liaise with State Fire brigade for any assistance.	
Commandant-CISF	Security and Evacuation	Shall be responsible for forming a cyclone/flood task force and will lead the same.	Dy. Commandant-CISF
		Controls & directs traffic in the area.	
		Shall supervise evacuation of personnel from the scene at the time of emergency.	
		Till normality is restored, arrangement will be made for thorough checks on all out-going vehicles to guard against pilferage.	
		Shall be responsible for rescue of the personnel.	
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Submits consolidated list of dangerous goods in port area.	Alternate Officer
		Coordinate with the truck contractors.	

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		Ensure availability of vehicles and mobilize and dispatch sufficient number of vehicles to the site during emergency.	
Executive Engineer	Civil Coordinator	Shall ensure the standard procedure before the monsoon has been followed and complied with by all the divisions.	Alternate Executive Engineer
		Keep enough number of cement bags ready as per SIC instructions.	
		Pump house equipment and all generator sets shall be tried out and kept ready.	
		Ensure all the drains and obstructions in the creeks/ culverts are cleaned for easy discharge of sludge water. Also, make arrangements for additional dewatering pumps as required.	
		As soon as the contingency plan is made operational all the water tanks should be filled up and standby arrangement for supply of water to be made.	
Executive Engineer	M & E Coordinator	Shall ensure the standard procedure before the monsoon has been followed and complied with by all the divisions.	Alternate Executive Engineer
		Shall form and head Cyclone/Flood mitigation Team comprising of Senior Electrical, Mechanical and Maintenance Engineers.	
		Ensure that all division and workshops standard procedures has been followed and equipment and installations are secured in a safe manner.	
		Shall be responsible for alternate electrical supply to vital equipment and systems.	
		All Sub Stations, Power Control rooms will be manned round the clock.	

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Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
Executive Engineer	Hydrographic Survey	Assist SIC.	Alternate Executive Engineer
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for taking the vessel out of berth or will not bring the vessel to berth as per the instruction given by CIC/SIC.	Standby Pilot
		Inform the Masters of all vessels at the berths to double the moorings and to keep engine ready to proceed out to sea if situation warrants.	
		Decision regarding moving vessels to the anchorage will be taken depending on the strength of the wind likely to be encountered and number of vessels in the Port.	
		Take all necessary steps for the safety of the Port crafts.	
		Ensure all other crafts are placed at safe place and properly secured excepting one pilot launch and one stand by launch used for inspection and emergency duties.	
		Fender and extra lengths of ropes/wires will be kept ready so as to attend to any craft whose moorings may part.	
		Inform the Port Control Room immediately in the event any craft is seen adrift or any other Port installation is seen in danger. Arrange an Emergency Maintenance team.	
Harbour Master for Vessel in Dry Dock	In-Charge of Dry Dock	Responsible for directing tugs for combating the fire and rescue. Securing of loose items. Ensure securing of dock cranes. Engine room entrance doors, sky lights etc. of all the floating crafts to be kept shut.	Alternate Officer

*Disaster Management Plan*

		Master shall be in constant touch with Port Control Room.	
Material Manager	Material Management	During cyclonic season sufficient stock of stores like Corrugated iron sheets, J.Hooks, screw hinges, gunny bags, tarpaulins, ropes and wires for Port Crafts, diesel oil, kerosene oil, hurricane lantern, kerosene lamps, torch lights with batteries and bulbs, electrical items etc. is kept. All the materials which are likely to get damaged in rain and flood are covered with tarpaulin.	Alternate Officer

<b>POST FLOOD DUTIES</b>	
<b>Sr. no.</b>	<b>Duty</b>
1.	All the Heads of the Departments are required to assess the damage and submit a detailed report indicating the estimate to the Chairman. For this, a team may be formed comprising Officers of Executive Engineer and above in rank at departmental level and may associate one Officer from Finance Department. The preliminary report is to be submitted.
2.	Hydrographic survey to be conducted to assess the channel condition and Shipping to resume as early as possible.
3.	A team of Officers to be nominated by Secretary to supervise the rescue and relief operation and disposal of carcasses in co-ordination with the local and District Administration.
4.	Mobile medical service, if required, to be provided by CMO. Preventive measures for epidemics to be taken.
5.	All the operating systems to be attended urgently and made operational as early as possible on war footing basis to resume operation.
6.	Spot tendering procedure can be followed for repairs.
7.	Water supply and electricity to be given priority. The CME shall be authorized to extend all assistance for manpower, conveyance, equipment and materials etc. to electrical board, if required, for resuming power supply. The electrical cabling network to be checked area wise.
8.	The Material Manager will nominate a team of Officers and staff for procurement and supply of essential materials for repair of various structures and equipment as reported.
9.	To assess the progress of repair works, HOD meeting will be held daily till normalcy is restored.
10.	Damage to furniture, building fixtures may be prepared.

**S15: Scenario 15****Part A:****1. Natural Disaster (Tsunami)****2. Precautions:** Continuous weather monitoring, Early warning system, Tsunami Shelters.

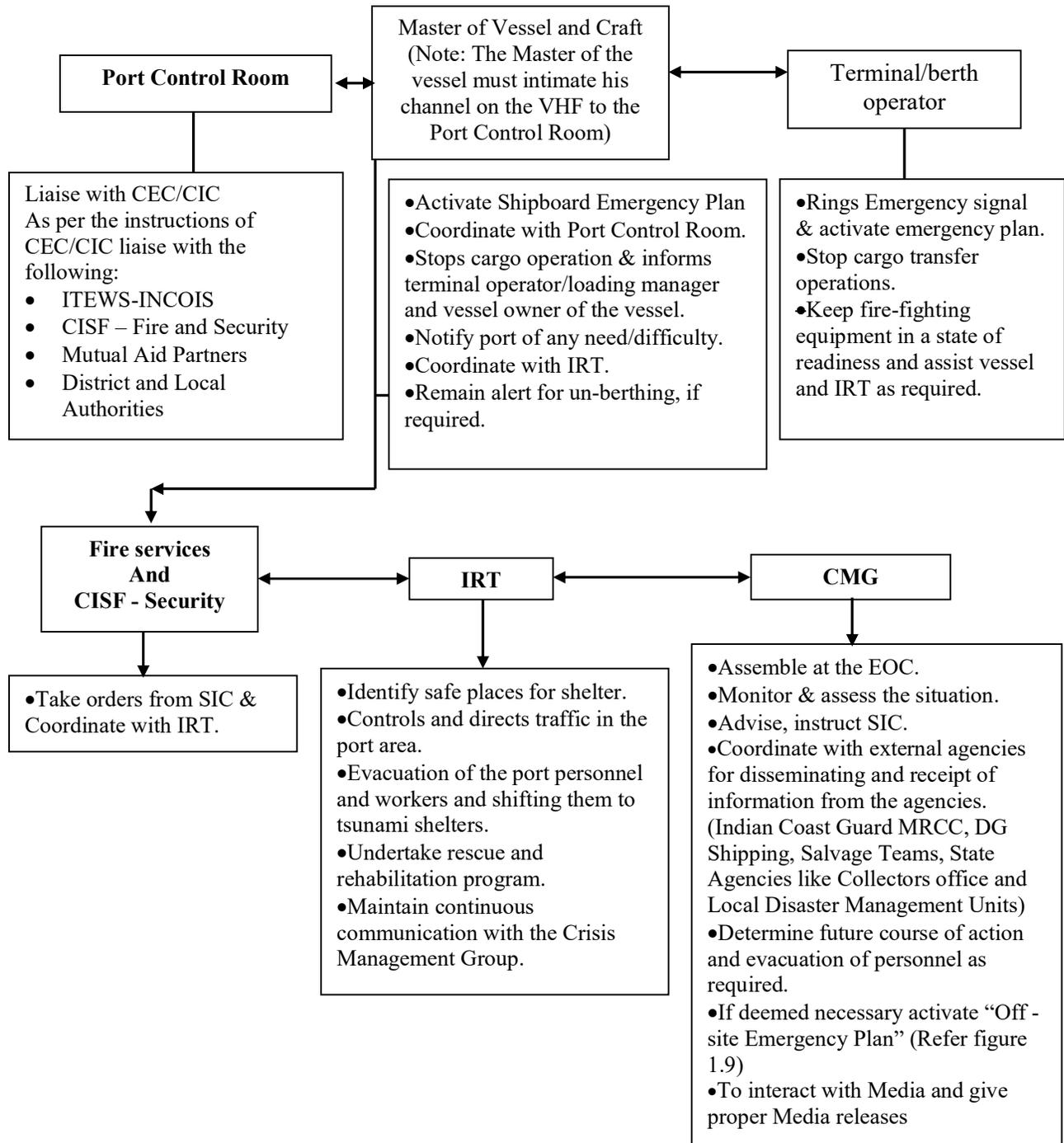
*Note: INCOIS and its monitoring centres will provide early warning by way of messages to the port about the occurrence of tsunami. The nearest earthquake subduction fault zone is located in the Bay of Bengal in the Myanmar coastline. Apart from this the Indonesian region also has considerable seismic activity. Very few earthquakes in the region have been powerful enough to cause a tsunami. Thus, although not very frequent but a clear and present danger of tsunami exist for the port.*

**3. Impact Zone:** Entire port.

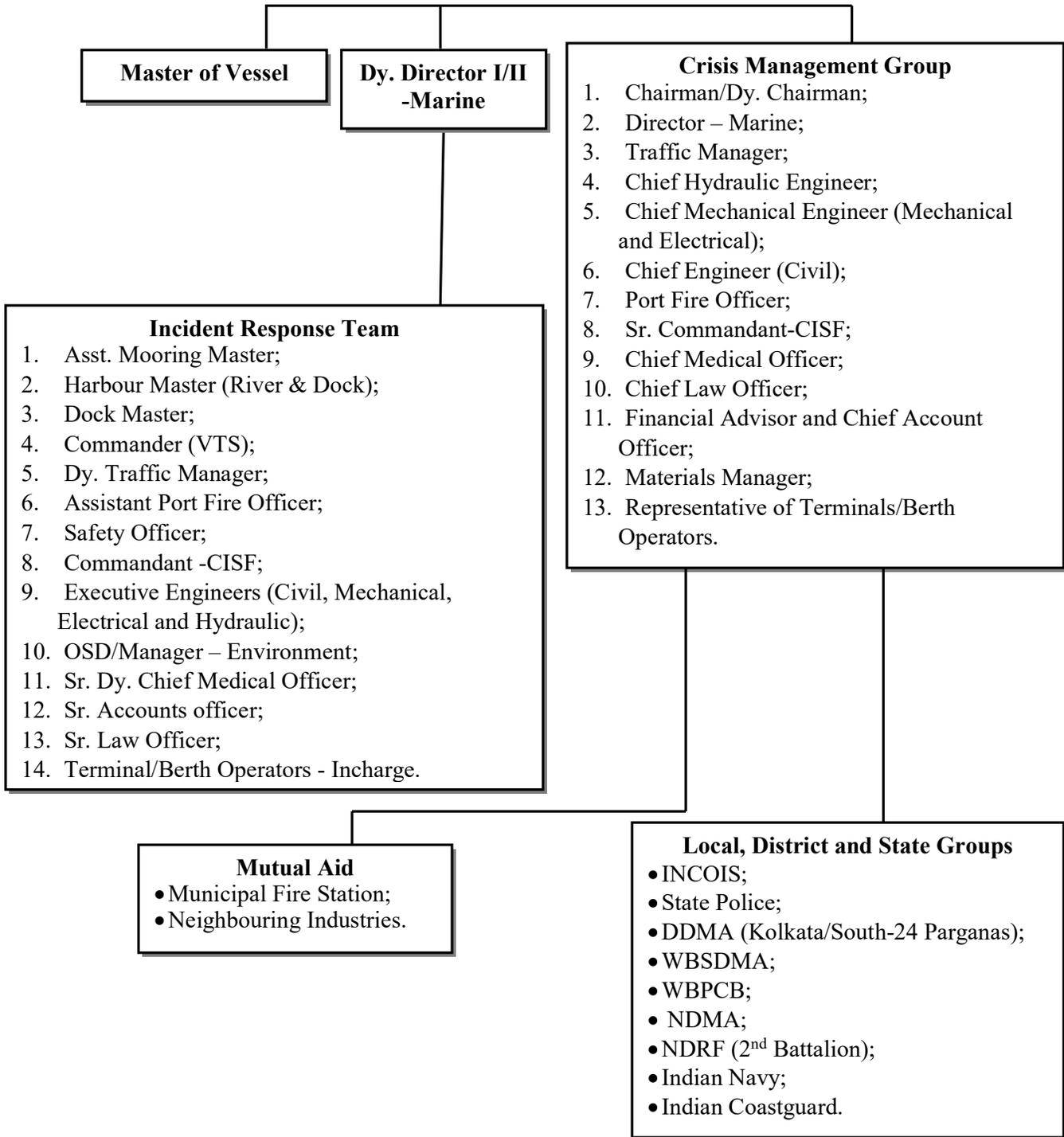
*Note: While in the past the Indonesian tsunami (2004) generated a small wave of approx. 2 mtrs. the damages in the event of a higher wave would be in proportion to the proximity to the earthquake zone and the resultant height of wave generation. Thus, the wave energy would impact the port and its constituents including marine and fixed assets in proportion to its severity. Actions at the National and State level for evacuation measures will be taken if the impact assessment is of a high magnitude. Thus, necessary coordination with District and State agencies will be required in case of “Red” and “Orange” alerts.*

**4. Resources required:** Refer Figure S15.2 and **Appendix D.**

Figure S15.1: Action Flow Chart



**Figure S15.2:** Action group



**Part B: Action Plan****1. Port Control – KDS, Port Control – Sagar Island, HDC**

<b>Response Action</b>	<b>Contact</b>
a. Gather information related to the vessel type and position in the port limit.	
b. Gather information related to the tsunami conditions by liaising with competent agencies for issuing warnings as mentioned in section 9.2.3 and other media. Monitor the conditions through Internet or Television and record approximate position of the tsunami and information about its movement as given in the news.	
c. Liaise with Master of the Vessel/Pilot.	
d. Ensure that telephones, one VHF and one walkie-talkie all are operational in the Port control centre. Listening watch to be maintained on VHF channel-16.	
e. Notify to CEC, CIC, Head of the Departments and the vessels moving into, through and inside the port. Keep CIC informed of all the messages received by telephone, VHF sets or by messenger.	<ul style="list-style-type: none"> <li>• CIC</li> </ul>
f. Notify the other Authorities and stakeholders within Port as per instructions of CEC/CIC.	<ul style="list-style-type: none"> <li>• Navy</li> <li>• Coastguard</li> <li>• Stakeholders</li> </ul>
g. Inform the Harbour Master/Dock Master/ Asst. Mooring Master of any buoys or crafts or any Port installation is seen adrift.	<ul style="list-style-type: none"> <li>• SIC</li> </ul>
h. Hoist signals or raise alarms, as per the warnings received by the competent agencies for issuing warnings. (for warning signals refer section 9.2.3)	

**2. Tidal observatory**

<b>Response Action</b>	<b>Contact</b>
a. The Gauge Clerk will record the range of tide, time and heights of high and low water and will report to Senior Hydrographic Surveyor who in turn will apprise the CIC and SIC of the actual and predicted tides.	<ul style="list-style-type: none"> <li>• Senior Hydrographic Surveyor</li> </ul>

**3. The Master of the Vessel (Alternate: Chief Officer)**

<b>Response Action</b>	<b>Contact</b>
a. Should raise vessels emergency alarm and activate ship board emergency action plan.	
b. Having raised the alarm, the Master will be responsible for taking all immediate steps to safeguard vessel.	
c. The Master will provide the Port Authority with details of	<ul style="list-style-type: none"> <li>• Port Control</li> </ul>

the vessel.	Room
d. Should follow the instruction of the CIC/SIC and be in continuous liaison with the CIC/SIC/Port Control Room.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Port Control Room</li> </ul>
e. Should be in a state of readiness to take the vessel out of the port.	

#### 4. The terminal/berth operator should

Response Action	Contact
a. Activate EAP and inform Port and be in a state of readiness to move out all types of cargo, equipment and vehicles (mobile cranes) outside the port area.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
b. Shall be responsible of shutting down of cargo operation (as per SOP and/ contingency plan) & coordinate with Port and Master of the Vessel and rendering necessary assistance to the SIC and vessel by providing emergency equipment as required.	
c. Submit consolidated list of dangerous goods in port and Vessels in port. Make arrangements to protect cargo.	
d. Assist IRT and provide all necessary equipment.	<ul style="list-style-type: none"> <li>• SIC</li> </ul>
e. He will direct operation staff. Coordinate with the vessel in-charge/C & F Agents/stevedores.	

*Note: It is important to understand that movable objects and structures which may float as a result of high-water levels will tend to generate flotsam and move with the current during the flooding and ebb situation of tsunami. This normally results in floating debris in large swaths causing structural, environmental and living beings damages.*

*As a lifesaving measure multi-storey building higher than 45ft are considered as safe zones in coastal areas.*

#### 5. Director -Marine (Alternate: Dy. Director I/II -Marine)

Response Action	Contact
a. Activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the most necessary course of action.	
c. Give necessary instructions to SIC and Port Control Room & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> </ul>

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	<ul style="list-style-type: none"> <li>• Dy. Chairman</li> </ul>
e. Consult with Chairman / Dy. Chairman and decide on clearing of vessels as soon as the tsunami is confirmed.	
f. Plan movements of vessels such that the vessels are cleared in shortest possible time.	
g. Coordinate with external agencies/authorities such as Indian Navy and Coastguard.	<ul style="list-style-type: none"> <li>• Indian Navy</li> <li>• Coastguard</li> </ul>
h. Be in constant touch with District and Local Administration for rescue and relief operation.	
i. Terminate the response and debrief before allowing normal operation.	

**6. Duties of IRT**

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I/II -Marine	Site Incident Controller	During Emergency shall proceed to the Port Control Room and communicate & collect all information.	Asst. Mooring Master
		Take over the charge and ensure the action plan is promulgated as per the instructions of CIC.	
		Inform vessels alongside berths to double up their moorings, provide shore gang assistance and ask Masters to keep their vessels ready to proceed to the sea at short notice as per the instruction of CIC.	
		He will keep close liaison will INCOIS, Radar Station, Police Wireless Station, Coast Guard, and Vessels in Port in regard to the likely weather conditions in the near further.	
		Ensure port control, hoists appropriate signal as per the situation.	
		Report the situation to the CIC & the CMG.	
		Keep rescue team ready with rubber boats, Life jackets etc.	

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		Ensure that the hazardous cargoes are shifted out or secured/stored in a safe manner.	
		Ensure that the operations are brought back to normal after the termination of the emergency procedure.	
Harbour Master (River)	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Master/ Pilot
		Instruct pilots to secure tugs, crafts and workboats.	
		He will maintain log of events.	
Safety Officer	Safety Coordinator	Shall take orders from the SIC.	Alternate Officer
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Alternate Officer
		Liaise with State Fire brigade for any assistance.	
Commandant-CISF	Security and Evacuation	Shall be responsible for forming a task force and will lead the same.	Dy. Commandant-CISF
		Controls & directs traffic in the area.	
		Shall supervise evacuation of personnel from the port at the time of emergency and moving them to identified tsunami shelters.	
		Responsible for rescue operation.	
Dy. Traffic Manager	Cargo Storage, Shed and Labour Coordinator	Submits consolidated list of dangerous goods in port area.	Alternate Officer
		Coordinate with the truck contractors.	
		Ensure availability of vehicles and mobilize and dispatch sufficient number of vehicles to the site during emergency.	
		Ensure all the drains and obstructions in the creeks/ culverts are cleaned for easy discharge of sludge water.	

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Executive Engineer	M & E Coordinator	Shall ensure the standard procedure has been followed and complied with by all the divisions.	Alternate Executive Engineer
		Shall form and head mitigation Team comprising of Senior Electrical, Mechanical and Maintenance Engineers.	
		All types of cranes, forklifts, heavy earth moving equipment to be secured in a safe manner.	
		Shall be responsible for alternate electrical supply to vital equipment and systems at the berth.	
		All Sub Stations, Power Control rooms will be manned as per the requirement.	
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required.	Alternate Medical Officer
Executive Engineer	Hydrographic Survey	Assist SIC.	Alternate Executive Engineer
Harbour Master for Vessel in Dry Dock	In-Charge of Dry Dock	Securing of loose items.	Alternate Officer
		Ensure securing of dock cranes.	
		Engine room entrance doors, sky lights etc. of all the crafts to be kept shut.	
		Master shall be in constant touch with Port Control Room.	
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for taking the vessel out of berth or will not bring the vessel to berth as per the instruction given by CIC/SIC.	Standby Pilot
		Inform the Masters of all vessels at the berths to double the moorings and to keep engine ready to proceed out to sea if situation warrants.	

		<p>Decision regarding moving vessels to the anchorage will be taken depending on the strength of the tsunami likely to be encountered and number of vessels in the Port.</p> <p>Take all necessary steps for the safety of the Port crafts.</p> <p>Ensure all other crafts are placed at safe place and properly secured excepting one pilot launch and one stand by launch used for inspection and emergency duties.</p> <p>Fender and extra lengths of ropes/wires will be kept ready so as to attend to any craft whose moorings may part.</p> <p>Ensure shifting of crafts at suitable places as directed by the Harbour Master and will secure them suitably with additional moorings.</p> <p>Extra fenders will be kept ready on board the Tug for use as required.</p> <p>Master shall be in constant touch with Port Control Room.</p>	
Material Manager	Material Management	Ensure availability of sufficient stock of stores like Corrugated Iron sheets, J.Hooks, screw hinges, gunny bags, tarpaulins, ropes and wires for Port Crafts, diesel oil, kerosene oil, hurricane lantern, kerosene lamps, torch lights with batteries and bulbs, electrical items etc. is kept.	Alternate Officer

**POST TSUNAMI DUTIES**

Sr. no.	Duty
1.	All the Heads of the Departments are required to assess the damage and submit a detailed report indicating the estimate to the Chairman. For this, a team may be formed comprising Officers of Executive Engineer and above in rank at departmental level and may associate one Officer from Finance Department. The preliminary report is to be submitted. The level of restoration

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	and efforts required to clear the area of debris, carcasses and damaged equipment will depend on the level of disaster.
2.	Hydrographic survey to be conducted to assess the channel condition and Shipping to resume as early as possible.
3.	In case of any small craft sunk or grounded, the same to be removed to make the channel/ berth safe for navigation. SIC will detail a salvage party.
4.	A team of Officers to be nominated by Secretary to supervise the rescue and relief operation and disposal of carcasses in co-ordination with the local and District Administration.
5.	Mobile medical service, if required, to be provided by CMO. Preventive measures for epidemics to be taken.
6.	All the operating systems to be attended urgently and made operational as early as possible on war footing basis to resume operation.
7.	Spot tendering procedure can be followed for repairs.
8.	Water supply and electricity to be given priority. The CME shall be authorized to extend all assistance for manpower, conveyance, equipment and materials etc. to electrical board, if required, for resuming power supply. The electrical cabling network to be checked area wise.
9.	All the damaged temporary roofed warehouses are to be repaired.
10.	Material Manager will nominate a team of Officers and staff for procurement and supply of essential materials for repair of various structures and equipment as reported.
11.	To assess the progress of repair works, HOD meeting will be held daily till normalcy is restored.
12.	Damage to furniture, building fixtures may be prepared.

**S16: Scenario 16****Part A:****1. Natural Disaster (Earthquake)**

*Note: As there are no warning signals for major earthquake the action plan will be for the aftermath of the emergency.*

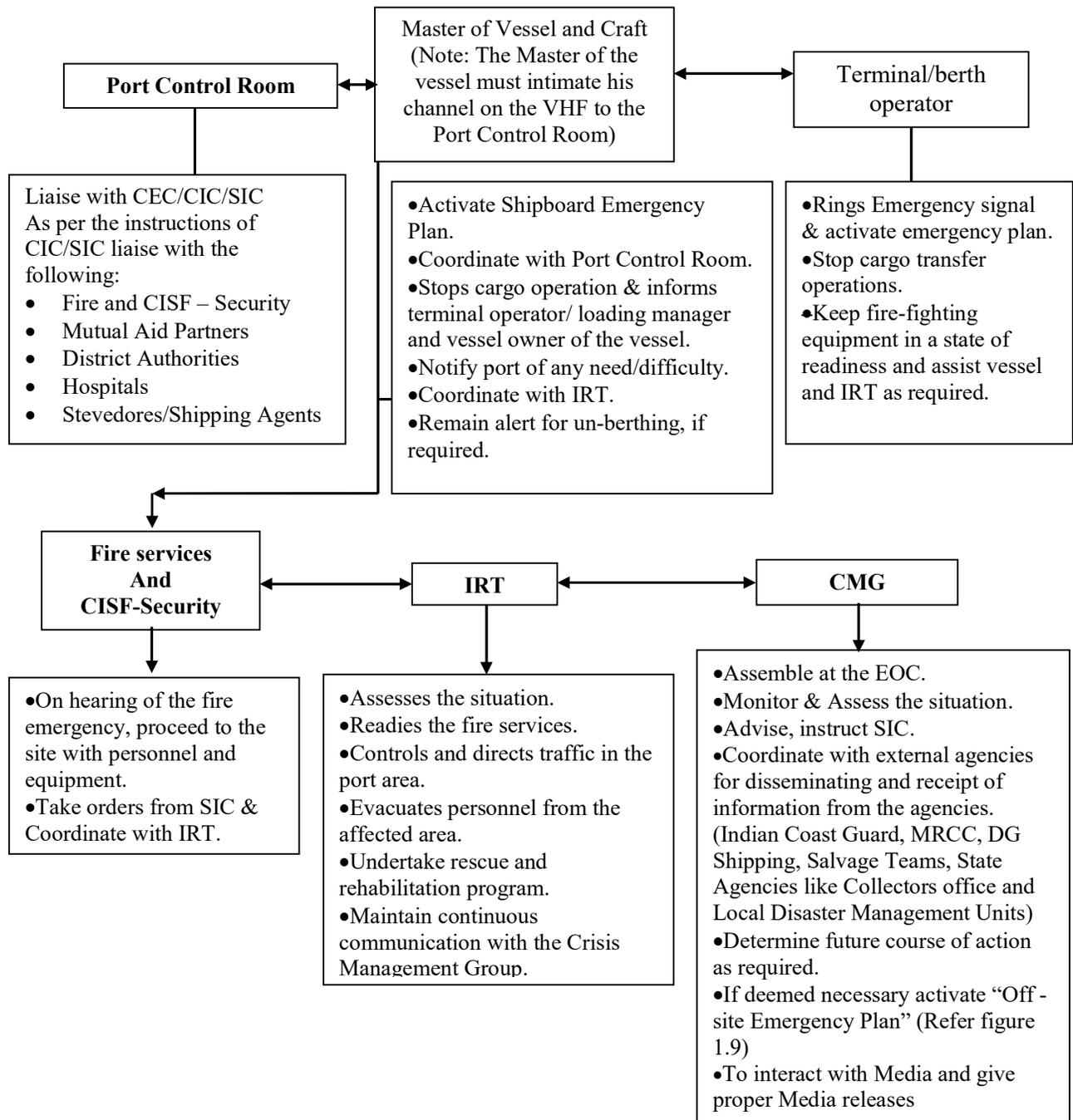
**2. Precautions:** Earthquake resilient buildings, equipment (cranes), pipeline infrastructure (as per relevant standards), Periodic inspection of old structures, pipelines and their support structures etc.

**3. Impact Zone:** Entire port.

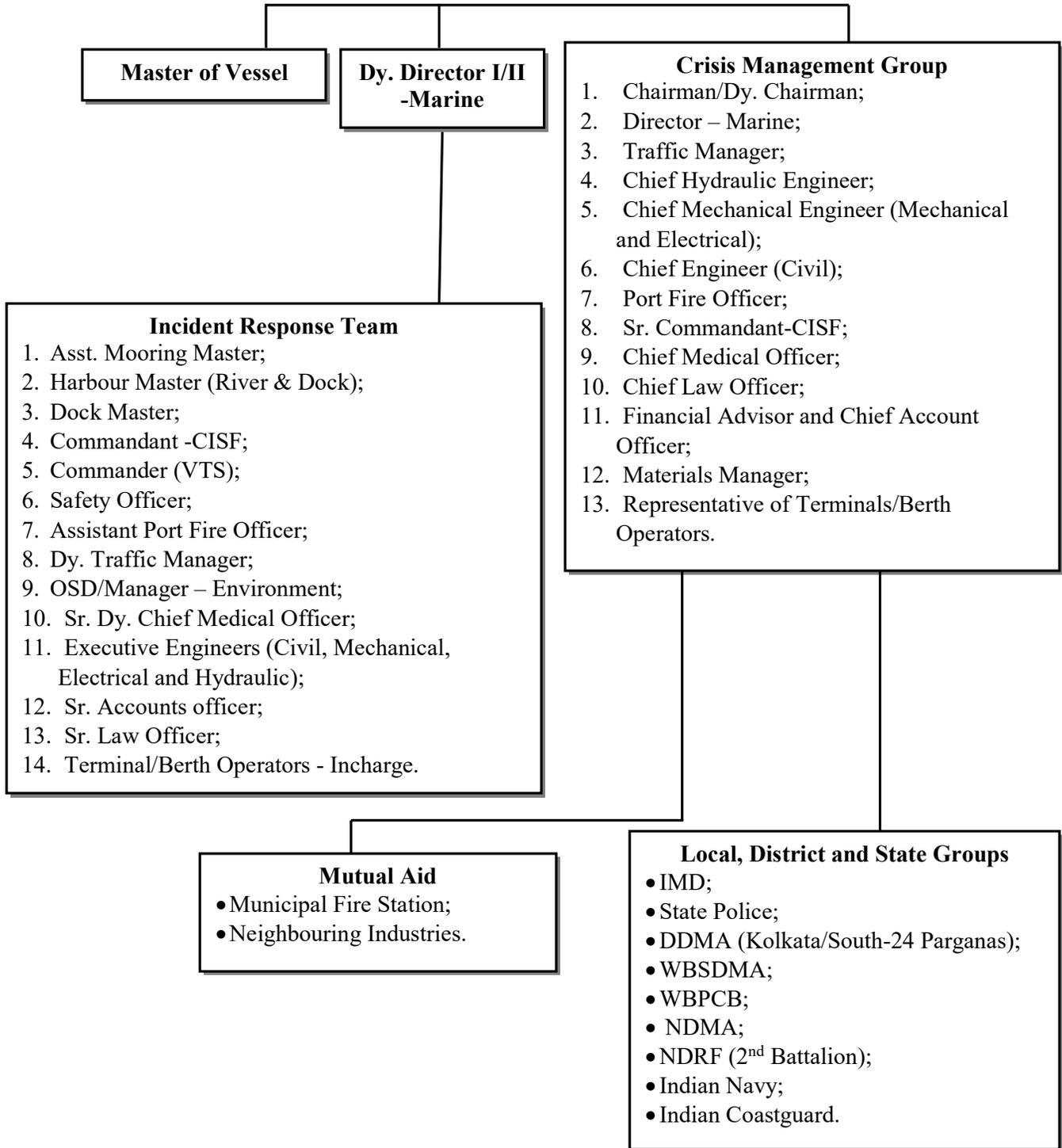
*Note: The Kolkata/South-24 Parganas district falls under Seismic zone category III (MSK scale VII) as per the vulnerability hazard map of the region.*

**4. Resources required:** Refer Figure S16.2 and **Appendix B.**

**Figure S16.1:** Action Flow Chart



**Figure S16.2:** Action group



**Part B: Action Plan****1. The Port Control Room - KDS**

<b>Response Action</b>	<b>Contact</b>
a. Gather information related to the vessel type and position in the port limit.	
b. Liaise with Master of the Vessel/Pilot.	
c. Ensure that telephones, one VHF and one walkie-talkie all are operational in the Port control centre. Listening watch to be maintained on VHF channel-16.	
d. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> </ul>
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	<ul style="list-style-type: none"> <li>• Navy</li> <li>• Coastguard</li> <li>• Stakeholders</li> </ul>
f. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel. Pass the information to various Port departments and other Port related organizations through telephones and VHF.	

**2. The Master of the Vessel (Alternate: Chief Officer)**

<b>Response Action</b>	<b>Contact</b>
a. Should raise vessels emergency alarm and activate ship board emergency action plan.	
b. Having raised the alarm, the Master will be responsible for taking all immediate steps to safeguard his vessel.	
c. The Master will provide the Port Authority with details of the vessel.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
d. Should follow the instruction of the CIC/SIC and be in continuous liaise with the CIC/SIC/Port Control Room.	<ul style="list-style-type: none"> <li>• CIC</li> <li>• SIC</li> <li>• Port Control Room</li> </ul>
e. Should be in a state of readiness to take the vessel out of the port, if required.	

**3. The terminal/berth operator should**

<b>Response Action</b>	<b>Contact</b>
a. Activate EAP and inform Port.	<ul style="list-style-type: none"> <li>• Port Control Room</li> </ul>
b. Shall be responsible of shutting down of cargo operation (as per SOP and/ contingency plan) & coordinate with	

Port and Master of the Vessel and rendering necessary assistance to the SIC and vessel by providing emergency equipment as required.	
c. Submit consolidated list of dangerous goods in port and Vessels in port. Make arrangements to protect cargo.	
d. Assist IRT and provide all necessary equipment.	<ul style="list-style-type: none"> <li>• SIC</li> </ul>
e. He will direct operation staff. Coordinate with the vessel in-charge/C & F Agents/stevedores.	

#### 4. Director- Marine (Alternate: Dy. Director I/II -Marine)

Response Action	Contact
a. Activate the DMP and OSCP (if any pollution).	
b. He will be stationed in EOC to review & assess the damage and determine the most necessary course of action.	
c. Give necessary instructions to SIC and Port Control Room & arrange for external aid as necessary.	<ul style="list-style-type: none"> <li>• SIC</li> <li>• Port Control Room</li> </ul>
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	<ul style="list-style-type: none"> <li>• Chairman</li> <li>• Dy. Chairman</li> </ul>
e. Consult with Chairman / Dy. Chairman and decide on clearing of vessels.	
f. Be in constant touch with District and Local Administration for rescue and relief operation.	

#### 5. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Director I/II -Marine	Site Incident Controller	During Emergency shall communicate & collect all information.	Asst. Mooring Master
		Take over the charge of control centre and ensure the action plan is promulgated as per the instructions of CIC.	
		Ensure that the operations are brought back to normal after the termination of the emergency procedure.	
Harbour Master (River)	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay	Dock Master/ Pilot

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		messages on the advice from CIC/SIC.	
		He will maintain log of events.	
Safety Officer	Safety Coordinator	All other workers to move out to safe (open) area.	Alternate Officer
Asst. Port Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Alternate Asst. Port Fire Officer
		Responsible for mobilizing fire tenders, men & fire-fighting equipment to the scene & extend all necessary support after the earthquake.	
		Liaise with State Fire brigade for any assistance.	
Commandant-CISF	Security and Evacuation	Controls & directs traffic in the area.	Dy. Commandant-CISF
		Shall search and rescue operations of the personnel trapped under the debris. A special task force can be formed for the same. Shifting of the injured and casualties to hospital.	
		Till normality is restored, arrangement will be made for thorough checks on all out-going vehicles to guard against pilferage.	
		Coordinate with the truck contractors.	
		Ensure availability of vehicles and mobilize and dispatch sufficient number of vehicles to the site during emergency.	
Executive Engineer	Civil Coordinator	Assist SIC/CIC and CISF after an earthquake emergency.	Alternate Executive Engineer
		Deploy engineers to direct or guide earth moving equipment and cranes to remove debris.	
Executive Engineer	M & E Coordinator	Shall be responsible for Electrical supply to vital equipment and systems.	Alternate Executive Engineer
		Ensure that all Sub Stations, Power Control rooms will be	

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		inspected and made operation.	
Sr. Dy. CMO	First Aid and Medical Coordinator	Shall be responsible to organize and dispatch first aid team with ambulance as required. Mobile medical service, if required, to be provided.	Alternate Medical Officer
Duty Pilot	In-Charge of Pilotage	Assist SIC and remain standby till further instructions.	Standby Pilot
Material Manager	Material Management	Ensure availability of sufficient stock of stores like Corrugated iron sheets, J.Hooks, screw hinges, gunny bags, tarpaulins, ropes and wires for Port Crafts, diesel oil, kerosene oil, hurricane lantern, kerosene lamps, torch lights with batteries and bulbs, electrical items etc. is kept. Will nominate a team of officers and staff for procurement and supply of essential materials for repair of various structures and equipment as reported.	Alternate Officer

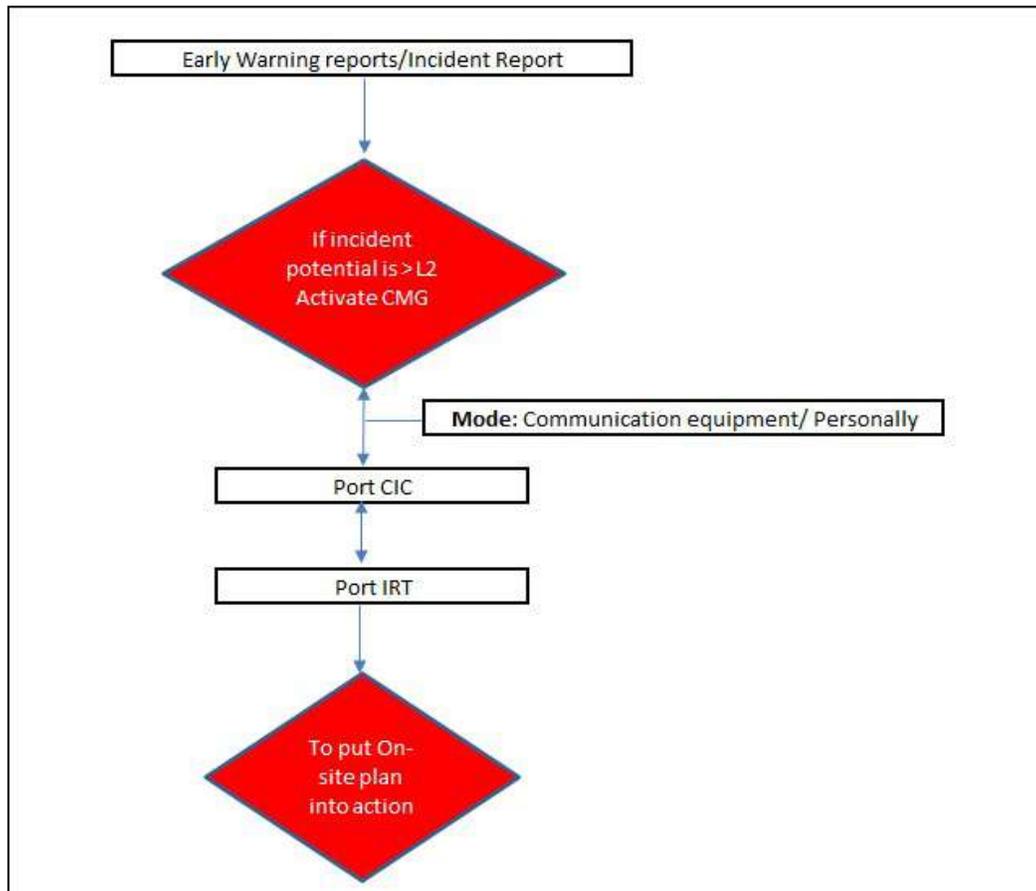
**ADDITIONAL POST-EARTHQUAKE DUTIES**

Sr. no.	Duty
1.	All the Heads of the Departments are required to assess the damage and submit a detailed report indicating the estimate to the Chairman. For this, a team may be formed comprising Officers of Executive Engineer and above in rank at departmental level and may associate one Officer from Finance Department. The preliminary report is to be submitted.
2.	A team of Officers to be nominated by Secretary to supervise the rescue and relief operation and disposal of carcasses in co-ordination with the local and District Administration.
3.	All the operating systems to be attended urgently and made operational as early as possible on war footing basis to resume operation.
4.	Spot tendering procedure can be followed for repairs.
5.	Water supply and electricity to be given priority. The CME shall be authorized to extend all assistance for manpower, conveyance, equipment and materials etc. to electrical board, if required, for resuming power supply. The electrical cabling network to be checked area wise.
6.	To assess the progress of repair works, HOD meeting will be held daily till normalcy is restored.

## 9.4 ACTIVATION OF RESPONSE PLAN

### 9.4.1 Prevention/Protection action implementation plan

Following is the typical Prevention/Protection action implementation plan.



**Figure 9.1:** Action Implementation Plan

The person who observes the emergency first is called as the First Observer. The First Observer, noticing an unusual occurrence like a fire /gas release /collapse of structure etc., should immediately notify the Signal Station/ Port Control Room/ CISF control room/Fire station with available means of communication and also contact the concerned Officer of the area in person.

He would:

1. Raise alarm
2. Call fire station and signal station and pass on following information:
  - Introduce himself
  - State briefly the type of emergency
  - Give the location of the incident.

3. Proceed to a safe place. However, he would return to the location of the incident and place himself in a safe area cross-wind to the wind direction and standby to give assistance if he is part of the action group.

After receiving information from the First Observer, the Port Control Room/ CISF control room/Fire station would notify all the key personnel of the Port and also direct the security personnel to activate Siren and will subsequently announce on the available means of Public Address System (say fire jeep which is fitted with PA system) as follows:

- Location of the emergency.
- Type of the emergency.
- Severity of emergency.

After hearing siren or the public announcement, all concerned personnel (identified in the plan) would move to their respective positions and will begin actions as documented in the plan.

<b>SITE CONTROL PROCEDURE</b>		
Site Control should be established for every site where access is to be controlled. This includes the EOC, sites of shoreline cleanup, waste storage, response vessel mooring areas or any site containing hazards or hazardous materials		
<b>Task</b>	<b>Action</b>	<b>Status</b>
1	Identify perimeter of the “Hot” (secure or prohibited) zone. This may be:	
	i Oiled shoreline. (Note: This zone should contain all hazards and sensitive areas where access should be restricted).	
	ii Jetty/Berth area	
	iii Area around the incident (e.g. Fire and Explosion).	
	iv EOC	
2	Identify the “Hot” zone perimeter by sign-posting or establishing a cordon.	
3	Identify the “Warm” (exclusion, controlled or support) zone. (Note: This is a non-contaminated/ non-hazardous zone). For e.g.:	
	i Shelter, canteen, car park etc.	
	ii Any water area established to exclude non-response vessels.	
4	Identify the “Warm” zone perimeter by sign-posting or establishing a cordon.	
5	Establish any required “Hot” zone perimeter facilities. For example (i) and (ii) this may include:	
	i Decontamination facility.	

	ii	Temporary waste storage.	
6	Establish “Warm” zone perimeter facilities. Generally, this is site security.		
7	Establish support facilities within Warm zone as required		

**Table 9.4: Site Control Procedure**

Note 1 Entry to a Hot Zone should be restricted to:

- Personnel involved in the on-site work.
- Personnel equipped with appropriate protective gear.
- Personnel who have undergone correct training and induction.

Note 2 The Warm Zone surrounds the Hot Zone and is the zone and is generally:

- The area from which personnel and equipment are deployed.
- The perimeter where site control is exercised i.e. the entry points to the Hot Zone.
- Restricted to those people who operate in the Hot Zone and those who support them.

Note 3 The Cold Zone is all public or otherwise unrestricted areas, i.e. those areas outside of the controlled site.

PLANNING MEETING SCHEDULE & PREPARATION OF THE INCIDENT ACTION PLAN (IAP)						
Phase/ Task	Action		Responsibility	Check		
Meeting	1	Briefing on situation.		CIC or others as nominated.		
		a	Current situation			
			i		Type and cause of incident	
			ii		Incident time and location	
			iii		Impact zone	
		iv	Resources mobilized			
		b	Predicted situation			
			i		Trajectory/Dispersion	
			ii		Resources and zones at potential risk	
	2	State Aim of Response.				
	3	Develop and rank response objectives based on protection priorities.		CIC		
	4	Develop Strategies and Tactics.		CIC and all Coordinators		
	5	Identify necessity for obtaining any permit (e.g. dispersant use).		CIC		
6	Prepare Draft Incident Action Plan.		CIC			
7	Determine need and location of Advanced Operations Centres or Staging Areas.		CIC and all Coordinators			

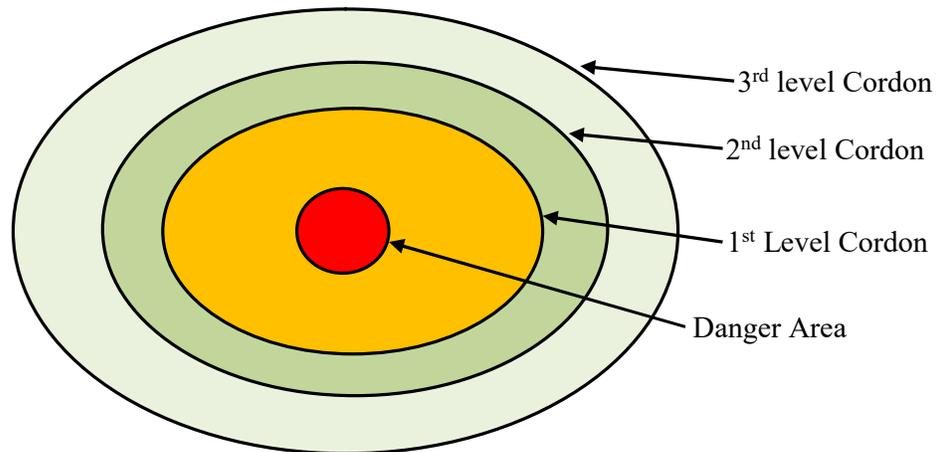
	8	Approve and Document IAP.	CIC	
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**Table 9.5:** Planning meeting schedule & Preparation of Incident Action Plan (IAP)

*Note:* Process to be repeated throughout the response as scenario, objectives, strategies or tactics change.

**9.4.2 Mechanism for access control and isolation of the Danger area**

1. All gates and berths/jetties should be guarded,
2. Unauthorized person should not be allowed to the restricted area,
3. Authorized person will be entering the zone with all the necessary PPEs,
4. The area should be cordoned off during operation,
5. Proper signage board and warning should be displayed at the place of the operation,
6. Fire-fighting facilities and other required resources should be available till the operation is terminated,
7. The restricted areas should be under surveillance at all times.



**Figure 9.2:** Isolation of Danger Area

- Danger/Hazardous area
- 1<sup>st</sup> Level Cordon off
- 2<sup>nd</sup> Level Cordon off
  - Site Control point
  - Ambulance
  - Casualty Clearing point
- 3<sup>rd</sup> Level Cordon off
  - Traffic Control

*Note:* Positions will depend on the wind directions

**9.4.3 Search and rescue operation**

Search and Rescue shall start as soon as the public warning signal has been issued and should be carried out as per the instructions of CIC/SIC.

**9.4.4 Evacuation**

On blast of Disaster warning siren, the personnel will assemble at the respective assembly points to be transported to the refuge centers.

**9.4.4.1 Evacuation Routes**

In case of a general emergency one of the first duties of the CIC is to alert outside authorities and advise them about the actions that should be taken to protect the public, if any. The most significant risk affecting the local population is that of a toxic materials release.

The evacuation route could be by two ways

- a. Land side
  - b. River side
1. The vehicle-carrying casualty should be given the first priority in traffic movement.
  2. While assessing the evacuation route, constant communication link should be maintained with the EOC as well as with the individual assembly point station from where the evacuation is to be undertaken.

**9.4.5 Evacuation Shelters**

In the event of an impending disaster the affected population would have to be transported to intermediate evacuation shelter. The evacuation shelters may be schools and colleges located at the City or as instructed by district authorities.

The P&IR will make necessary arrangement in coordination with the local administration for evacuating people from the low-lying area. They will be shifted to Centres as indicated below:

Administration department shall ensure adequate quantity of water supply and food at all the temporary evacuation centres.

CMO shall ensure that necessary medicine and medical assistance at the temporary evacuation centres is available.

**9.4.6 Transportation****9.4.6.1 Vehicle Pool**

All vehicles whether it is of Port or hired should be parked in the location as decided for immediate use as soon as the people move into action.

Apart from the above M&E dept. shall hire vehicles from the private vehicles contractors for emergency work. Refer **Appendix D** for list of vehicles.

**9.4.6.2 Contact with Railways & State Road Transport Corporation**

Secretary to ensures for the smooth movement of workers/employees for which he may get in touch with the Station Master and apprise him about the situation so that the movement of staff moves efficiently.

**9.4.7 Generator Sets**

Wherever generator sets are required, M&E department shall be contacted, who shall immediately hire/procure or provide from whatever sources.

**9.4.8 Decontamination**

Decontamination of personnel and equipment is required in case of contact with hazardous materials.

**9.4.9 Medical Facilities**

Depending on the nature of the emergency, it may be necessary to alert medical facilities within and outside the port.

Medical facilities likely to be used will need to be informed

- The nature and location of the emergency,
- The likelihood or number of casualties,
- Whether medical staff are required at the location of the emergency,
- Actual details of the casualties, including the names, as soon as these are known.

**9.4.9.1 First Aid Centers**

First Aid treatments provided at the port and the Port ambulance placed at every First Aid center and hired vehicles, can be used for taking the person to the medical centre.

Refer **Appendix B**.

**9.5 LOGISTICS/SERVICE DELIVERY MECHANISM**

The required/necessary equipment and assistance during various types of emergencies can be requested from the Local Industry crisis groups, District crisis group, MoU signed with Industry association operating in port. Additional resources available for disaster relief with the various departments in the Kolkata/South-24 Parganas District can be found from IDRN (Refer **Appendix D**)

## 10. RECOVERY AND RECONSTRUCTION

### 10.1 RESPONSIBILITY FOR TERMINATING THE RESPONSE

The decision to terminate a response is taken by the CIC in consultation with the Chairman/Dy. Chairman.

### 10.2 CONDITIONS FOR TERMINATION

**10.2.1 In the case of Natural Disasters** Response action can also be terminated as per the information received from the “Competent early warnings agencies e.g., IMD” (Refer 9.2.3).

**10.2.2 Fire Extinguishing operation** should be terminated when:

- Fire has been completely extinguished,
- Area has been declared as “Risk or Hazardous or Smoke’ free area.

**10.2.3 Marine Response Operations in case of oil spill** should be terminated when:

- Oil has been recovered to the extent practicable; or
- The surface oil slick has broken up; or
- Oil has impacted shorelines and is no longer on the water.

In the last case marine response resources must remain on standby and equipment maintained at the ready until shoreline response operations have been completed.

**10.2.4 Shoreline Response Operations** should be terminated when:

- All accessible shorelines are clean to the extent practicable.
- Cleanup is having no further net beneficial effect or having a deleterious effect on the shoreline or associated plants or animals.

Shoreline cleanup operations may be terminated only upon the instruction of the **WBPCB/Coastguard**.

**10.2.5 Land Spill Response Operations** should be terminated when:

- Chemical has been recovered to the extent possible,
- Area has been declared “Risk or Hazardous” free.
- Source of leakage is stopped and the condition of the area is safe for operation.

Land spill cleanup operations may be terminated only upon the instruction of the **WBPCB**.

**10.2.6 Human Induced Disasters** response may be terminated when

- a. War and terrorism threats are evaluated by the security agencies and as such the response may be terminated gradually in stages as per the input received from them.
- b. Bomb threat related response will be terminated on case to case to basis as per instructions from district and state authorities.

**10.3 STAND-DOWN PROCEDURES****10.3.1 Return of Equipment**

Upon completion of the response, the SIC (or delegate) will:

- Arrange recovery of all equipment, and unused materials.
- Ensure that all equipment is cleaned.
- Ensure that all equipment is returned to the owner.

**10.3.2 Debrief**

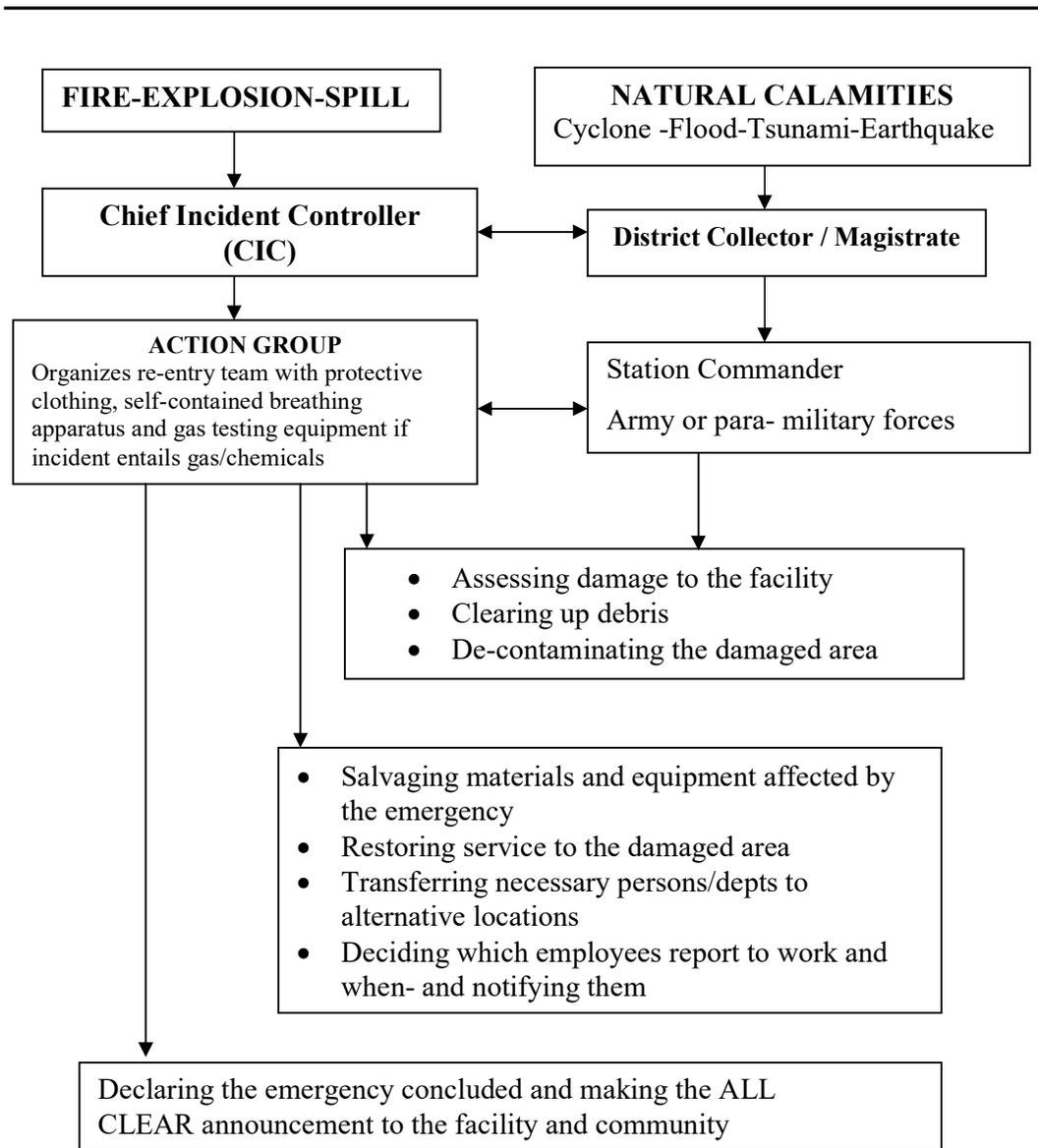
The SIC may hold a post-incident debriefing. Debriefing should address:

- Spill causes (if known) and future prevention methods.
- Speed of response activation.
- Effectiveness or suitability of strategies, tactics and equipment.
- Health and Safety issues (if any).
- Any other issues required to be communicated.
- Damage in terms of life, injury and loss of property should be assessed.

**10.3.3 Incident Report**

The Chairman/Dy. Chairman and relevant authority may request the preparation of an Incident Report. This should follow the debrief outline or another format.

*Disaster Management Plan*



**Figure 10.1: DE-ACTIVATION OF THE PLAN-RECOVERY-RESTORATION**  
*Note:- For natural calamities at the District level-the District collector or District magistrate will make the necessary initiative through the paramilitary group. The Port Chairman/Dy. Chairman or CIC may also request para military personnel to assist when the accidents have originated at the port premises.*

**10.3.4 Cost recovery**

1. All records of costs must be collated for submission to the relevant insurer.
2. For expenses incurred assisting third parties, costs should be kept and submitted to relevant authority.

**10.4 DAMAGE, LOSS AND NEED ASSESSMENT**

**10.4.1 Initial Damage Assessments**

Following any major disaster, rapid assessment of damage is important for restoring the facilities, resuming Port operations and cost recovery. In certain cases e.g.

terrorism and security related, thorough site or damage assessment is not possible immediately after an event. Access to, and assessment of Port facilities and its contents may be delayed for a period of time. The delays may be due to possible loss of structural integrity, necessary forensic investigation, or the existence or potential existence of toxic or hazardous materials.

Immediately following a disaster and as soon as it is safe to do so, the CISF or other designated team shall conduct a preliminary damage and environmental assessment by conducting a drive-through of all Port facilities.

#### **10.4.2 Secondary Damage Assessments/Temporary Repairs**

Once the affected site is approved for entry, a Damage Assessment Team assembled by the Engineering Department will conduct a more thorough assessment of damage to facilities and utilities. This assessment will focus on those assets needed to facilitate a rapid recovery such as electric power, communications and transportation. The assessment should also identify any potential environmental issues that require immediate attention.

#### **10.4.3 Assessment of Damage to Navigational Channel**

The assessment of damage to the Navigation Channel is under the jurisdiction of the Indian Navy and Hydrographic department of Survey of India. Assessment of damage to the berthing area portion of the channel is under the jurisdiction of the port. Assessment of damage to Aids to Navigation is under the jurisdiction of the Port. The Harbormaster or Senior Hydrographic Surveyor (SHS) will provide status report the condition of the channel to the Director-Marine.

#### **10.4.4 Potential loss estimates analyzed include**

- Physical damage to residential and commercial buildings, schools, critical facilities, and infrastructure.
- Economic loss, business interruptions, repair and reconstruction costs.
- Social impacts, including estimates of shelter requirements, displaced households, and population exposed to scenario floods, earthquakes and cyclone Short Term Reconstruction.
- The decision to rehabilitate or abandon port structures depends on the extent of damage, importance of the structure, and limits on its use. Aspects of an inspection may include:
  - An underwater inspection by divers to check for possible demolition damage or deterioration of footings.
  - An inspection of the piling at low water from a boat to check for decay, borer attack, or other damage. The stringers and deck are examined from below to determine the need for repair.
  - Lock gates, berths/jetties, or seawalls are inspected for damage. If breached, such structures are repaired to avoid scour and further damage.
  - Assessment of facilities by civil engineers and surveyors to ensure compliance with local building and architectural codes and to ensure that damaged or repaired buildings are safe for occupancy.

In the event of a terrorist act at the port, reconstruction planning should also take into account the interests of security representative, and the need to collect evidence.

## **10.5 RECOVERY PLANNING**

### **10.5.1 Short-term recovery planning**

Short-term recovery planning runs parallel to short term response, and begins during and immediately after an incident.

### **10.5.2 Medium-term recovery planning**

In the medium-term recovery planning, port will engage in contracting and setting up for large scale reconstruction and reconstitution operations. This may include financial planning, contracting, and the formation of joint venture agreements to assist in long-term business continuity.

Initial reconstruction of damaged or destroyed facilities begins, as structural and civil engineers rehabilitate existing port structures. They use appropriate methods of lightering and port construction to handle cargo.

The reconstruction activities which may require an Environmental Impact Assessment are as follows:

- a. Debris Removal
- b. Emergency Protective Measures
- c. Repair to Pre-Disaster Condition
- d. Modification, Expansion, and Mitigation Projects
- e. New Construction and Ground Disturbance

Sr. no. (d) Above has been included so as to undertake proactive mitigation steps as part of “**Build-Back-Better**” of the Sendai Framework.

### **10.5.3 Long-term recovery planning**

In the event that a part of the entirety of a port becomes unusable or requires rebuilding, the long-term reconstruction considerations will be taken by Ministry of Port, shipping and Waterways taking into account the financial planning and resources that may be involved in the process. This may include budgetary support.

## **10.6 RE-OPENING OF BERTHS TO VESSELS**

After the channel to the Port has been re-opened and the Port infrastructure is found to be restored and in good condition, the Port will be in a position to begin accepting request for berthing. This will require coordination between the Port, ship pilots, and terminals.

Areas of consideration for prioritizing the calling vessels include:

- Available depth in the channel/draft of vessel;
- Condition of facilities to receive the vessel;
- Availability of labor to offload/load cargo;
- Is vessel carrying a critical feedstock for area manufacturing?

- Is vessel carrying commodities that can be used in recovery?

### **10.7 RAIL RAKE DELIVERIES**

After the Port has found the rail infrastructure in good condition, the Port will be in a position to begin accepting rail rake deliveries. This will again require coordination between the Port, rail authority, and terminals.

## 11. BUDGETARY PROVISIONS

### 11.1 BUDGETING AND FINANCIAL ARRANGEMENTS

#### 11.1.1 DM Budget

The port will assign sufficient funds from its revenue reserves towards disaster management under following broad categories

- i. **DRR measures (Structural and Non-structural)**
  - Fire-Fighting and Oil Spill Response Equipment;
  - Purchase of Tugs, Navigational aids;
  - Training of Personnel;
  - Risk Transfer – Insurance;
  - Civil works –lock gate, sea wall, berth/Jetty-fenders-Repair and maintenance.
  
- ii. **Restoration Measures**
  - Administrative building damage;
  - Power Supply – restore sub stations;
  - Damage to tugs – floating craft;
  - Damaged buoys- loss of buoys;
  - Repair of damaged roads;
  - Injury & infection-medical treatment;
  - Flooding & stagnant water - clean drains;
  - Electrical & Mechanical works;
  - Damage to cranes;
  - Civil works –lock gate, sea wall, berth/Jetty-fenders-Damage Repair.

The stakeholder's commitment will also follow similar funding for preventive measures and repair and restoration activities.

Immediately following an incident, all the Heads of the Departments are required to assess the damage and submit a detailed report indicating the estimate to the Chairman/Dy. Chairman.

#### 11.1.2 Insurance of Port Assets

The Insurance cover for the port assets/properties should be as follows

1. Building, workshop, warehouse and other structure inside port;
2. VTMS, Navigational aids structures and equipment;
3. Fire-fighting aids;
4. Berths, Docks & Jetties;
5. Port Equipment & Plant & Machineries;
6. Floating craft and others;
7. Railway permanent way, loco shed and locomotives;
8. Electrical Installations.

#### 11.1.3 Loans and other financing

Loans and other financing for DM will be decided based on the contingency and cases will be put up to Ministry of Ports, Shipping and Waterways accordingly by the port.

## 12. PLAN MANAGEMENT

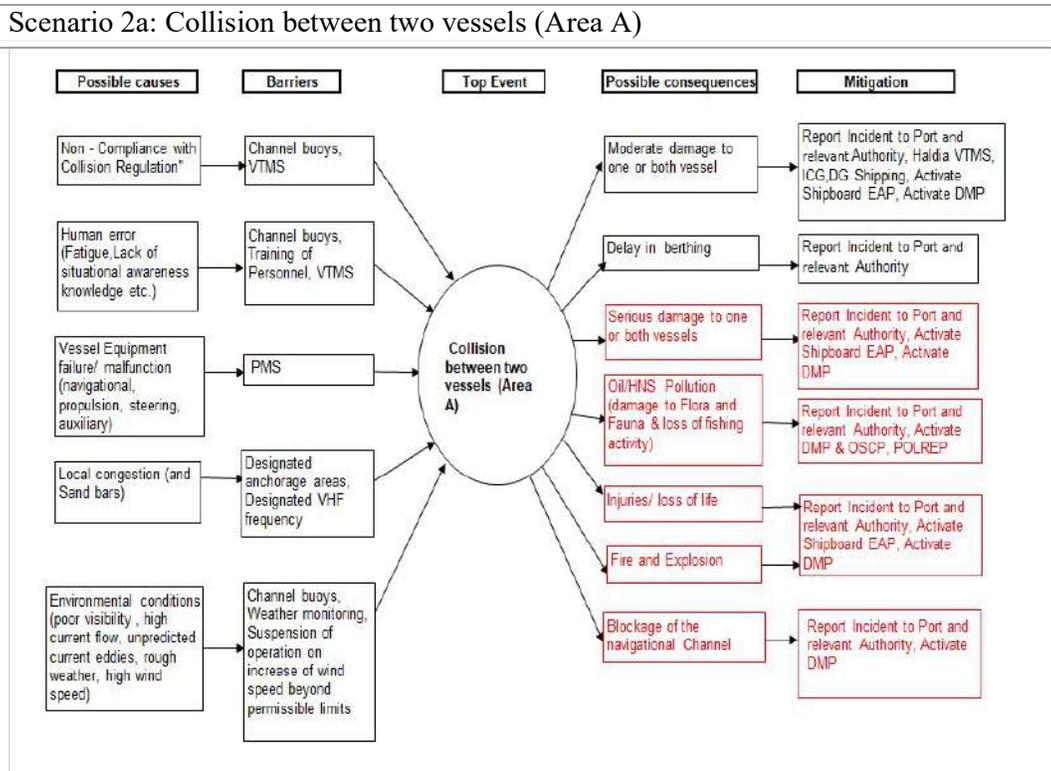
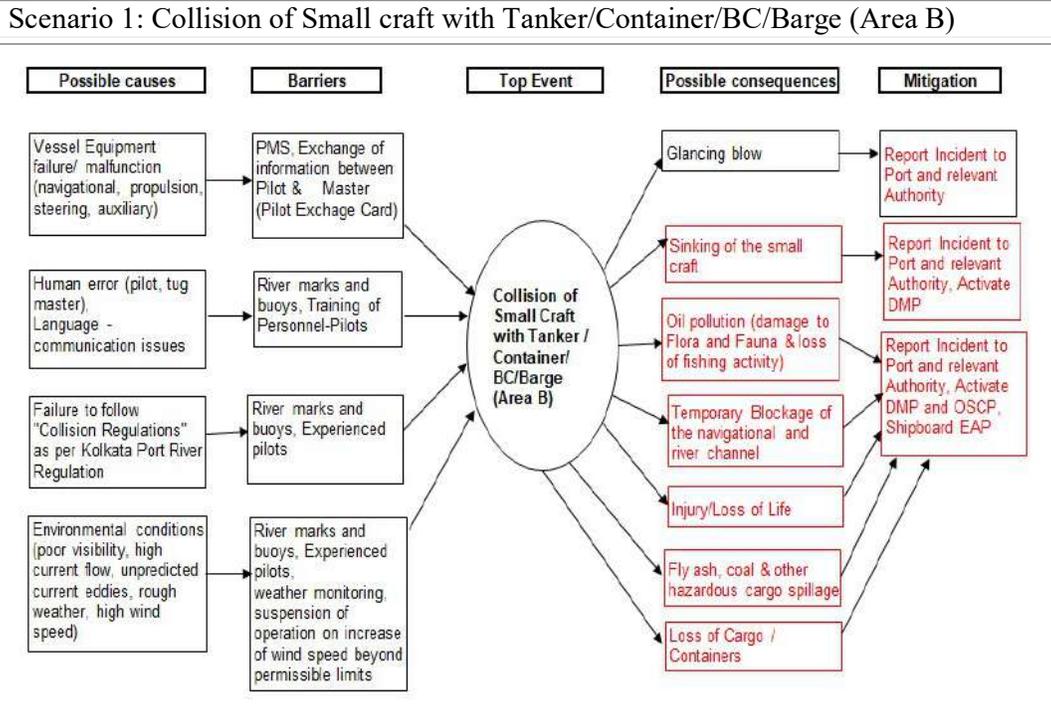
### 12.1 DEVELOPMENT, APPROVAL, IMPLEMENTATION, REVIEW AND REVISION

- This plan is developed in accordance with the template issued by Ministry of Ports, Shipping and Waterways, Government of India and guidelines of NDMP (2019) and structured to suit the port organization. The implementation will be undertaken by the office of the Director – Marine department in association with various stakeholders. It is understood that lessons learned from previous near disaster/disaster situations have been studied and cognizance of the after effect of these disasters noted. Understanding of risk and preventive measures has thus been analyzed and mitigation plan prepared. Prioritization of risks has been done in the HRVCA section.
- Plan would be circulated to all stakeholders.
- Regular Drills/exercises would be conducted to test the efficacy of the plan and check the level of preparedness.
- NDRF, SDRF, BARC (for nuclear and radiological emergencies only) and other agencies e.g. civil defense, local govt. departments would be integrated into the plan.
- Review and updating of the plan would be carried out annually as per Disaster Management Act, 2005 Section 37.
- Consequent to any change/modification, the Director – Marine department is responsible for reviewing, updating and maintaining the DMP.

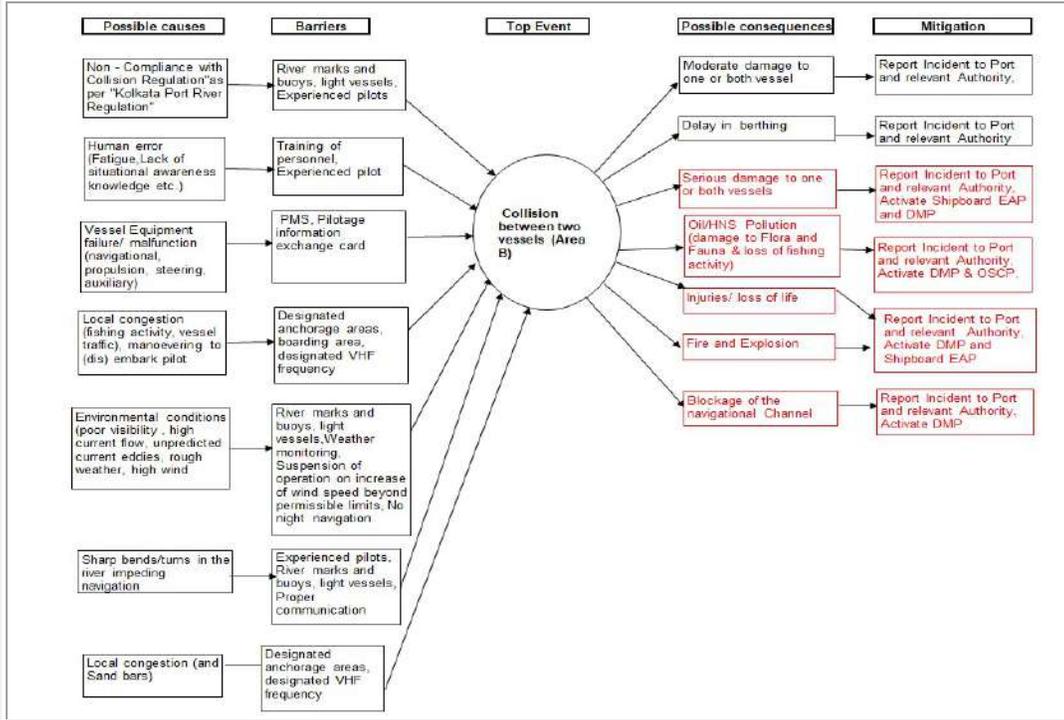
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16. Loss prevention in the Process Industries, Hazard Identification, Assessment and Control, Volume 3, 2<sup>nd</sup> Edition. Frank P. Lee.

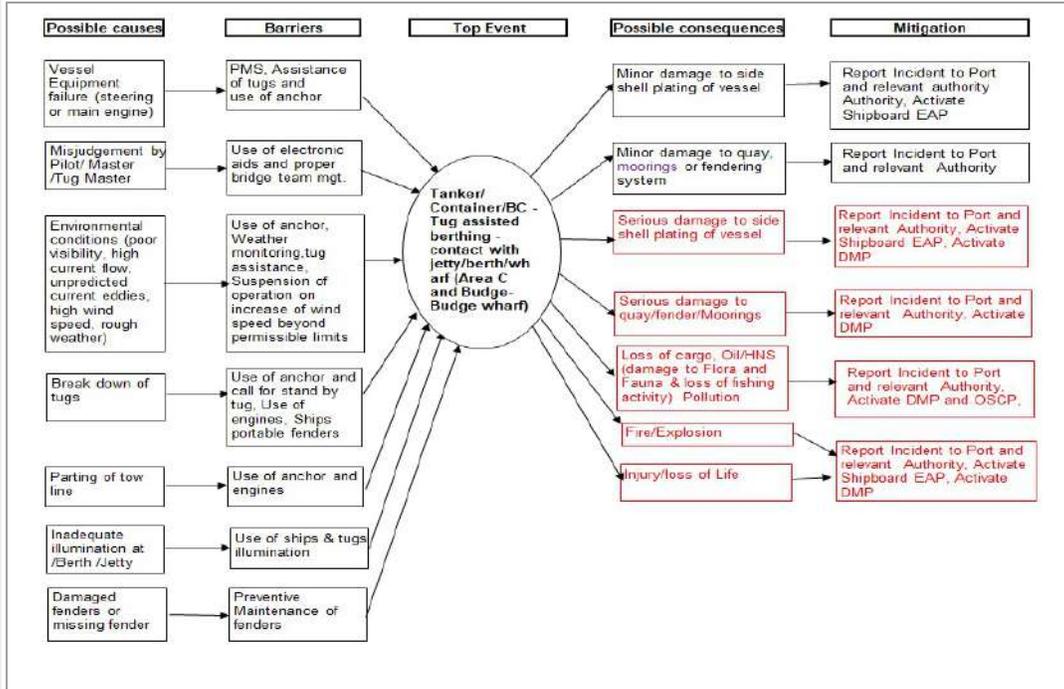
## APPENDIX A NAVIGATIONAL RISK USING BOW-TIE MODEL



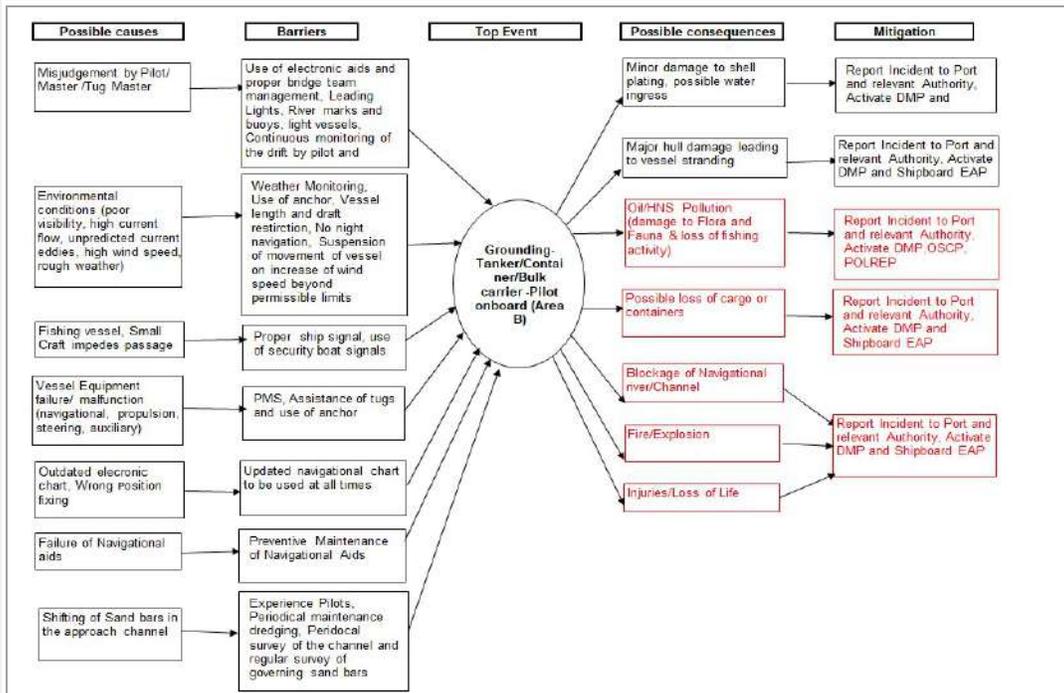
Scenario 2b: Collision between two vessels (Area B)



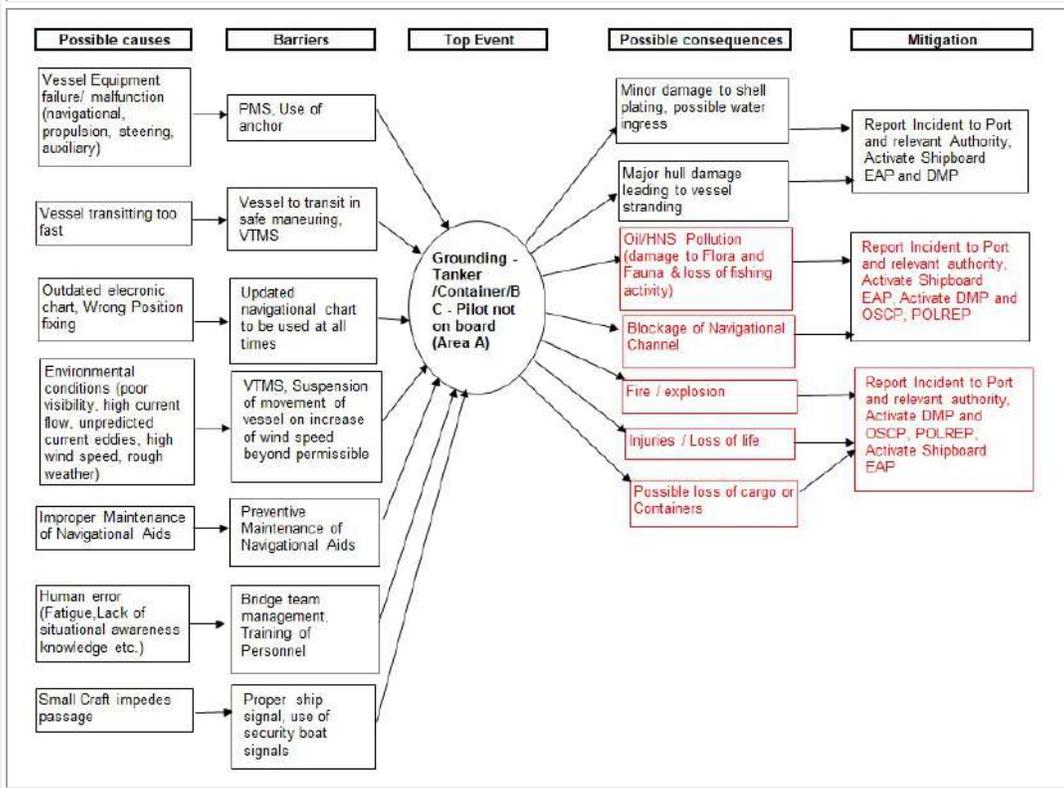
Scenario 3: Tanker/Container/BC – Tug assisted berthing – contact with jetty/berth/wharf (Area C and Budge-Budge wharf)



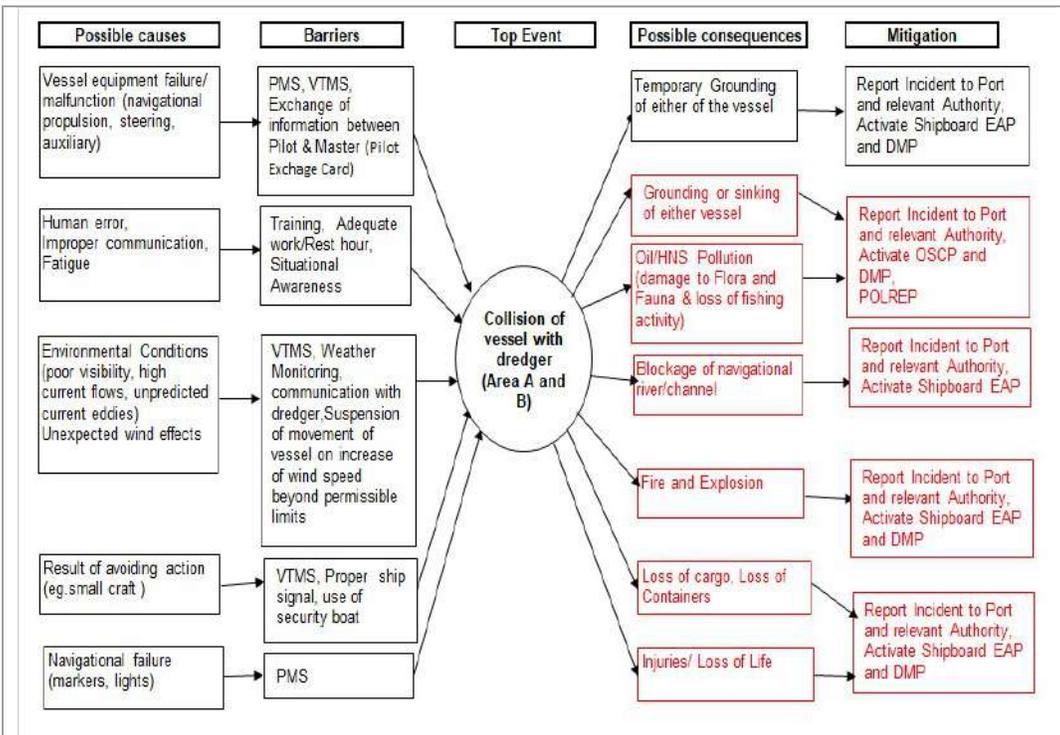
**Scenario 4: Grounding- Tanker /Container/ Bulk carrier- Pilot onboard (Area B)**



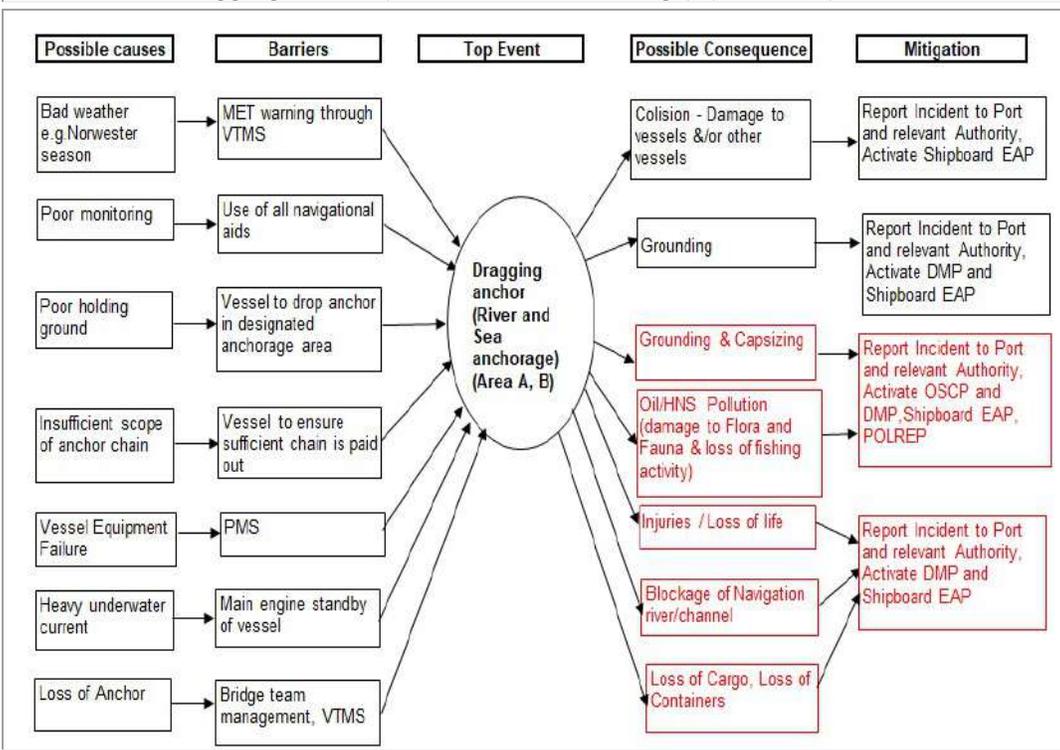
**Scenario 5: Grounding- Tanker /Container/ Bulk carrier- Pilot not onboard (Area A)**



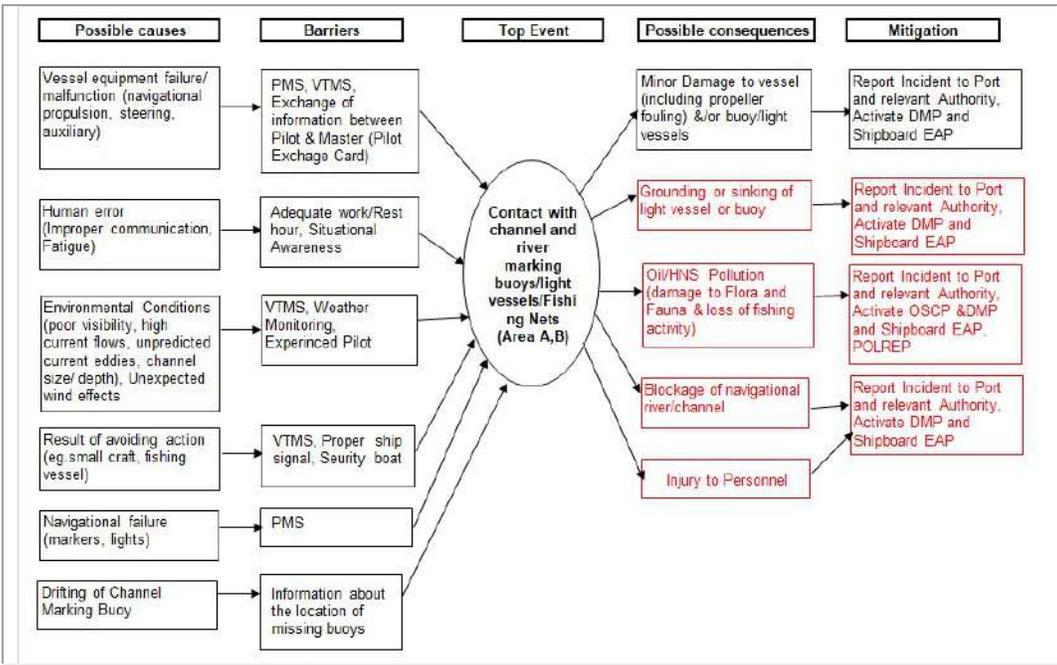
**Scenario 6: Collision of vessel with dredger (Area A and B)**



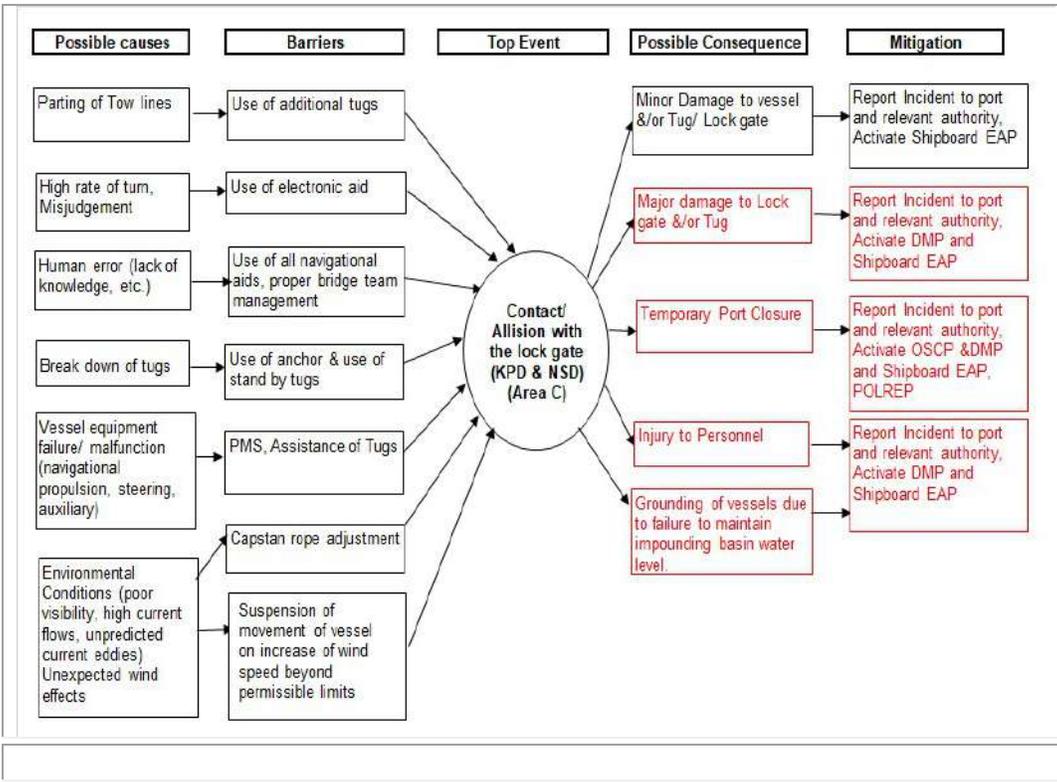
**Scenario 7: Dragging anchor (River and Sea anchorage) (Area A,B)**



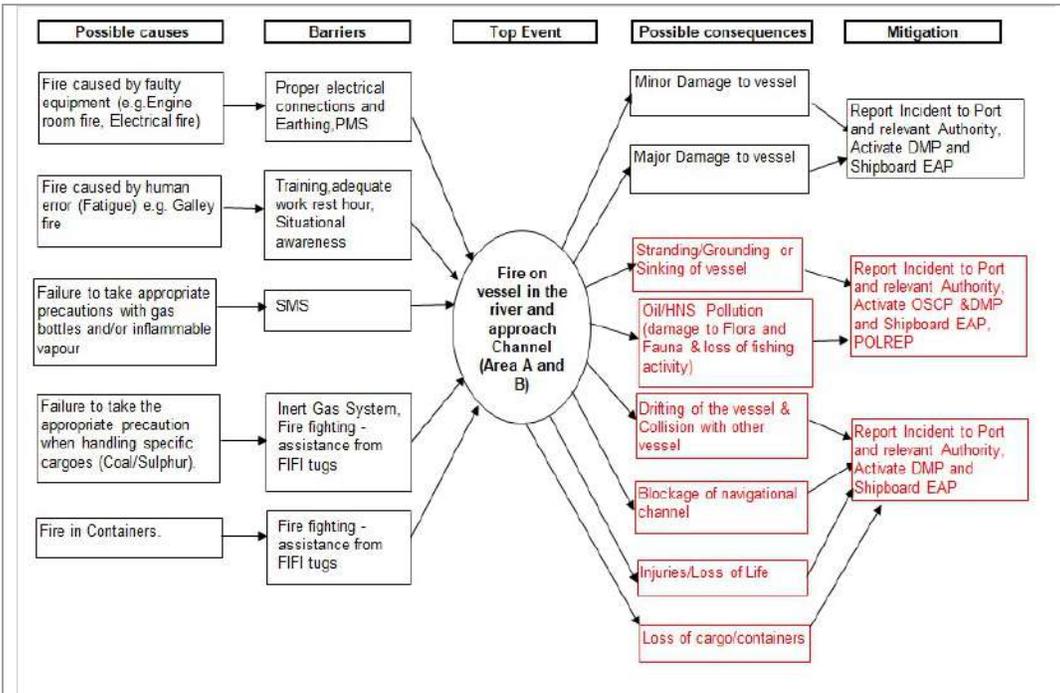
**Scenario 8: Contact with channel and river marking buoys (light vessels/Fishing nets) (Area A, B)**



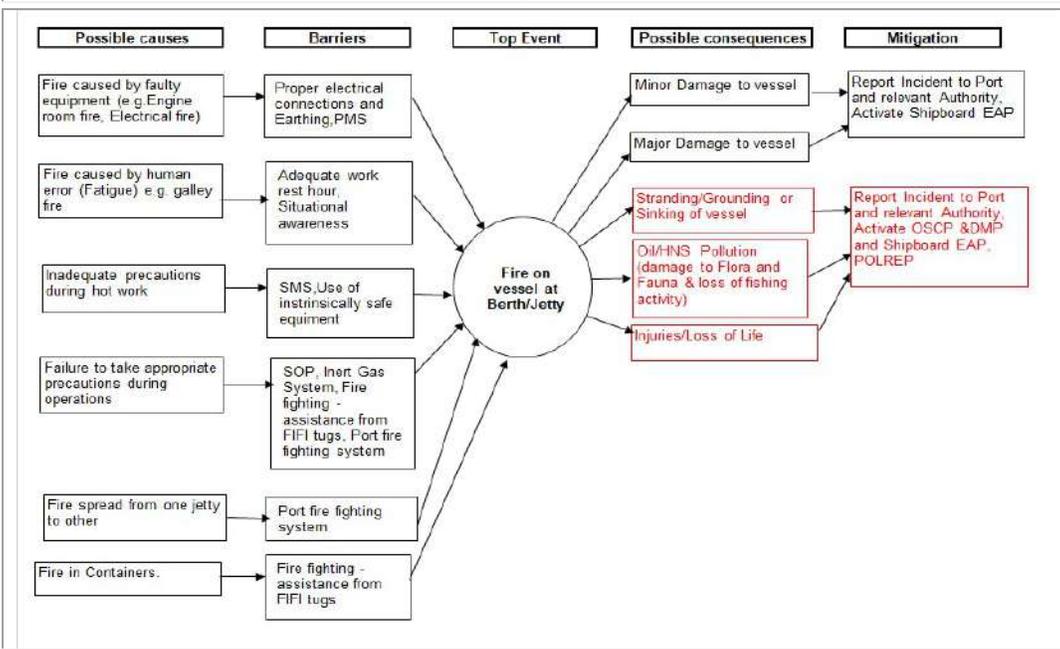
**Scenario 9: Contact allision with lock gate (KPD & NSD) (Area C)**



**Scenario 10a: Fire on vessel in the river and approach channel (Area A,B)**



**Scenario 10b: Fire on vessel at Berth/Jetty**



**Note:**

**Area A:** Approaches to Kolkata port (East anchorage to Middleton pilot boarding point);  
**Area B:** River passage area (from Middleton to Garden reach anchorage or Budge-Budge wharf, anchorage to lock gate);  
**Area C:** Lock gate to berth.

## **APPENDIX B**

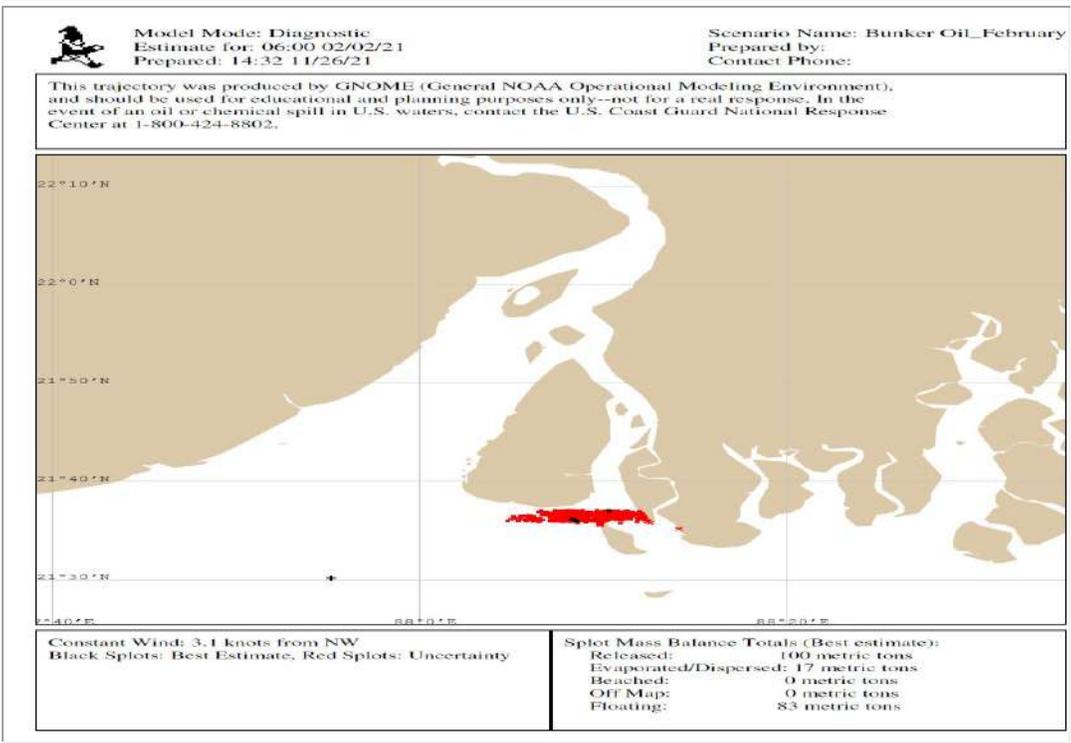
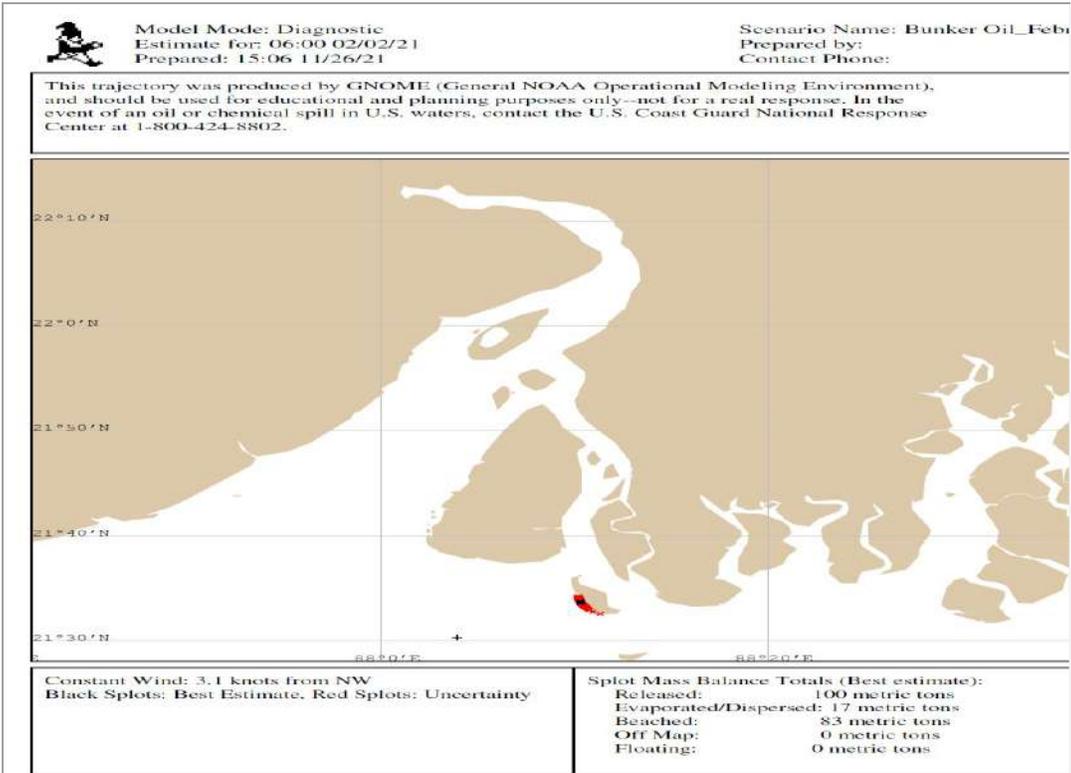
# **OIL SPILL TRAJECTORY MODELING BY USING GNOME**

The National Oceanic and Atmospheric Administrations (NOAA's) GNOME model is used to simulate trajectory of Oil Spill. Input data for GNOME includes:

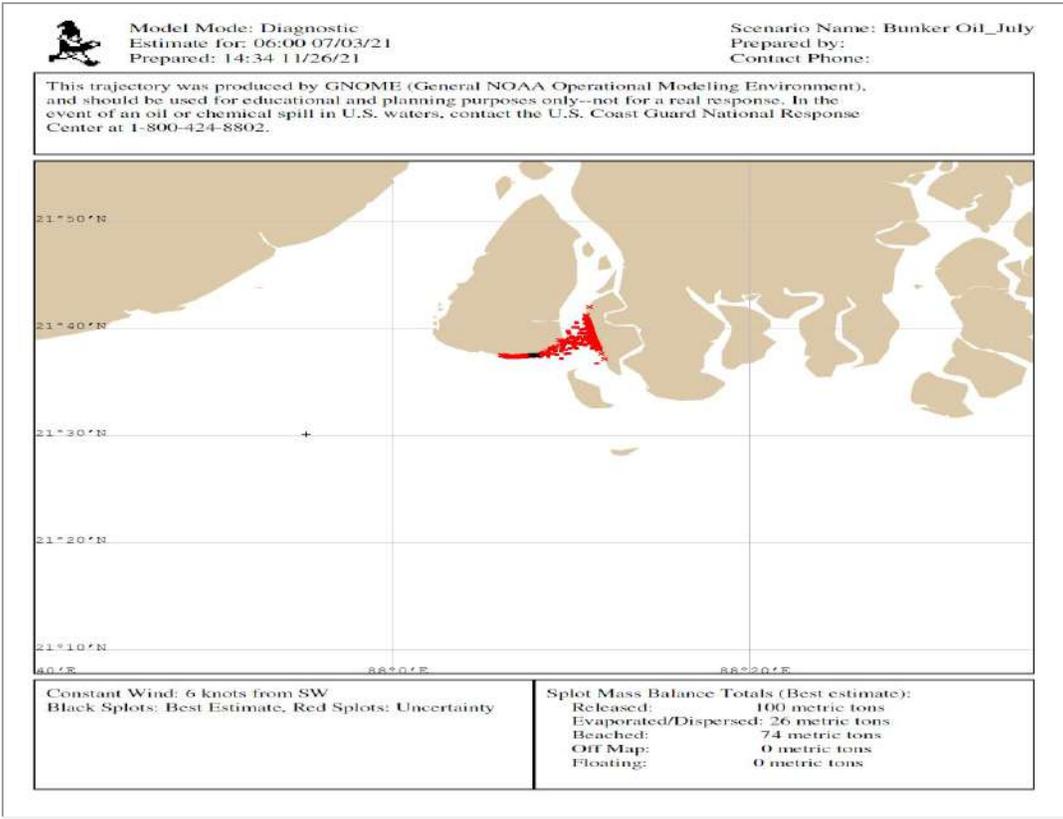
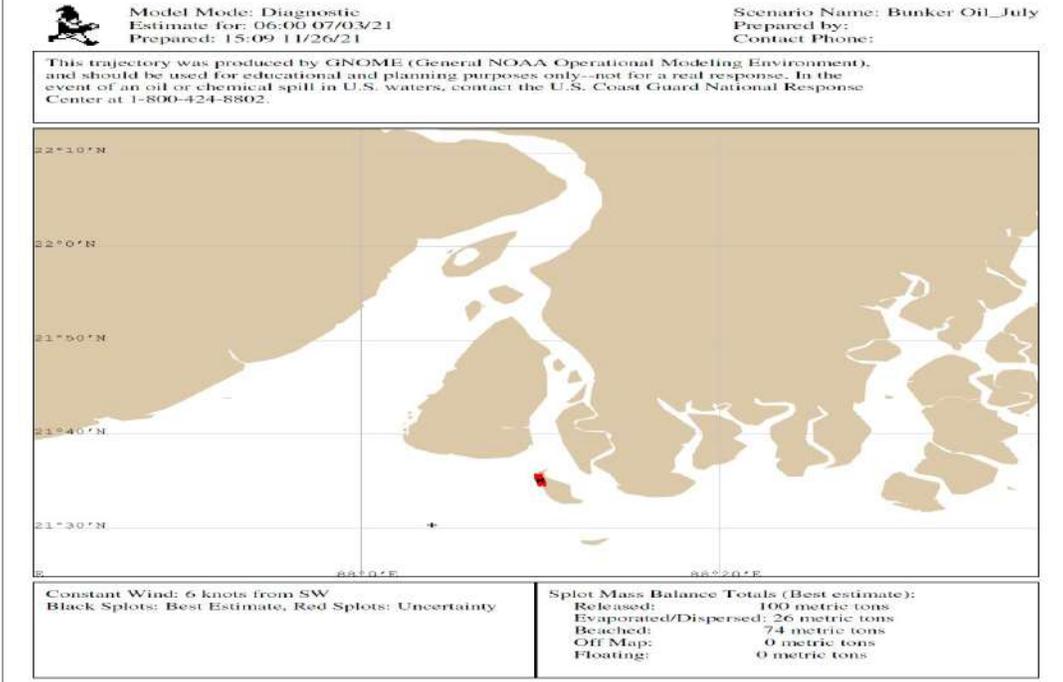
- Map file generated from GNOME global custom map generator.
- Current file is taken from Geostrophic currents.
- Location of Spill (marked by “+” in figures):
  - Near Anchorage (Eastern- for Kolkata Port and Eden channel-for Haldia Dock)
- Trajectory Modelling is carried out for spillage of Bunker Oil and Diesel Oil for 100 MT month of February, July and November.

**1. BUNKER OIL SPILLAGE NEAR ANCHORAGE POINTS**

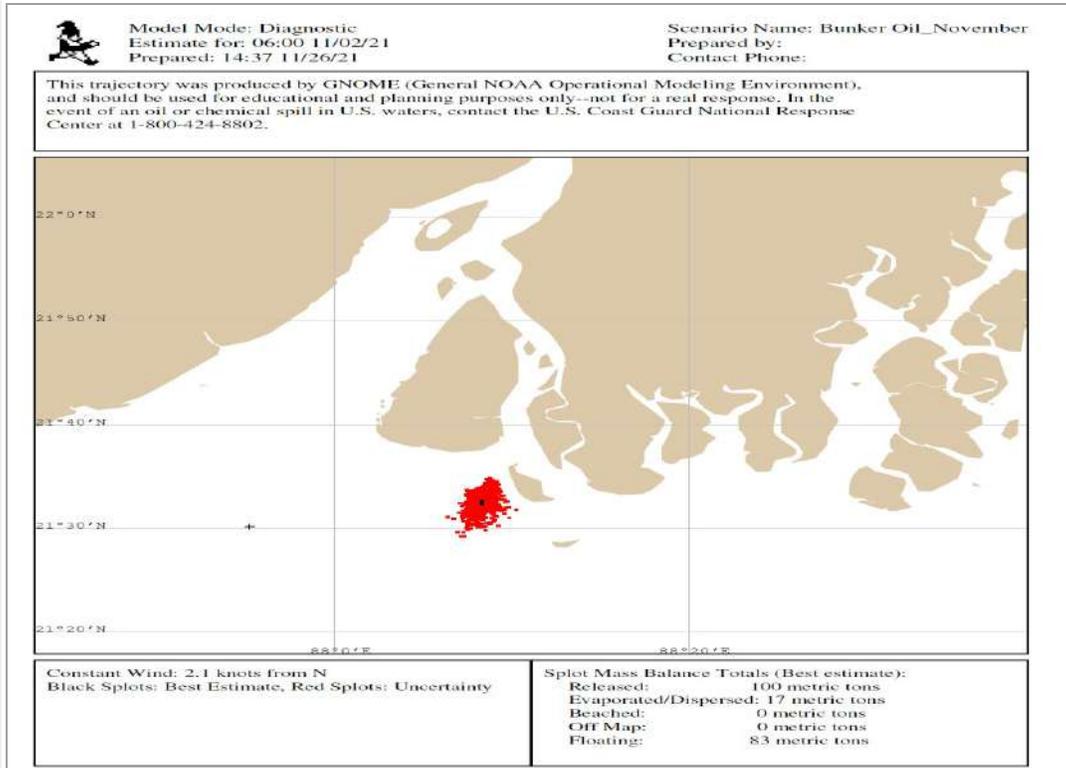
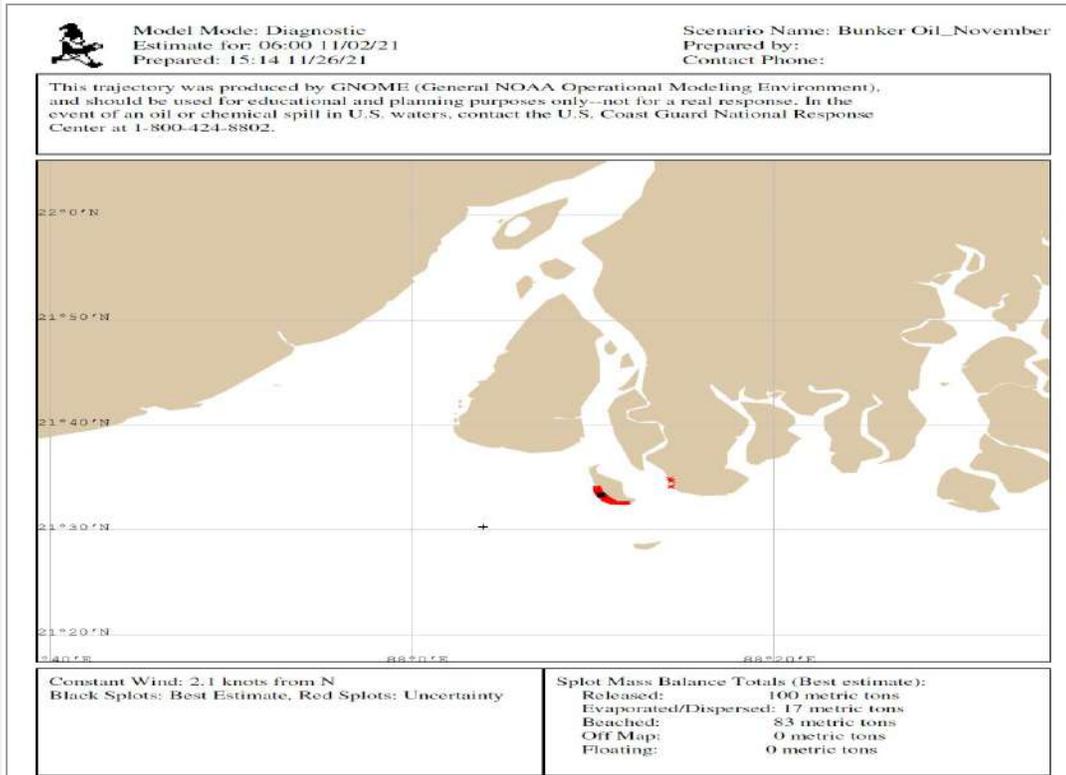
1.1 Trajectory of spillage of Bunker oil of 100 MT at Anchorage for the month of February is as shown in below figure. After 24 hrs the position of the slick is shown in the figure.



1.2 Trajectory of spillage of Bunker oil of 100 MT at Anchorage for the month of July is as shown in below figure. After 48 hrs the position of the slick is shown in the figure.

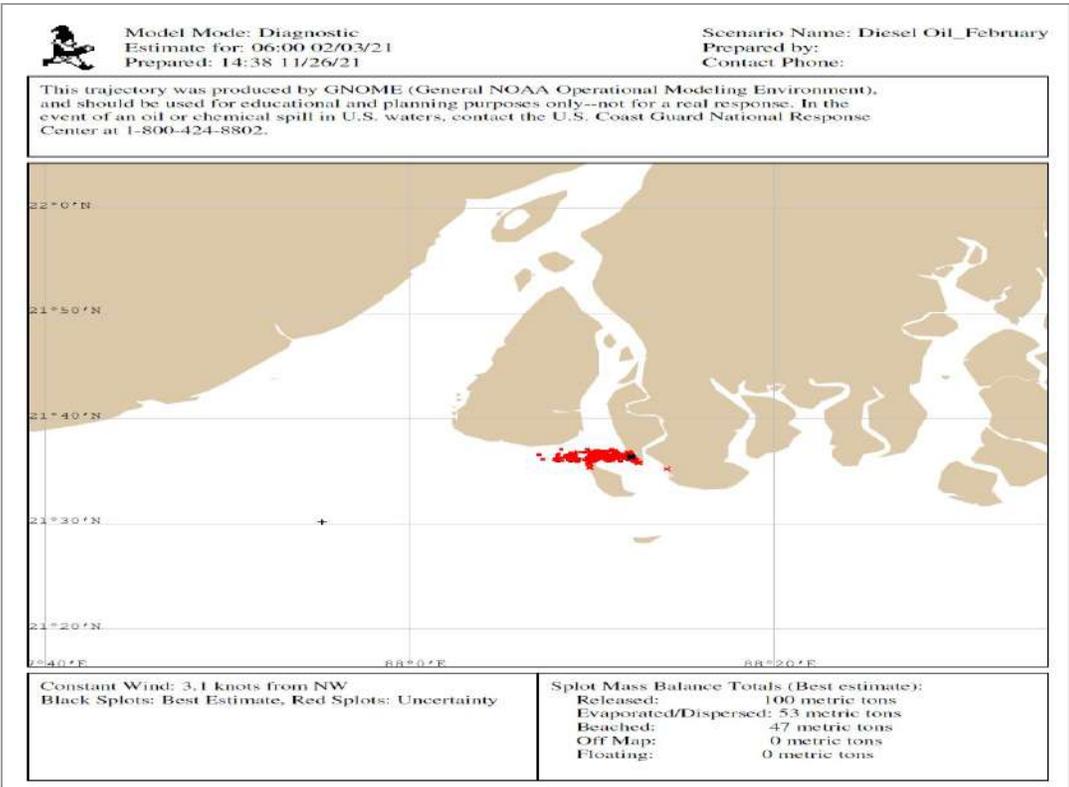
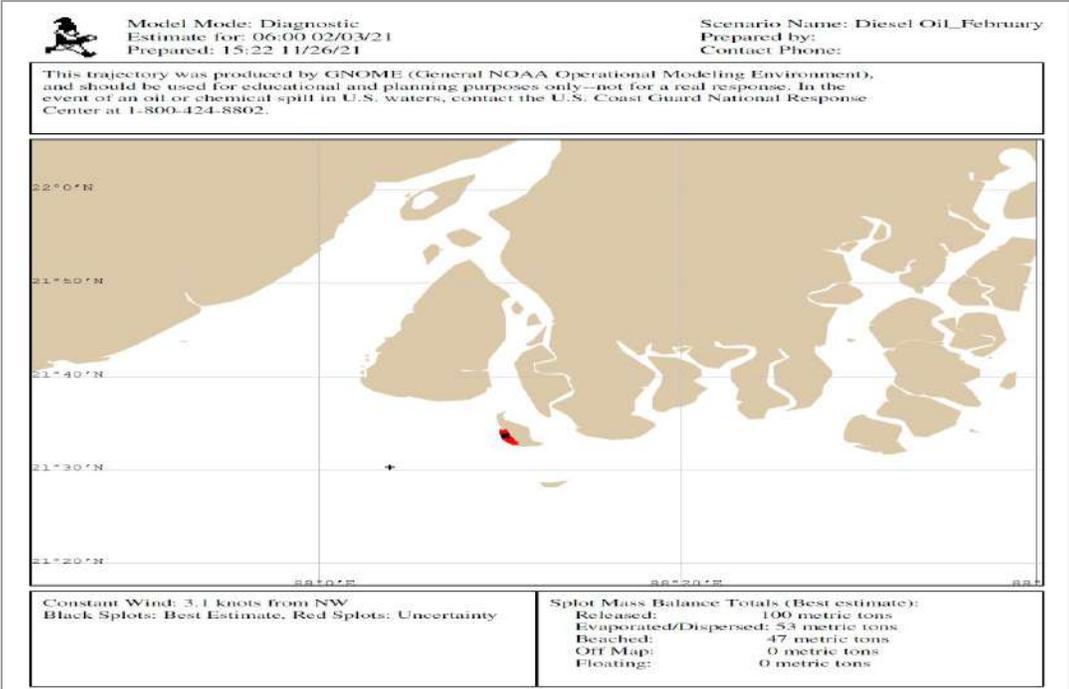


1.3 Trajectory of spillage of Bunker oil of 100 MT at Anchorage for the month of November is as shown in below figure. After 24 hrs the position of the slick is shown in the figure.

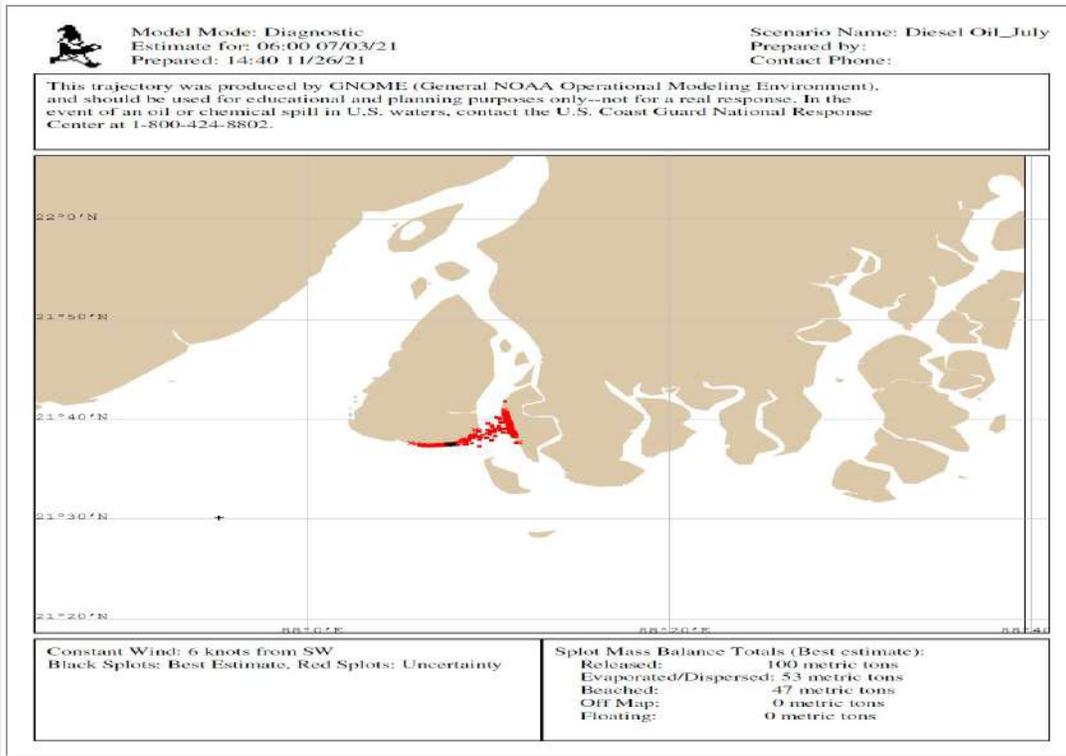
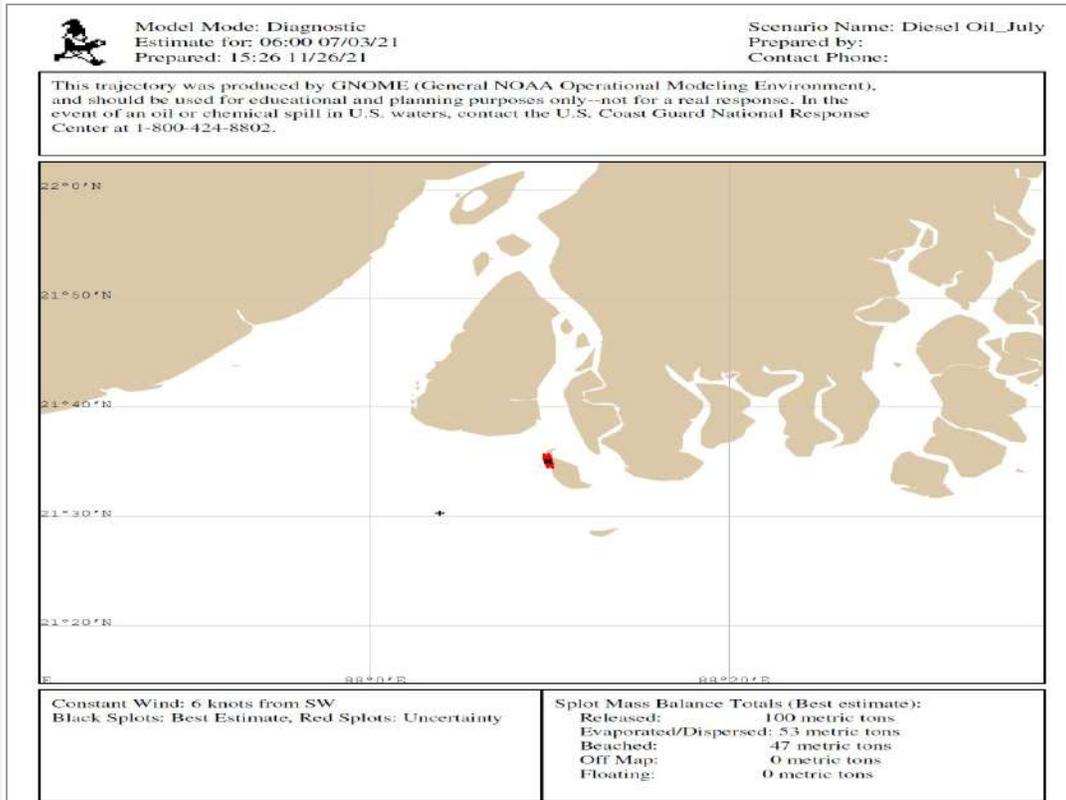


**2. DIESEL OIL SPILLAGE NEAR ANCHORAGE POINTS**

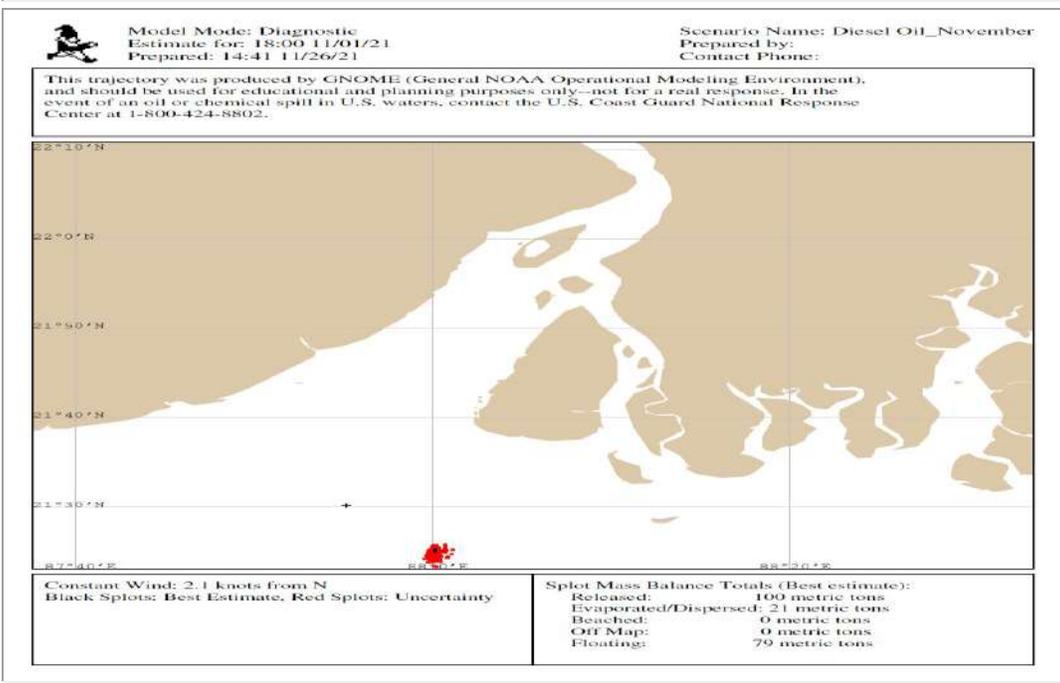
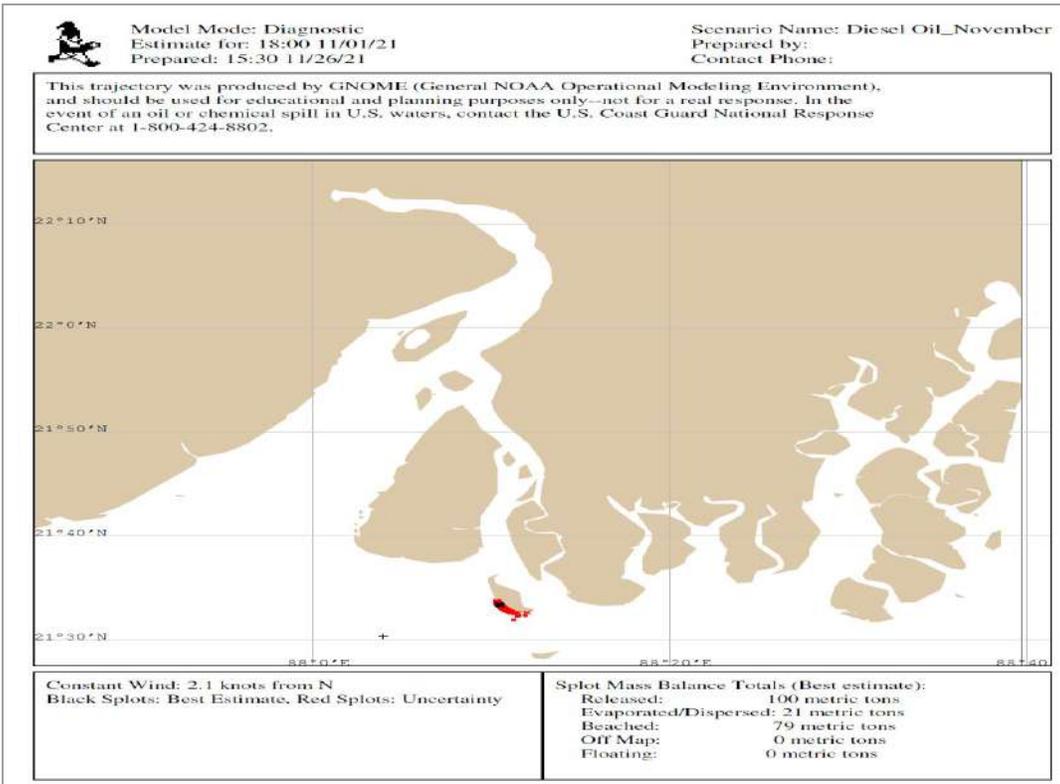
2.1 Trajectory of spillage of Diesel oil of 100 MT at Anchorage for the month of February is as shown in below figure. After 48 hrs the position of the slick is shown in the figure.



2.2 Trajectory of spillage of Diesel oil of 100 MT at Anchorage for the month of July is as shown in below figure. After 48 hrs the position of the slick is shown in the figure.



2.3 Trajectory of spillage of Diesel oil of 100 MT at Anchorage for the month of November is as shown in below figure. After 12 hrs the position of the slick is shown in the figure.



**Type of Oil:** Bunker Oil,  
**Quantity:** 100 MT,  
**Location of Spill:** Near Anchorage Points  
**Note:**

1. R- Released; F- Floating; B – Beached; ED – Evaporated & Dispersed
2. Wind speed and direction is taken from online site

NEAR EASTERN CHANNEL																		
Month	Mean Wind Speed in km/hr or knots	Direction (from) Wind	6hr				12hr				24hr				48hr			
			R	F	B	ED	R	F	B	ED	R	F	B	ED	R	F	B	ED
February	3.1 knots	NW	100	0	93	7	100	0	89	11	100	0	83	17	100	0	74	26
July	6 knots	SW	100	0	93	7	100	0	89	11	100	0	83	17	100	0	74	26
November	2.1 knots	N	100	93	0	7	100	0	89	11	100	0	83	17	100	0	74	26

NEAR EDEN CHANNEL																		
Month	Mean Wind Speed in km/hr or knots	Direction (from) Wind	6hr				12hr				24hr				48hr			
			R	F	B	ED	R	F	B	ED	R	F	B	ED	R	F	B	ED
February	3.1 knots	NW	100	93	0	7	100	89	0	11	100	83	0	17	100	0	74	26
July	6 knots	SW	100	93	0	7	100	89	0	11	100	0	83	17	100	0	74	26
November	2.1 knots	N	100	93	0	7	100	89	0	11	100	83	0	17	100	0	74	26

**Type of Oil:** Diesel Oil,  
**Quantity:** 100 MT,  
**Location of Spill:** Near Anchorage Points

**Note:**

1. R- Released; F- Floating; B – Beached; ED – Evaporated & Dispersed
2. Wind speed and direction is taken from online site

NEAR EASTERN CHANNEL																		
Month	Mean Wind Speed in km/hr or knots	Direction (from) Wind	6hr				12hr				24hr				48hr			
			R	F	B	ED	R	F	B	ED	R	F	B	ED	R	F	B	ED
February	3.1 knots	NW	100	0	88	12	100	0	79	21	100	0	66	34	100	0	47	53
July	6 knots	SW	100	0	88	12	100	0	79	21	100	0	66	34	100	0	47	53
November	2.1 knots	N	100	88	0	12	100	0	79	21	100	0	66	34	100	0	47	53

NEAR EDEN CHANNEL																		
Month	Mean Wind Speed in km/hr or knots	Direction (from) Wind	6hr				12hr				24hr				48hr			
			R	F	B	ED	R	F	B	ED	R	F	B	ED	R	F	B	ED
February	3.1 knots	NW	100	88	0	12	100	79	0	21	100	0	66	34	100	0	47	53
July	6 knots	SW	100	88	0	12	100	79	0	21	100	0	66	34	100	0	47	53
November	2.1 knots	N	100	88	0	12	100	79	0	21	100	66	0	34	100	0	47	53

## APPENDIX C

### CONSEQUENCE ANALYSIS

Potential for damage of property, loss of lives and injury to health due to possibility of accidents has been estimated for various credible scenarios as mentioned in para below.

#### 1. Consequence modeling generally involves three distinct steps:

- i. Estimation of the source term, i.e., how much material in what form (gas/liquid/two-phase) is being released from containment as a function of time, and development of the release scenarios or possible hazard outcomes (cloud dispersion, fire, explosion, etc.) following the release.
- ii. Estimation of the hazard level (hazard modeling) as a function of time and at selected receptor locations, i.e., estimation of:
  - Ambient concentrations for a toxic or flammable gas release (for modeling the effects of a toxic cloud or flash fire),
  - Thermal radiation flux for fires (for a jet fire, pool fire, or fireball),
  - Overpressure for explosions (for a confined explosion, boiling liquid expanding vapour explosion [BLEVE], or vapour cloud explosion [VCE]).
- iii. Estimation of damage level on the selected receptor, based on the hazard level at the receptor location (vulnerability modeling).

#### 2. Incident Outcomes – Definitions

##### 2.1 Fireball

One of significant fire hazard related to liquefied gas. The fireball either results from the bursting of pressure vessel or from vapor cloud explosion. In the first case bursting may occur under fire conditions and be part of a BLEVE or it may occur in the absence of fire. Momentum forces predominate, if fireball is formed from the bursting of vessel, while buoyancy forces predominate, if it is formed from a vapor cloud.

##### 2.2 Pool Fire

A pool fire occurs when a flammable liquid spills onto the ground and is ignited. A fire in a liquid storage tank is also a form of pool fire, as is a trench fire. A pool fire may also occur on the surface of flammable liquid spilled onto water.

##### 2.3 Jet Fire

Normally on high-pressure release of pressurized vessel or pipelines on ignition, burn likes a jet flames in open space. Any equipment can come in heavy thermal load if the flame jet impinges on it. The consequent radiation hazard is very small.

##### 2.4 Unconfined Vapor Cloud Explosions (UVCE) and Flash Fire

When gaseous flammable material is released a vapor cloud forms and if it is ignited before it is diluted below its lower explosive limit, a vapor cloud explosion or a flash fire will occur. Insignificant level of confinement will result in flash fire. The vapor cloud explosion will result in overpressure.

### 2.5 Boiling Liquid Expanding Vapor Explosion (BLEVE)

A BLEVE occurs when there is a sudden loss of containment of a pressure vessel containing a superheated liquid or liquefied gas. It is sudden release of large mass of pressurized superheated liquid to atmosphere. The primary cause may be external flame impinging on the shell above liquid level weakening the vessel and leading to shell rupture.

### 2.6 Toxic Effect

The critical toxicity values which should be considered for evaluating effect on humans in the event of release of chemicals are:

- a) Permissible exposure limits
- b) Emergency response planning guidelines
- c) Lethal dose levels.

### 3. Damage Severity Criteria

The quantitative estimation of effects of Thermal radiations and overpressure on human population, process and equipment is given in following three tables.

**Table 1:** Exposure at different incident levels of Thermal radiation

<b>RADIANT HEAT (kW/m<sup>2</sup>)</b>	<b>HUMAN EXPOSURE LIMITS*</b>
35 to 37.5	100% lethality in 1 min; 1% lethality in 10 seconds
25	100% lethality in 1 min; significant injury in 10 seconds
12.5 to 15.0	1% lethality in 1 min; first degree burns in 10 seconds
9.5	Pain threshold reached after 8 seconds; second-degree burns after 20 seconds
4.0 to 5.0	Sufficient to cause pain to personnel if unable to reach cover within 20 seconds; However, blistering of the skin (second-degree burns) is likely; 0% lethality
1.6	Will cause no discomfort for long exposure

**Table 2:** Thermal radiation damage levels

<b>INCIDENT HEAT FLUX (Kw/m<sup>2</sup>)</b>	<b>DAMAGE TO EQUIPMENT</b>	<b>REMARKS</b>
35.0 to 37.5	Damage to process equipment	Generally includes steel tanks, chemical process equipment,

		industrial machinery
25.0	Minimum energy to ignite wood at indefinitely long exposure without a flame	
18.0 to 20.0	Plastic cable insulation degrades	
12.5 to 15.0	Minimum energy to ignite wood with a flame; melts plastic tubing	
* Based on an average 10 min exposure time		

**Table 3:** Explosion overpressure damage impacts

Overpressure (bar)	Mechanical Damage to equipment	Damage to people
0.3	Heavy damage to plant & structure	Fatality probability = 1 for humans indoor as well as outdoor >50% eardrum damage >50% serious wounds from flying objects
0.1	Repairable damage	1% death >1% eardrum damage >1% serious wounds from flying objects
0.03	Major glass damage/10% glass damage	Slight injury from flying glass

**4. Software used for consequence assessment**

Analysis of liquid/gaseous release events are made by analytical methods, like computer dispersion models PHAST which will predict real time scenario of the situations. The values of downwind concentration of vapor clouds are determined by the physical properties of the dangerous substances, meteorological data, leakage rate, etc. PHAST software is developed by DNV and is used for both consequence and risk calculations. It contains a series of up-to-date models that allow detailed modeling and quantitative assessment of release rate pool evaporation, atmospheric dispersion, Vapour Cloud Explosion, Combustion, heat radiation effects from fires etc.

5. Consequence assessment results using PHAST software are superimposed in map given in below table:

1. Jet fire from Full Bore Rupture of MTBE unloading hose with wind speed 5 m/s and D stability class at Budge Budge Jetty-5.



2. Flash fire from Full Bore Rupture of MTBE unloading hose with wind speed 5 m/s and D stability class at Budge Budge Jetty-5.



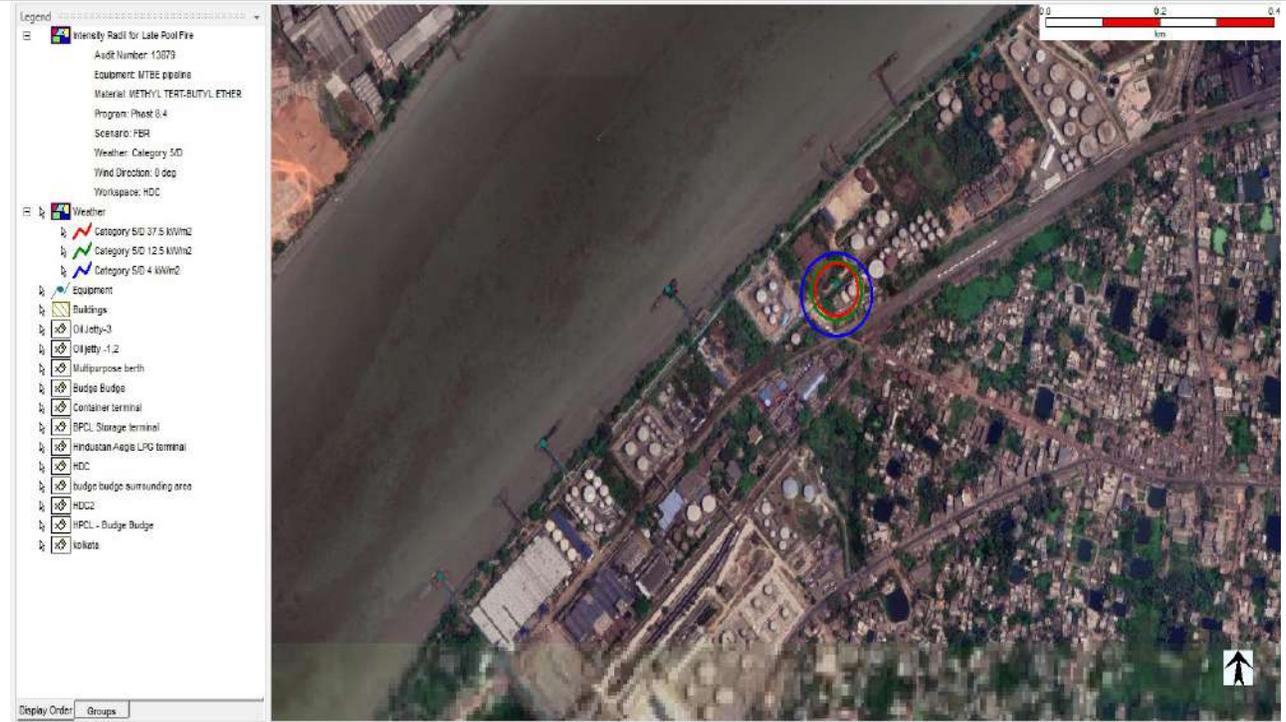
**3. Vapor Cloud Explosion from Full Bore Rupture of MTBE unloading hose with wind speed 5 m/s and D stability class at Budge Budge Jetty-5.**



**4. Jet fire from Full Bore Rupture of MTBE transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.**



5. Pool fire from Full Bore Rupture of MTBE transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.



6. Flash fire from Full Bore Rupture of MTBE transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.



**7. Vapour cloud Explosion from Full Bore Rupture of MTBE transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.**



**8. Pool fire from Full Bore Rupture of Toluene unloading hose with wind speed 5 m/s and D stability class at Budge Budge Jetty-3.**



9. Pool fire from Full Bore Rupture of Xylene unloading hose with wind speed 5 m/s and D stability class at Budge Budge Jetty-3.



10. Jet fire from Full Bore Rupture of MS transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.



11. Pool fire from Full Bore Rupture of MS transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.



12. Pool fire from Full Bore Rupture of Toluene transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.



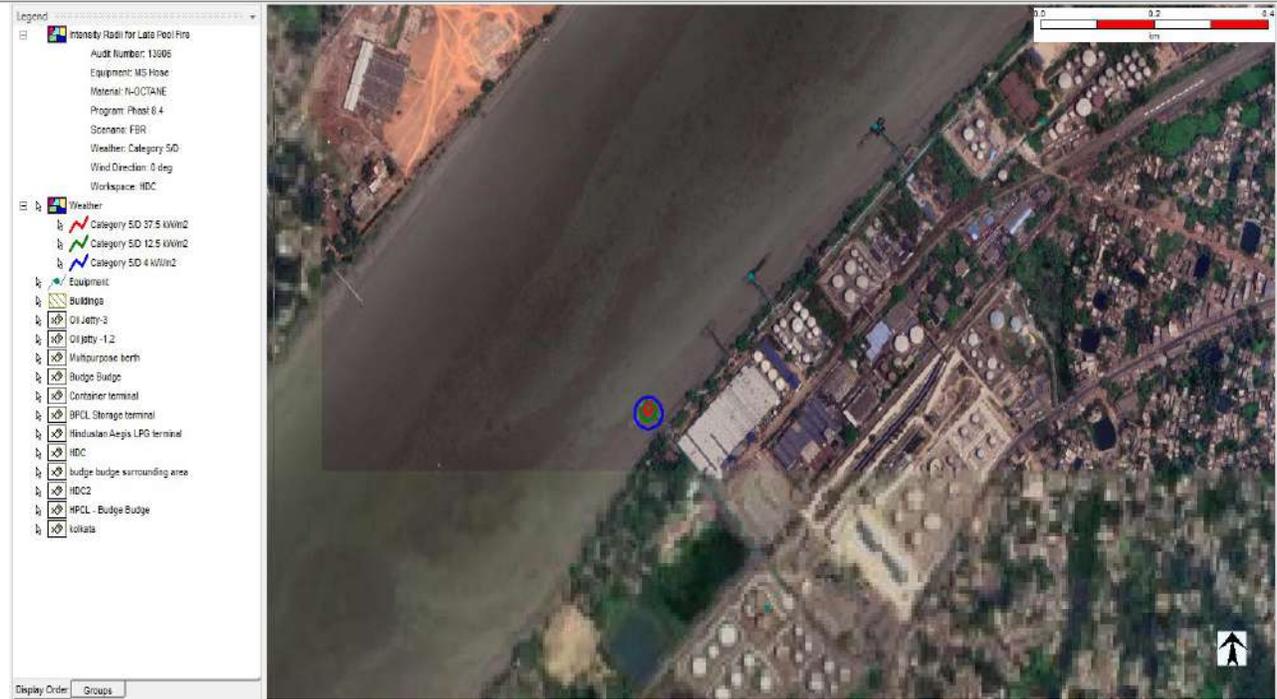
13. Pool fire from Full Bore Rupture of **Xylene** transfer pipeline with wind speed 5 m/s and **D** stability class from jetty to terminal.



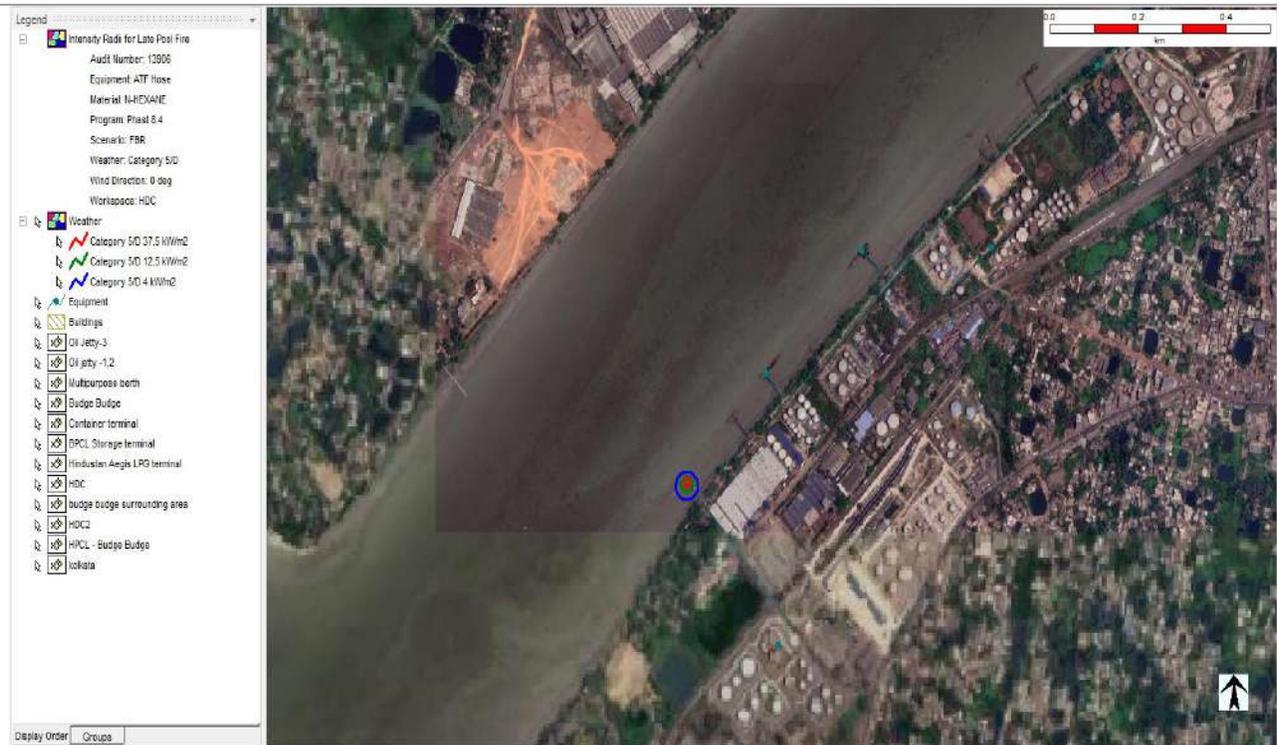
14. Pool fire from Full Bore Rupture of **Naphtha** transfer pipeline with wind speed 5 m/s and **D** stability class from jetty to terminal.



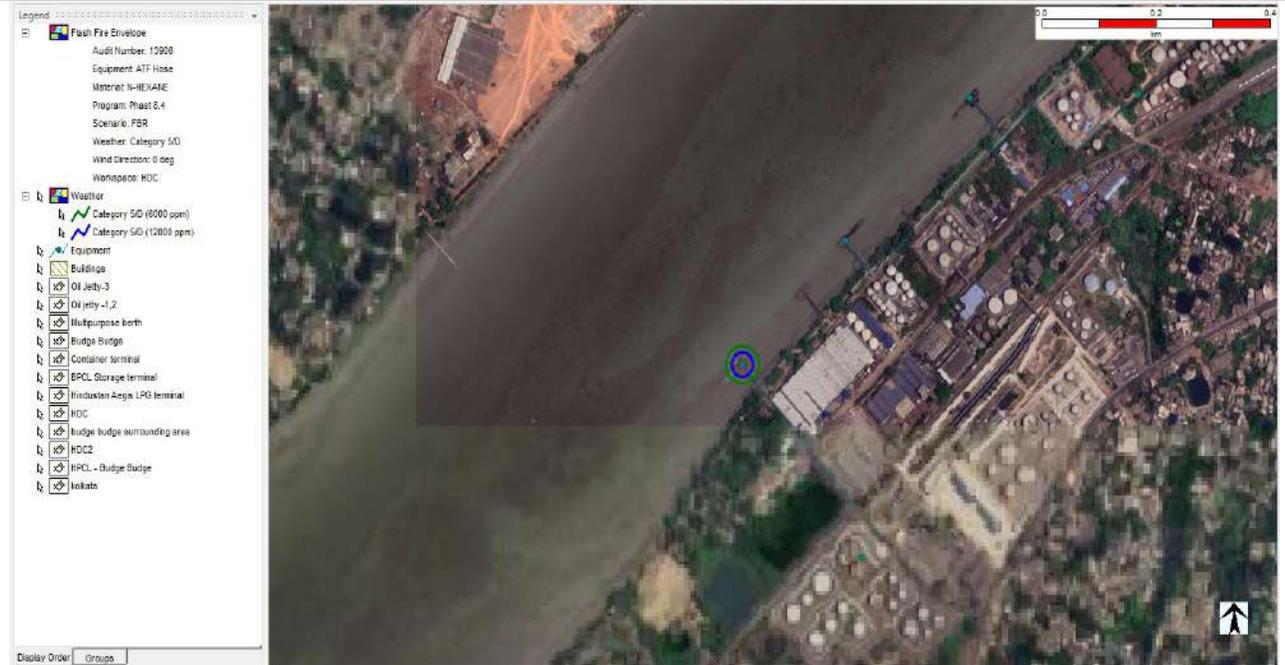
15. Pool fire from Full Bore Rupture of MS unloading hose with wind speed 5 m/s and D stability class at Budge Budge Oil Jetty-1.



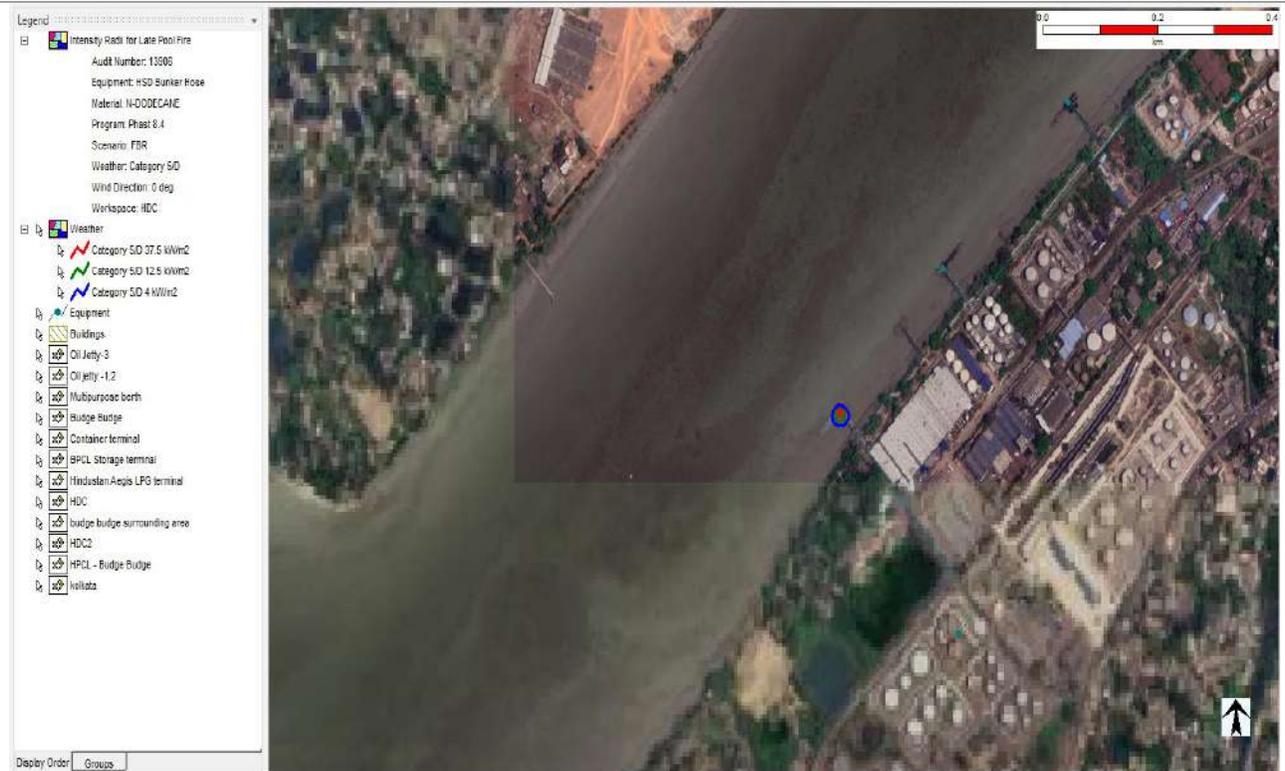
16. Pool fire from Full Bore Rupture of ATF unloading hose with wind speed 5 m/s and D stability class at Budge Budge Oil Jetty-1.



17. Flash Fire from Full Bore Rupture of ATF unloading hose with wind speed 5 m/s and D stability class at Budge Budge Oil Jetty-1.



18. Pool Fire from Full Bore Rupture of HSD bunker hose with wind speed 5 m/s and D stability class at Budge Budge Oil Jetty-1.



19. Pool Fire from Full Bore Rupture of MS transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.



20. Jet Fire from Full Bore Rupture of ATF transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.



21. Pool Fire from Full Bore Rupture of ATF transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.



22. Vapor cloud explosion from Full Bore Rupture of ATF transfer pipeline with wind speed 5 m/s and D stability class from jetty to terminal.



## APPENDIX D RESOURCES

### D.1 Floating Crafts

Port Owned			Hired by Port		
Description	Number	Capacity	Description	Number	Capacity
<b>Dredgers</b>	NIL		<b>Dredgers</b>	<b>3/4 out of 5</b>	
			D.C.I. Dr. XII		4500 m <sup>3</sup>
			D.C.I. Dr. XIV		4500 m <sup>3</sup>
			D.C.I. Dr. XIX		5550 m <sup>3</sup>
			D.C.I. Dr. XX		5550 m <sup>3</sup>
			D.C.I. Dr. XXI		5500 m <sup>3</sup>
			Grab Dredger River pearl -2	1	750 m <sup>3</sup>
			Trailer suction hopper dredger (river pearl -4)	1	1500 m <sup>3</sup>
<b>Tugs</b>	<b>8</b>		<b>Tugs</b>	<b>6</b>	
Golap	2	2*475 BHP	Gladiator -VI	2	2*470 BHP
Kamal	2	2*496 BHP	Gladiator	2	2*470 BHP
Kalikata	2	2*475 BHP	Gladiator -III	2	2*470 BHP
Gobindapur	2	2*475 BHP			
<b>Launches</b>	<b>8</b>		<b>Launch (for Shipping)</b>	<b>1</b>	
Pilot Launch (Gopal)	2	2*442 BHP			
Pilot Launch (Rupsa)	2	2*940 BHP			
Pilot Launch (Hugli)	2	2*940 BHP			
M.L. Sidho	2	2*195 BHP			
<b>Water Barges</b>	<b>0</b>		<b>Water Barge (SEALAND)</b>	<b>1</b>	<b>160 KW</b>
<b>Launch Survey</b>	<b>2</b>		<b>Pilot Launch</b>	<b>2</b>	
<b>M.L Kanho</b>	<b>2</b>	<b>2*195 BHP</b>	Aquator I	1	2*441 KW
			River Pearl I	1	2*447 KW
<b>Others</b>					

River Survey vessel – Sarojini	1	2*700 BHP			
Rabindra	2	2*1320 BHP			
Pilot vessel – Ma Ganga	2	2*600 BHP			

**D2. Fire-fighting resources****D3. Pollution Response equipment****D4. Pollution Response vessels****D5. IMO Level Trained Personnel**

Sr. no.	IMO Level - I	IMO Level - II
1.		
2.		
3.		
4.		
5.		
6.		

**D6. KDS maintains following schedule for the contingency mock drills**

Sr. no.	Drill	Frequency
1.		
2.		
3.		
4.		
5.		
6.		
7.		

**D7. Emergency Control Room equipment**

Equipment	Quantity (nos)	Remarks
BSNL satellite phone		
VHF sets		
Telephones		
Walkie-talkie sets & mobile		
Charts		
Emergency lights and torches		
Portable PA/loud hailer set		
With emergency generator-dry food & water for 72 hours		

**D8. Other equipment including rescue items: -**

Sr. no.	Nomenclature	Quantity
1.	Air Lifting Bag (72 Ton)	
2.	Battery operated Spreader and Cutter	
3.	Hydraulic Rams	
4.	B.A. Set	
5.	Fire Entry Suit	
6.	Aluminum Proximity Suit	
7.	Chain Saw	
8.	Hydraulic pump	
9.	Circular Saw	
10.	Bolt Cutter	
11.	Tripod	
12.	Dragon Search Light	
13.	Life Buoy	
14.	Life jacket	
15.	Inflatable Light Tower	

**D9. Required resources for the identified Emergencies**

The following table shows the risks identified in this plan and the key resources that may be required during emergencies arising from each risk.

*Disaster Management Plan*

Identified Risk	First Aid/ Medical equipment	Lifting equipment/ Fork lift	Cranes	High angle rescue equipment	Boats/ Vessels	Fire Fighting equipment	Communications	Oil Containment/ cleanup equipment	Others
Marine casualty (Collision/Grounding)	√				√		√		PPE,Ambulance
Fire or Explosion on a vessel at berth/wharf	√	√	√		√	√	√		Ambulance, vehicles, PPE, Equipment for cordoning, torch light
Fire or Explosion on a vessel in the water	√				√	√	√		Ambulance, vehicles, PPE, Equipment for cordoning, torch light
Oil Spill					√		√	√	PPE
Utility Fire/building fire	√					√	√		PPE, Generator, Lightings, torch light
Dangerous Goods spill (other than oil)	√				√	√	√	√	PPE, Dangerous good container/cleanup equipment, Equipment for cordoning, torch light
Gas dispersion	√					√	√		PPE, Equipment for cordoning, torch light
Crane Collapse/ Container fall	√	√	√	√	√		√		PPE, Equipment for cordoning, torch light
Terrorist incident	√	√	√	√	√	√	√		Ambulance, vehicles, Equipment for cordoning, torch light
Bomb Threat	√					√	√		
Cyclone /Severe Storm/Tsunami	√	√	√	√	√	√	√		
Flooding	√	√			√		√		
Earthquake	√	√				√	√	√	PPE, torch light, ambulance, vehicles

**D.10 Mutual Aid Agreement**

All Port operators/agencies/institutions, where possible, will supply resources to support emergency response operations when requested by CEC/CIC/SIC or whole of Port Emergency Operation Centre as per the Mutual Aid Agreement.

**D.11 Resource Inventory (IDRN)**

India Disaster Resource Network is an online inventory designed as a decision-making tool for the Government administration and crisis managers to coordinate effective emergency response operations in the shortest possible time.

The Ministry of Home Affairs, Government of India has developed a web-based database of resource named India Disaster Resource Network (IDRN). This database contains information about equipment (such as boats, bulldozers, etc.), manpower (divers, swimmers, etc.) and critical supplies (oxygen cylinder, firefighting foams, etc.) required during the response.

Resources which are available with the various departments in the Kolkata/ South-24 Parganas District are uploaded in IDRN.

Kolkata: <https://idrn.nidm.gov.in/Home/CountryWideQueryList>

South-24 Parganas: <https://idrn.nidm.gov.in/Home/CountryWideQueryList>

## APPENDIX E

### EMERGENCY CONTACT NUMBERS

Designation	Contact		Mobile
	Office	Residential	
Chairman	2230-5370/3451		90739-63001
Dy. Chairman	2230-9164/3451 3094-8675 2439-1883 (At Subhash Bhavan)	2456-5082	83348-80004
Secretary	2230-634/3451 7101-2370/2371		98362-98639
Director Marine	2230-3214 22331-3271 7101-2375/2016	2421-8411	98362-98620
Dy. Director I - Marine			
Dy. Director II - Marine			
Chief Engineer	2230-0413/3451 7101-2363	2448-2097	98362-77661
Chief Medical Officer	2401-4503 7100-3623/3634	2448-4016	98362-98634
Traffic Manager	2439-2926 7100-2020/3393	2448-8080	94340-64873
Financial Adviser & Chief Accounts Officer	2231-2022/ 2230-3451 7101-2014		81276-93333
Chief Hydraulic Engineer	24093031 7100 3513/71003515		96747-20049
Chief Mechanical & Electrical Engineer	2409-3037 7100-2017		96747-33364
LA & IRO/Sr. PO	22306234	24840735	98362-98665
Material Manager	2459-4126 7100-3304	2556-6128	96747-20053
Harbour Master (Port)	2439-1730/7100- 3425	2448-3750	98362-98636
Harbour Master (River)	2409-3035/7100- 3298	2448-3750	98362-98636
Dy. Harbour Master (Port)	2439-1730 71003430	2348-13781	96741-55636

*Disaster Management Plan*

Dy. Harbour Master (River)	2439-1853/7100-3340	2403-7120	96741-55637
Security Adviser	2439-2055/7100-3819		98362-98647
Sr. Commandant-CISF	2439-0566/7359 2439-0480/1360		98362-98616
SATM	2470-1871/71002811	2537-6722	89021-75968
Sr. Traffic Manager (Docks)	7100-3367		94340-65098
Sr. Dy. Traffic Manager -II	7100-3372 7100-3235	2449-6228	98362-98689
Sr. Asst. Secretary (Public Relations)	2220-6645/3451 7101-2214	26327725	96741-55648
Sr. Dy. Traffic Manager (Docks)	7100-3367		94340-65098
Dy. Traffic Manager (CT)	7100-3270		98362-98689
Port Fire Officer	2439-5881 7100-3475		9674155645
L.A. & I.R.O /Sr. PO	2220-6234/3451 71012355	2484-0735	98362-98665
Safety Officer	7101-2284	2669-2730	96747-93009
Dy. CMO II	2401-4094 7100-3821		90510-77464
Manager (Environment)	7101-2224	6526-8583	98362-98692
Hospital Enquiry	2401-4577 2401-8735		
Safety & APO	7101-2396		
Executive Engineer			90388-88036
Dy. CMO	7100-3657		98302-47076
Executive Engineer (Mechanical)			87597-86070
Executive Engineer (Mechanical)			94382-73774
Dy. Commandant CISF (Forward Control)			85477-49936
Asstt. Commandant CISF (Base			89897-66885 99788-56611

*Disaster Management Plan*

Control)			
Insp/Exe Crime & Intelligence			89027-16483
Control room of CISF Unit KoPT Kolkata	033- 24391360 033- 24390480		96744-66428
For Kolkata /Howrah & Districts (a)Asst. Supdt PSO (b) Security Officer	7100-3344		96747-20081
Control room (KoPT Security Wing)	033-2439 5841 7100-3347/ 3346		96741-55660
For Budge Budge- Dy Chief Security Officer	7100-3291		98362-98652

<b>Company Name</b>	<b>Designation</b>	<b>Mobile No</b>	<b>Email Id</b>
<b>BPCL</b>	Chief Installation Manager	9982754999	paikarasm@bharatpetroleum.in
<b>HPCL</b>	GM Installation	9840774918	kaushik@hpcl.in
<b>IOC</b>	DGM(I/C) Terminal	9831504668	bc@indianoil.in
<b>IOC (Lub Div)</b>	GM Plant	9830918018	beckrd@indianoil.in
<b>Rajiv Agarwal</b>	GM	9831022279	rajiv_agarwal1963@yahoo.co.in
<b>S K Oil Terminals (P) Ltd</b>	GM	9830021201	Tkmukherjee.skoilterminal2@gmail.com
<b>JRE Tank Terminals Pvt Ltd</b>	GM	9674947990	gururajan@imc.net.in
<b>Hindustan Storage &amp; Distribution Co. Ltd</b>	Operation Manager	7980859815	mihir@hindustanstorage.in
<b>Mundial Export</b>	Operation Manager	07002100690	Tm-mubb@imc.net.in

<b>Import Finance Pvt</b>			
<b>IFB Agro Industries</b>	Manager	9836479852	Swapanmitra1952@gmail.com
<b>Mother Dairy Fruit &amp; Vegetable</b>	SR. Executive	9830211286	Sujit.dey@motherdairy.com
<b>Gem Refineries (1997) Pvt Ltd</b>	Terminal Manager	8961002239	gemrefineries1997_p@yahoo.in

<b>Name</b>	<b>Official Address</b>	<b>Contact Number</b>
<b>Department of Home, Govt. of West Bengal</b>		
Secretary (Home)	Writers Buildings Kolkata – 700 001	033-22 535072
Principal Secretary,	Disaster Management and Civil Defence, Nabanna, 2 <sup>nd</sup> Floor, 325 Sarat Chatterjee Road, Mandirtala, Shibpur, Howrah-711102.	033-2214-3674
	Commissioner of Police Kolkata, Lalbazar Kolkata – 700 001.	033-2214-5060/ PBX No.033 2214-5000
<b>West Bengal Police</b>		
	Supdt. Of Police South 24 Parganas, Bhabani Bhavan, Alipore Kolkata – 700 027.	033- 479-3333/ PBX No. 033 2479-1311-15
	Add. DG & IG of Police (Admn.) West Bengal Writers Buildings Kolkata – 700 001.	033-2235-7411
<b>Port Police</b>		
	Watgunge Police Control Room	033 2459-3298/2408-2100/2459-8819
	Watgunge Women Police Control Room	033 2489-2100
	West Port Police Control Room	033 2439-3617/2409-6100/2439-2454
	Garden Reach Police Control Room	033 2469-6569/2408-1100/2489-3272
	Hare Street Police Control Room	033 2211-8760/2215-0100/2211-8761
	Metiabruz Police Control Room	033 2469-5317 / 2409-9179
	Cyber Police Station	033 2214-3000/2250-5120
	Lalbazar Police Control Room	033 2214-3024 / 2214-3230 / 2214-1310

**Disaster Management Plan**

	Traffic Police Control Room	033 2214-3644 / 2242-7248
	North Divn. Police Control Room	033 2360-6405 /2360-6417
	Port Divn. Police Control Room	033 2409-3109
<b>Kolkata Municipal Corporation</b>		
	5, S.N.Banerjee Road Kolkata – 700 013	033 2286 1212/1313/1414 Whatsapp no: 8335988888 033 2286 1000(28 lines)
SSKM Medical College & Hospital		033 2223 6026/6242/ 1615/9735/ 6180/ 9692/ 9822
Kolkata Medical College & Hospital		033 2212 3853
NRS Medical College & Hospital		033 2286 0140; 988303 1301; 90073 66597; 98320 25916
RG KAR Medical College & Hospital		033 2555-7656/7675/7676 033 2555-7656, Extn: 2516/1021/2515
Calcutta National Medical College & Hospital		033-2289-7122/23 (Extn:104)
<b>Coast Guard</b>		
HQ Coast Guard Region NE, Coast Guard	Newtown Rajarhat, Kolkata 700157	033-2324 8002 email: <a href="mailto:ops-ne@indiancoastguard.nic.in">ops-ne@indiancoastguard.nic.in</a>
Officer In Charge MRSC, Haldia, HQ	Coast Guard District No 8 (West Bengal) Anchorage Camp Haldia, West Bengal 721605	032-24 264541; email: <a href="mailto:dhq8@indiancoastguard.nic.in">dhq8@indiancoastguard.nic.in</a>
Officer In Charge MRCC, Chennai, HQ	Coast Guard, Region (East) Chennai 600009.	044-2536 3209 email: <a href="mailto:east@indiancoastguard.nic.in">east@indiancoastguard.nic.in</a>
<b>Navy Office</b>		
	Chief Staff Officer to NOIC Staff Officer (Operation) to NOIC Officer of the day, INS, Netaji	033-2242- 0430/ 0432/0503/0441

**Disaster Management Plan**

	Subhas, Hastings, Kolkata – 700 022	
<b>Inspectorate of Dock Safety</b>		
Dy. Director (Safety) Inspectorate	Dock Safety, Kolkata Nizam Palace, 1st floor, 2nd M.S.O.Bldg. 234/4 A.J.C. Bose Road, Kolkata-700020.	033-2574-5512; 8285412802; 033- 22830719(O)/ Fax: 033 2283-0718 <b>email:</b> <a href="mailto:idskolkata@dglasli.nic.in">idskolkata@dglasli.nic.in</a> , <a href="mailto:idskol@rediffmail.com">idskol@rediffmail.com</a>
<b>Shipping Corporation of India</b>		
	Regional General Manager Shipping House 13, Strand Road Kolkata – 700 001	033 2254 3415
<b>Directorate of Fire &amp; Emergency Services</b>		
	West Bengal Fire Services 13-D, Mirza Galib Street Kolkata – 700 016	033-2358-1130
Director	West Bengal Fire Services 13-D, Mirza Galib Street Kolkata – 700 016	033-2252 1165
<b>Petroleum &amp; Explosives Safety Organisation, East Circle</b>		
<b>Joint Chief Controller of Explosives</b>	8, Esplanade East, 1 <sup>st</sup> Floor, Kolkata – 700 069.	2213 0895; 033-2248 0427/ 2248 9524/ 2248 6600/ 2242 0686
<b>Disaster Management Department</b>		
	Nodal Officer of Disaster Management Dy. Director Public Health & communicable Disease	2214-5601 2214-3371 (Ext.226)
<b>West Bengal Pollution Control Board</b>		
	Paribesh Bhavan, Block – LA, Bldg.No.10A, Sector-III, Salt Lake, Kolkata – 700 091	033-2335-6731/9088/0261
<b>District Relief Department Office of the District Magistrate</b>		
District Magistrate South 24 Parganas		
SDO	South 24Pgs Alipore 2479-1681 South 24Pgs, Diamond Harbour.	0317 4255222
Bhaba	BARC, Kolkata	033-337 1230

**Disaster Management Plan**

Atomic Research Centre	BARC, Mumbai	022- 25505050/ 25592000
Government of India Department of Atomic Energy Variable Energy Cyclotron Centre	Sector-I, Block-AF, Bidhan Nagar, Kolkata - 700 064	033-2337- 1230 / 1231 / 1232 / 1233 / 1238 / 4831 / 4832 /4838, 033-2359-4008/2321-4435/ 033-2321-4435
Mercantile Marine Department	Principal Officer Marine House, Hastings, Kolkata – 700 022	033-22230238

**OTHER EXPERTS AND AGENCIES**

Name of body	Telephone / fax
Indian Register of Shipping, Mumbai	022-30519400 / 25703611 <a href="mailto:ho@irclass.org">ho@irclass.org</a>
IIT – Mumbai	022-2572 2545 / 2572 3480
Meteorological Centre, Kolkata	033-2479 3167/24790596 <a href="mailto:kolkatarmc@gmail.com">kolkatarmc@gmail.com</a>
The National Environmental Engineering & Research Institute (NEERI), Nagpur	0712-2249999 / 660 / 2244900
Ministry of Petroleum & Natural Gas	011-23382426 / 23383100
National Institute of Ocean Technology (NIOT), Chennai	044-66783300 / 22460275 / 22460645
National Ship Design and Research Centre, Visakhapatnam	0891-2578360 / 2577754 <a href="mailto:nsdrc@itpvis.ap.nic.in">nsdrc@itpvis.ap.nic.in</a>

**NDRF – 2<sup>nd</sup> BATTALION**

Name & Designation	Address	Contact & email id	Fax no.	Mobile	Control room no
Sh. Nishit Upadhyay (Commandant)	2nd BN NDRF, Near RRI Camp. Haringhata, Mohanpur, Nadia, (West Bengal) Pin - 741246	033-25875032 <a href="mailto:wb02-ndrf@nic.in">wb02-ndrf@nic.in</a>	033-25875032	09474061104, 09474116775	033-25875032

**FIRST AID CENTRES**

**Disaster Management Plan**

<b>Sr. no.</b>	<b>Name of institution</b>	<b>Area</b>	<b>Telephone</b>
1.			
2.			
3.			

<b>SALVAGE COMPANY</b>	<b>TELEPHONE</b>

<b>TRANSPORTATION-VEHICLE POOL</b>			
<b>Sr. no.</b>	<b>Name of travels</b>	<b>Telephone</b>	<b>Mobile</b>
1.			
2.			
3.			
4.			

## **PART II**

## ENSURING BUSINESS CONTINUITY

### 1. OBJECTIVES

- Port resuming business operations as quickly and efficiently as possible.
- Preservation of cargo transport and supply chains.
- Developing partnerships between the public and private sector to improve the resiliency.
- Assessing and determining resources required and available to mitigate economic impacts of an incident on the port and its businesses.
- Determining how to create redundant and resilient power, water, sanitation, and data storage systems.

### 2. BUSINESS IMPACT ASSESSMENT

In the case of Level 2 and Level 3 disasters where serious disruptions in port business is possible due to collapse and damage to infrastructure and services in addition to human casualties, the process of recovery is conducted by undertaking a Business Impact Assessment (BIA). The following table lists the responsibilities of various authorities in case of major disasters.

SCENARIOS	LEVEL 2 & 3 – ACTION BY
Vessel- Collision/Grounding-Evacuation	IRT + CMG + Salvage efforts + Navy + Coast Guard
Casualties	Port + District + State
Fire & Explosion on Vessel or Terminal	IRT + CMG + Terminal + District (Fire wing) + CMG
Fire & Explosion at Shed	IRT + CMG + Port Fire team + District (Fire wing)
Fire in Office buildings, Hospital, Electrical substations, Pump houses and control rooms at Lock gate and bridges, Dry docks, Warehouses, Coal stack yard	IRT + CMG + Port Fire team + District (Fire wing)
Oil or Chemical Spill	IRT +CMG + Master of vessel outside agencies + Coast Guard
Toxic Gas Leakage	IRT + CMG + Master of vessel + District/state assistance + outside agencies
Cyclone, Tsunami, Flood, Earthquake	IRT + CMG + Master of vessel + Terminal +National Disaster Management Group + CMG + District + State
Human related – Bomb threat, War and terrorism	CISF (Security) + CMG+ Terminal + National Disaster Management Group + District + State
Electric Supply breakdown	Port M& E + CMG + District + State

**Table II-1:** Responsibilities of action for the Level 2 and 3 type disasters

### 3. TOLERABLE RECOVERY TIME

The Port EOC will provide the initial response to a major disaster and stakeholders will have assigned unique function on their respective parts for recovery and restoration efforts. Each stakeholder is expected to maintain their respective business recovery plan for use and activation.

It has to be kept in mind that the business impact of the identified disasters will be in accordance the vulnerability profile of the port. Thus, a concept of “tolerable recovery time” for resuming business operations after an emergency is an important part of business continuity plan. The maximum tolerable recovery duration for some of the emergencies will be as follows:

1. 2 days for transport accident scenarios (rail and road);
2. 2 days hours for utility functional failures;
3. 4 days for collision, grounding and fire related disasters;
4. 2-4 days for disasters in service and administration facilities;
5. 21 days for Natural disasters;
6. 30 days for disasters during cargo storage or transfer.

The following table list the tolerable recovery times for the port for various identified scenarios as per HRVCA (Refer Table 2.5).

EVENT/SCENARIO SPECTRUM	TIME TO RESTORE FACILITIES
<b>DISASTER DURING CARGO STORAGE/TRANSFER</b>	
Fire due to rupture/leakage of POL/Chemical from pipeline/hose at NSD oil jetty– on ship or ashore	2-30 days
Fire due to rupture/leakage of POL/Chemical from pipeline/hose at budge-budge wharf– on ship or ashore	2-30 days
Toxic gas (e.g. toluene) leak at budge-budge wharf during operation – on Ship or Ashore	2-7 days
Corrosive Acid - Leakage (e.g. Sulphuric acid) at budge-budge wharf during operation – on Ship or Ashore	2-4 days
Fire /leakage due to Crane Accidents (Container drop/crane fall) at container berth – secondary event.	2-7 days
Fire on vessel (non-tankers) at berth at KPD/NSD	2-4 days
Fire in Coal Stackyard at KPD/NSD	2 days
<b>NAVIGATIONAL DISASTERS</b>	
Collision of Small Craft with Tanker / Container/BC/Barge (Area B)	4-96 hours
Collision between two vessels (Area A, B)	4-96 hours
Vessel - Contact with Jetty/berth (Area C and Budge-Budge Wharf)	4-96 hours
Grounding- Tanker/Container/BC (Area A, B)	4-96 hours
Dragging anchor (River and sea anchorage) (Area A, B)	4-96 hours
Contact with channel and river marking buoys/light vessels (Area A, B)	4-96 hours
Contact/Allision with Lock gate (KPD & NSD) (Area C)	12-96 hours
Fire on vessel in the river and approach Channel (Area A and B)	12-96 hours
Fire on vessel at the Berth/Jetty	12-96 hours

<b>DISASTER IN SERVICE AND ADMINISTRATION FACILITIES</b>	
Fire in Office buildings, Hospital	12 hours – 96 hours
Fire in Dry docks	12 hours – 48 hours
Fire in warehouse	12 hours – 48 hours
<b>NATURAL DISASTER</b>	
Cyclone/ Floods/ Tsunami/ Earthquake	7-21 days
<b>TRANSPORT ACCIDENT</b>	
Rail	1-48 hours
Road Accident	<1 hour
<b>UTILITY FUNCTION FAILURE</b>	
Electrical sub station	12-48 hours
Pump house	12-48 hours
Control room at lock gate and bridges	12-48 hours
Communications	12-48 hours

\*Refer Hazard Assessment Worksheet (Table 2.5).

**Table II-2:** Time to Restore for identified scenarios

**4. PLANNING CONSIDERATIONS FOR BUSINESS CONTINUITY**

In actual practice, deviations may occur due to reasons beyond control and same can be recorded so as to gain from experiences and work towards a “Build Back Better” approach. The recovery planning outlined for short, medium- and long-term measures will therefore need to be objective enough to meet these timelines. The lessons learned from earthquake damage to Kandla Port during Bhuj earthquake 2001 reveals damage to jetties, piles and RCC structures such as warehouse, the signal control tower and office building. In such an eventuality occurring at HDC steps to restore the functioning of the affected cargo berths and control stations will need extensive repair and rehabilitation measures.

*In case of major incident or following a natural disaster resulting in stoppage of port operations, a BIA will be undertaken. Priority areas will be identified for short term recovery amounting to approx. 30 % capacity of cargo handling, medium term recovery amounting to approx. 70 % capacity of cargo handling and long-term recovery for 100 % capacity cargo handling.*

Port will consider short-, medium-, and long-term priorities to better organize and improve recovery

- Local priorities would be taken into account when determining where to focus recovery efforts.
- Assess the port functions, both internally and externally, to determine which manpower, materials, procedures and equipment are absolutely necessary to keep the port operating.
- Create a contact list for existing critical business contractors and others that the port can use in an emergency.

## 4.1 SHORT-TERM RECOVERY PLANNING

### 4.1.1 Damage Assessment and Prioritization of Restoration Work

Tasks during initial damage assessment will include the following.

- Assessment of Engineering Assets
- Assessment of Current Condition of Facilities
- Assessment of Utility Infrastructure

### 4.1.2 Actions that assist in damage assessment will include the following.

- Documentation of Replacement Costs
- As-Built Building Plans, Specifications and Other Facility Records
- Determining, positioning, and planning for assistance to obtain Critical Recovery Resources

*Note: In relation to Oil Spill following an incident the OSCP will be brought into effect and immediate containment and recovery of oil will be undertaken.*

### 4.1.3 Scope of inspection may include the following:

- Assessment of facilities by civil engineers to ensure compliance with local building and architectural codes and to ensure that damaged or repaired buildings are safe for occupancy.
- An underwater inspection by divers to check for possible demolition damage or deterioration of footings.
- An inspection of the piling at low water from a boat to check for damage. The stringers and deck are examined from below to determine the need for repair.
- Lock gate, berths/jetties, or seawalls are inspected for damage.

## 4.2 MEDIUM-TERM RECOVERY PLANNING

In medium-term recovery planning, the port will engage in contracting and setting up for reconstruction and resumption of operations at the affected site. This may include financial planning, contracting and the formation of mutual aid agreements to assist in business continuity.

### 4.2.1 Mutual Assistance

The port may include the recovery operations plans, provisions for the pooling of recovery and business resources (heavy lift equipment, for example), and pre-positioning where needed.

Port may require to develop an alternate operational logistics support plan for cargo diversion in an incident at the port. It may also explore the agreements with Railways regarding goods movement in the event of an incident.

In case of damage to road infrastructure, port may also consider examining alternative transportation routes to and from the port and also within the port itself.

### 4.2.2 Medium-term reconstruction projects include:

- Expedient repair of existing structures.
- Repair of unloading facilities e.g. quay cranes, pipelines etc.

### 4.2.3 Marketing and Communications

Post-incident, port may consider publishing press releases and advertisements to demonstrate to the public that the port is open for business and still functional.

**4.3 LONG-TERM RECOVERY PLANNING**

This may include assessment and short- and medium-term measures as discussed earlier to provide temporary relief and alternate sites for cargo handling. For full recovery steps including as listed below will be required.

- Determining the financial impact of the emergency on the port and the budget needed for recovery, including insurance reimbursement and non-reimbursement issues, and central govt. assistance;
- Building relationships with emergency management and first responders based on unmet coordination needs;
- Initiating public relations activities to rebuild confidence in the transition period on the part of customer and the community in its entirety;
- Administering a comprehensive cargo movement recovery policy;
- Provide support for Construction & Maintenance, repair, alteration and reconstruction of port facilities and infrastructure;
- Laying out of plans and specifications and other contract documents necessary for the construction of new facilities and for any modifications to existing port facilities by engineering department;
- Repair of extensive damage to port buildings and properties and its maintenance;
- Assessment of environmental impacts of reconstruction projects and determining mitigation measures as appropriate by Environment department.