

URBAN FLOODING

STANDARD OPERATING PROCEDURE



सत्यमेव जयते

Ministry of Urban Development
Government of India

Table of Contents

1	INTRODUCTION	3
2	UNDERSTANDING OF STANDARD OPERATING PROCEDURES (SOP)	4
3	OBJECTIVES OF THE STANDARD OPERATING PROCEDURES	5
4	MITIGATION STRATEGY FOR URBAN FLOODING	6
	4.1 Alerts and warnings	8
	4.2 Nodal Agencies for Early Warning	9
	4.3 Variation in SOPs	10
5	CITY LEVEL ACTIONS	12
	5.1 Establishment of Emergency Operations Centers (EOC):	12
	5.2 Functions of EOC:	12
	5.3 Composition of EOC:	12
6	SCOPE AND LIMITATIONS OF THE SOP	15
	6.1 Scope of coverage	15
	6.2 Limitations to operations and procedures only	15
7	PUBLIC AGENCIES AND THEIR RESPONSIBILITIES	16
	7.1 Tasks of Municipal Corporation/ULB:	18
	7.2 Tasks of Crisis Control Room (CCR)	19
	7.3 Ward level action plan	19
8	SOP OF VARIOUS DEPARTMENTS	20
	8.1 Urban Local Body	20
	8.2 Urban Development Authority	21
	8.3 Health Department	21
	8.4 Irrigation Department/ Storm Water Drainage	22
	8.5 Public Work Department /Water Board	23
	8.6 Public Work Department (Road and Bridges)	23
	8.7 Public work department (Building)	24
	8.8 Power Supply Department	24
	8.9 Telecommunication	25
	8.10 Education Department	25
	8.11 Law and Order Department	26
	8.12 Traffic Police	26
	8.13 Fire Department	27
	8.14 Indian Meteorological Department	27
9	KEY OFFICIALS AND NODAL OFFICERS	28
10	REPORTING FORMATS	29
11	REFERENCES	30
	Annexure – I: General Action Plan at Ward Level	31

Abbreviation

AWS	Automatic Weather Stations
CBO	Community Based Organizations
CDP	City Development Plan
CCR	Crisis Control Room
CMO	Chief Medical Officer
CSO	Central Statistical Office
DCR	Development Control Regulations
DM	Disaster Management
DDMA	District Disaster Management Authority
DEOC	District Emergency Operations Centres
ECU	Emergency Control Unit
ESFs	Emergency Support Functions
FEOCS	Flood Control Emergency Operations Centres
FIR	First Information Report
GIS	Geographical Information System
IRS	Incident Response System
IDRN	India Disaster Resource Network
RWA	Resident Welfare Association
MHA	Ministry Of Home Affairs
MARG	Mutual Aid and Resource Groups
NDMA	National Disaster Management Authority
NEOC	National Emergency Operations Centres
NGO	Non-Governmental Organization
PMO	Prime Minister Office
PWD	Public Work Department
S&T	Search and Rescue Teams
SDMA	State Disaster Management Authority
SEOC	State Emergency Operations Centres
QRT	Quick Response Teams

1

Introduction

Increasing trend of urban flooding is a universal phenomenon and poses a great challenge to city administration and urban planners the world over. Problems associated with urban floods range from relatively localized incidents to major incidents, resulting in cities being inundated from a few hours to several days. Therefore, the impact can also be widespread, including temporary relocation of people, damage to civic amenities, deterioration of water quality and risk of epidemics. The problems posed by urban flooding are quite challenging and aggravate with continuous climate change, with its adverse impact affecting variation in rainfall and intra-city /intra-region disparities in the distribution of rainfall.

Urban Flooding: Floods can be defined as ‘the submergence of usually dry area by a large amount of water that comes from sudden excessive rainfall, an overflowing river or lake, melting snow or an exceptionally high tide’. Floods has multiple effects on human society, these can be primary effects like casualties and property loss, secondary effects like contamination of water, loss of entire harvest and spread of water borne diseases or tertiary effects like economic hardship, loss of tourism, food shortage, rebuilding costs, price increase etc.

There has been an increasing trend of urban flood disasters in India over the past several years whereby major cities in India have been severely affected. The most notable amongst them are Hyderabad in 2000, Ahmedabad in 2001, Delhi in 2002 and 2003, Chennai in 2004, Mumbai in 2005, Surat in 2006, Kolkata in 2007, Jamshedpur in 2008, Delhi in 2009 and Guwahati and Delhi in 2010. The most recent devastating ones were Srinagar in 2014 and Chennai in 2015.

Unplanned development and encroachments of sprawling habitations alongside rivers and watercourses have meddled with the natural streams and watercourses. As a result of this, the runoff has increased in proportion to urbanization of the watersheds causing urban floods. New and intensified phase of urbanization during 2001-2011 coupled with spatial expansion of urban extents have compounded flood risk in the urban centers. Area under urban settlements (7933 towns) in India has increased from 77370.50 sq. km in 2001 to 102220.16 sq. km in 2011 showing 24850.00 sq.km of additional land area being brought under urban uses.

In order to check the threat of urban flooding, each city should have their Flood mitigation plans (floodplain, river basin, surface water, etc.) strongly embedded within the overall land use policy and master planning of a city. A prompt, well-coordinated and effective response mounted in the aftermath of urban floods not only minimizes casualties and loss of property but also facilitates early recovery.

2

Understanding of Standard Operating Procedures (sop)

Standard Operating Procedure (SOP) is a predefined set of directives. It is widely used concept by different organization to guarantee the expected outcome without any error. In general terms SOPs can be defined as “A set of directives, covering those features of operations that lend themselves to a definite or standardized procedure”. Such procedures are applicable unless prescribed otherwise in a particular case. Thus, the flexibility necessary in special situations is retained without the loss of its effectiveness.” Standard Operating Policies and Procedures can be effective catalysts to drive performance improvement and improving organizational results. Every good quality system is based on its standard operating procedures (SOPs). In terms of disaster management, a Standard Operating Procedure (SOP) is a set of written instructions that is to be followed by an organization to mitigate and manage any disastrous event.

Realizing the aftermath of urban flooding and the actions to be taken to mitigate the disaster, there is a need for clear cut Standard Operating Procedures for mitigating Urban Flooding. This SOP lays down, in a comprehensive manner, the specific actions required to be undertaken by various departments and agencies in a city/town and also organizations under the district administration as well as State Government for responding to urban flooding/disaster of any magnitude.

ADOPTION OF SOPS:

- To be executed without deviation / modification to guarantee the expected outcome.
- Modifications or deviation, if any, from a given SOP to be thoroughly investigated with results and documentation before application
- All quality impacting processes and procedures should be laid out in SOPs.
- SOPs should be the adopted in routine training program of employees.
- SOPs should be regularly updated with a minimum review schedule of 3 years.
- SOPs should be in place for all Quality Systems including specific operations.
- Individual SOPs and SOP Systems must be properly integrated.
- Too many SOPs could lead to a collapse of the SOP System.

These Standard Operating Procedures may not be found adequate to deal with all kind of exigencies since Nature has a way of surprising human being. Yet efforts have been made to prepare a basic plan for engagement and coordination in the times of Crisis management post disaster. This SOP is to be adopted after customization for each urban area.

3

Objectives of the Standard Operating Procedures

- To minimize the loss of life and damages to property and to ensure restoration and rehabilitation.
- To illustrate a concise chart, listing major executive actions required in response to urban flooding
- To list necessary tasks for preparedness, response relief and restoration required to be undertaken by the line agencies and departments involved.
- To ensure effective integration of tasks/events of each department at every stage of the disaster management process and enable continuous coordination of all actions.
- To enable reporting of actions taken by each agency / department for further review and updating of the existing SOP from past learnings.

This Model SOP is an indicative SOP Document issued for the guidance of States and UT Administrations for preparation of their city specific SOPs. The instructions contained in this Model SOP should not be regarded as exhaustive of all the actions that might be considered necessary.

4

Mitigation Strategy for Urban Flooding

Standard Operating Procedure (SOP) is a predefined set of directives. It is widely used concept by different organization to guarantee the expected outcome without any error. In general terms SOPs can be defined as “A set of directives, covering those features of operations that lend themselves to a definite or standardized procedure”. Such procedures are applicable unless prescribed otherwise in a particular case. Thus, the flexibility necessary in special situations is retained without the loss of its effectiveness.” Standard Operating Policies and Procedures can be effective catalysts to drive performance improvement and improving organizational results. Every good quality system is based on its standard operating procedures (SOPs). In terms of disaster management, a Standard Operating Procedure (SOP) is a set of written instructions that is to be followed by an organization to mitigate and manage any disastrous event.

Realizing the aftermath of urban flooding and the actions to be taken to mitigate the disaster, there is a need for clear cut Standard Operating Procedures for mitigating Urban Flooding. This SOP lays down, in a comprehensive manner, the specific actions required to be undertaken by various departments and agencies in a city/town and also organizations under the district administration as well as State Government for responding to urban flooding/disaster of any magnitude.

ADOPTION OF SOPS:

- To be executed without deviation / modification to guarantee the expected outcome.
- Modifications or deviation, if any, from a given SOP to be thoroughly investigated with results and documentation before application
- All quality impacting processes and procedures should be laid out in SOPs.
- SOPs should be the adopted in routine training program of employees.
- SOPs should be regularly updated with a minimum review schedule of 3 years.
- SOPs should be in place for all Quality Systems including specific operations.
- Individual SOPs and SOP Systems must be properly integrated.
- Too many SOPs could lead to a collapse of the SOP System.

These Standard Operating Procedures may not be found adequate to deal with all kind of exigencies since Nature has a way of surprising human being. Yet efforts have been made to prepare a basic plan for engagement and coordination in the times of Crisis management post disaster. This SOP is to be adopted after customization for each urban area.

The management of urban flooding is an emerging subject, and as such it has to be treated holistically in a multi-disciplinary manner. There are many issues that need to be considered in order to develop sound, reliable and most representative urban flood/disaster management strategies. The Standard Operating Procedures (SOP) covers the following three phases of disaster management for effective and efficient response to urban flooding:

Pre-Monsoon Phase:

Preparedness: Planning for Disaster Reduction

During Monsoon Phase:

Early Warning
Effective Response and Management
Relief planning and execution

Post-Monsoon Phase:

Restoration and Re-habilitation

As a part of its mandate, the National Disaster Management Authority (NDMA) has prepared National Disaster Management Guidelines: Management of Urban Flooding in September, 2010. The said guidelines suggest establishment of Urban Flooding Cells at State Nodal Departments and ULBs.

Preparedness: Planning for Disaster Reduction focuses on plans to respond to a threat or occurrence of urban flooding. It takes into account an estimation of emergency needs and identifies the resources to meet these needs. It also involves the preparation of well-designed plans to structure the entire post-flooding response, and familiarizing the stakeholders, particularly the communities through training and simulation exercises. This phase will include taking all necessary measures for planning, capacity building and other preparedness so as to be in a state of readiness to respond, in the event of urban flooding. This Stage will also include development of identification of Teams for maintaining the drains and roads, mobilization of resources and taking measures in terms of equipping, providing training, conducting exercises for prevention of water logging/ inundation etc.

Early Warning: This phase will include all necessary measures to provide timely, qualitative and quantitative warnings to the urban flooding based on the intensity of rainfall to enable various agencies to take preventative measures for preventing loss of life and reducing loss/damage to the urban infrastructure. On the occurrence of urban flooding and threat thereof, all the concerned Departments/Agencies need to be act for initiating immediate necessary follow up action.

Response: The Response Phase is the actual implementation of the disaster plan. Disaster response is the organization of activities used to respond to the event and its aftermath. The Response Phase focuses primarily on emergency relief: saving lives, providing first aid, minimizing and restoring

damaged systems (communications and transportation), meeting the basic life requirements of those impacted by disaster (food, water, and shelter), and providing mental health and spiritual support and comfort care. This phase will include all necessary measures to provide immediate relief to the affected people by identifying the affected search areas vulnerable to inundation.

Relief: This phase will include all necessary measures to provide immediate relief and relief/ assistance to the affected people in terms of their essential needs of food, drinking water, health and hygiene, temporary shelter, traffic control, wherever the areas are under heavy inundation etc.

Restoration: This phase will include all necessary measures to stabilize the vulnerable situation and restore the utilities. This phase is to establish a programme to restore both the disaster site and the damaged materials to a stable and usable condition.

This SOP does not cover long-term measures needed either for mitigation or for rehabilitation/ recovery of the affected people and reconstruction of the area. The detailed actions to be undertaken under of each phase of managing urban flooding are given in the relevant sections of this SOP.

4.1. ALERTS AND WARNINGS

For the purpose of dissemination of alerts, a uniform system has been devised by MHA categorizing alerts in stages – Yellow, Orange and Red. While generating and transmitting alerts to Stakeholders and line departments, the concerned agency has to indicate the category of alert as well as its corresponding stage (Red/Orange/Yellow). The communication stages are:

Yellow: to be communicated to EOC through EMS.

Orange: to be communicated to EOC and SDMA@ 12 hourly updates.

Red: to be communicated to EOC, DEOC/SDMA, NEOC@ 3 hourly updates or more frequent.

Yellow Stage

- Alerts will be transmitted to Branch Officer DM.
- Alert messages will also be sent to the concerned Departments/ Organizations/ Agencies rendering ESF for their information and necessary action where required.
- To all designated Nodal Officer of DM in different ESF Departments.
- Alerts would also be communicated to the vulnerable communities through the available means.

Orange Stage

- All Departments/Agencies will be required to transmit 12 hourly updates.
- All Departments/Agencies generating alerts will be required to transmit information to IC, SEOC and DEOCs within 30 minutes of the receipt of information regarding with up gradations.
- Alerts will be transmitted by IC, SEOC to all designated Nodal Officer (DM) in ESF departments to be ready with all necessary and standby arrangements.
- IC, SEOC will transmit alerts to the concerned Districts authorities.
- Alerts would also be communicated to the vulnerable communities through the available means.

Red Stage

- All concerned departments/organizations/agencies will be required to transmit alerts to IC, SEOC and DEOC immediately on receipt of information and not later than 30 minutes of the event.
- IC, SEOC will constantly monitor the position and transmit 3 hourly updates to all designated Nodal Officer (DM) in all ESF Departments to be ready with all necessary standby arrangements.
- IC, SEOC will transmit alerts to the concerned Districts authorities. The district EOC would intimate and alert all concerned.
- Alerts would also be communicated to the vulnerable communities through the available means.

Central Water Commission (CWC) has developed a network of flood forecasting stations to issue Daily Flood Bulletins to all designated authorities/agencies of the Central Government and State Governments/District Administration for all major river basins as the following:

Category	Description	Stage
IV	Low Flood (Water level between Warning Level and Danger Level)	Yellow
III	Moderate Flood (Water Level below 0.50 m less than HFL and above Danger Level)	Yellow
II	High Flood (Water Level less than Highest Flood Level but still within 0.50 m of the HFL)	Orange
I	Unprecedented Flood (Water Level equal and above Highest Flood level)	Red

However, typically flood warnings in local area may be categorized as per the following:

Category	Description	Stage
IV	Sudden flash flood due to sporadic heavy downpour	Yellow
III	Water logging in all arterial and sub-arterial roads and intersections	Yellow
II	Breach of river embankments /flooding of river flood plains	Red
I	Inundation/water logging in the buildings-residential and other buildings	Red

Source: Modified based on the categorization of Warning given in Himachal Pradesh “Standard Operating Procedures for Responding to Disasters, 2012”

4.2. NODAL AGENCIES FOR EARLY WARNING

Following are the Nodal agencies in the Government of India mandated for early warning:

Urban Flooding	Agencies
Rainfall	Indian Meteorological Department
River Floods	Central Water Commission/State Irrigation Department
Drainage	Municipal Corporation/PWD
Geomorphologic features	Geological Survey of India
Mapping	National Remote Sensing Centre
Water Logging	PWD Department/Jal Board/Municipal Corporations

These agencies shall be responsible for keeping track of developments in respect of urban flooding assigned to them and inform the designated authorities/ agencies at National, State and District levels about the forecasting/advance warning on urban flooding. Some of these agencies have developed guidelines for early warning. Other agencies would also develop guidelines for early warning/communication of impending disasters/disasters and share with the city agencies.

4.3. VARIATION IN SOPS

The geographic location and physiographic conditions of cities are to be taken care of while devising the city specific SOP. Some such major considerations are as given below:

Coastal cities

Floods in coastal cities are compounded by high tides depending on the time of the event.

- Short term: Clearing of natural and engineered drainage system from silt and municipal solid waste.
- Medium/Long term: Plans to include emphasis on rain water harvesting at household & neighborhood level.

Inland cities

Immediate water discharge and prevention of water logging is a challenge in inland cities.

- Short term: Clearing of natural and engineered drainage system from silt and municipal solid waste.
- Medium term: Catchment areas with natural gradient towards a nearby lake / river to be restricted from development.
- Long term: Afforestation for reduction of rainwater runoff. Rejuvenation and conservation of ponds, tanks and lakes with interconnections

Hill towns

Challenged with very high runoff, short flow duration and high scouring on account of slope, floods may also trigger mud flow and land slide.

- Short term: Clearing of natural drains from municipal solid waste and other dumping.
- Medium term: Flood plains to be kept construction free by notifying "Conservation zones" along the river channels, suitably demarcated and with strict compliance/enforcement. Natural drain channels to be kept obstruction free at all times. Digital Flood modeling to be attempted for different scenarios of precipitation.
- Long term: Afforestation is highly desirable along the hill slopes to reduce impact of flood and prevent landslides.

Cities along rivers

Challenged with shifting water course in the middle and lower Gangetic plains or unexpected high water discharge in-course.

- Short term: To undertake dredging and de-silting to keep the bed clear for volume flow.

- Medium term: Building byelaws may incorporate provisions for construction on higher plinth or stilts as traditionally practiced. Vulnerable areas be demarcated and be kept construction free
- Long term: Natural and manmade water bodies should be well conserved, rejuvenated and interconnections be established for efficient flood control.

Cities near dams and reservoirs

Requires selective actions from the measures mentioned above along with coordination with the reservoir management agencies.

5

City Level Actions

5.1. ESTABLISHMENT OF EMERGENCY OPERATIONS CENTERS (EOC):

Each city /ULB to establish Emergency Operations Centre (EOC) which will be under Control of District Commissioner/ District Magistrate / Municipal Commissioner. The EOCs/Control Rooms (EOC/CR) at the city will be the brain & nerve for coordination and management of all emergencies. EOC may be located either in Municipal corporation office or at a suitable safe location. The EOC will be the lead agency of the city for Disaster preparedness/Rescue/Relief / Restoration and Rehabilitation functions.

5.2. FUNCTIONS OF EOC:

The Key functions of EOC in managing urban flooding would be

- Coordination with line agencies
- Policy Making and plan preparation including action plans as per SOP
- Direction and Monitoring of Operations Management.
- Information gathering and record keeping
- Preparation of web enabled resource inventory under India Disaster Resource Network (IDRN).
- Public Information and Citizen updation
- Resource Management
- Reporting

5.3. COMPOSITION OF EOC:

Chairperson, EOC will be District Commissioner/ District Magistrate/ Municipal Commissioner. The members of EOC will be representative officers from all line agencies likely to be involved in managing urban floods such as:

- a) Municipal Corporation
- b) Municipal Health and Sanitation Department
- c) Urban Development Authority
- d) Fire Brigade
- e) Public Transport
- f) Police Commissionerate
- g) Traffic Police
- h) Home Guards and Civil Defense
- i) District Collectorate (City & Suburban)

- j) India Meteorological Department (Regional Office).
- k) Public Works Department
- l) Power Supply Department
- m) Railways
- n) Telecommunication
- o) Food and Civil supplies
- p) Irrigation and Flood control
- q) Others

The EOC shall also undertake the co-ordination between the establishments of Emergency Support Functions (ESFs). The major ESFs shall include:

- i. Communication,
- ii. Public Safety and Law & Order,
- iii. Fire Fighting, Search and Rescue,
- iv. Transport,
- v. Public Health and Sanitation,
- vi. Resource Management,
- vii. Information Management,
- viii. Mass Care – Housing and Human Services,
- ix. Relief essential supplies- Food and beverages,
- x. Energy management (power, gas and fuel),
- xi. Utility Services,
- xii. Public Works & Infrastructure,
- xiii. Oil & Hazardous material.

ESFs are mandatory to be established by EOC. The EOC shall identify the Lead / Primary Agency which will be responsible for managing and coordinating the efforts/actions of other agencies under the mentioned ESF. These ESFs should coordinate its activities from the allocated EOC and according to Incident Response System (IRS) in a standardized manner. The IRS shall emphasize on use of state-of-art technologies and contemporary systems with connectivity to the EOC and zone/ward level units.

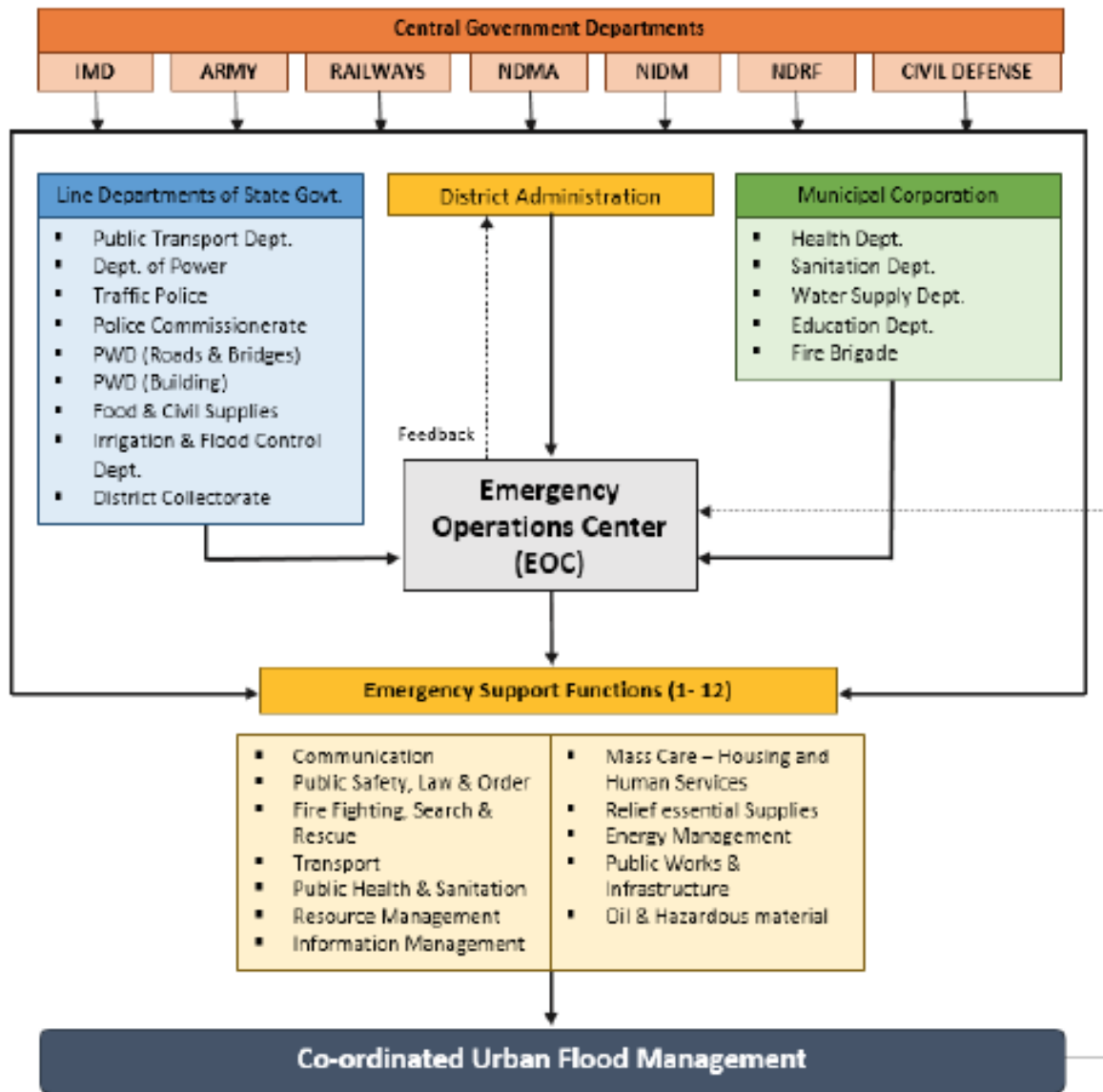


Fig. Co-ordination between agencies for Urban Flood Management

6

Scope and Limitations of the SOP

6.1. SCOPE OF COVERAGE

The problem of urban flooding calls for long-term and annual disaster mitigation measures and the co-ordination of procedures and actions adopted by the related agencies in each ESF.

The SOP identifies relevant public agencies concerned with dealing with situations arising from urban flooding, enumerates their broad responsibilities in the different phases defined, and lays down the sequence of actions to be taken by these agencies in coordination with other involved agencies and as per the ESFs.

The system for responding to flooding rests on a tripod of three partnerships- partnership among public agencies (public-public partnership), partnership between public agencies and non-Government and other organizations (public-private partnership) and partnership between public agencies and information disseminators (public-media partnership). This SOP also lays down the mechanics of these partnerships.

6.2. LIMITATIONS TO OPERATIONS AND PROCEDURES ONLY

Detailed engineering aspects such “estimates, procurement and installation of infrastructure and services” requiring Detailed Project Reports like broadening and deepening of rivers and nallas, upgrading and cleaning of storm water drains, construction of anti-landslide retainer walls, relocation of vulnerable settlements, repair/reconstruction of dilapidated buildings, improvement of solid-waste management and transport infrastructure and services, installation of Doppler Weather Radar System, setting up of Automatic Weather Stations, etc. Such measures are beyond the scope of this SOP.

7

Public Agencies and their Responsibilities

In managing of urban flooding involvement and coordination of various key public agencies/ departments /NGO/ RWA /Religious Institutions/Private organizations is very important. Each agency has its defined role may be at preparedness stage, Early warning stage, Rescue and Relief during flooding stage or at restoration and Rehabilitation stages. A list of key agencies and their roles in different phase of urban flooding management is illustrated below need to be involved is listed below.

Sl.No	Key agencies	Phases involved	Functions
1	District Collectorate (City & Suburban)	Preparedness, Early warning, Response, Relief Restoration Rehabilitation	Co-ordination with EOC, Municipal Corporation, State Govt. Central Govt., State disaster management authority, Monitor Movement of man power and resources and machinery, NDMA, Media and other line departments
2	Municipal Corporation	Preparedness, Early warning, Response Relief Restoration Rehabilitation	Co-ordination with EOC, Municipal Corporation, State Disaster Management authority, State Govt. and other line departments. Mobilization of manpower, machinery and other resources for ESFs.
3	Health Departments	Response Relief Rehabilitation	Medical attention/treatment of injured control on spread of epidemics, distribution of medicines, drugs and other medical aids. Transport of injured to suitable nearest medical institutions through ambulances.
4	Municipal Sanitation Department	Preparedness, Early warning, Response Relief Restoration	Preparation of drainage plans of city, de-silting of drains/nallah/water bodies well before monsoon, arrangement of pump etc. Identification of low lying areas and vulnerable areas for water logging. Removal of dead bodies and animal caracas.

5	Urban Development Authority	Preparedness and Rehabilitation	<p>Preparation of City Master Plans including Disaster Mitigation Plans, integration of City Drainage & Sanitation Plan.</p> <p>Preparation of action plans and route planning for relief and rescue work. Identifying land and areas for storage of relief material. Preparation of temporary and permanent Rehabilitation plans for affected people.</p>
6	Fire Brigade	Response, Relief, Restoration & Rehabilitation	Prevention of fire outbreak. Collapse of structures/buildings, Relief operations
7	Police Commissionerate	Early warning, Response Relief, Restoration Rehabilitation	<p>Maintaining law and order during crisis. Helping in rescue and relief operations. Security of effected goods, properties and also relief material.</p>
8	Traffic Police	Response Relief	<p>Management of traffic, ensuring smooth flow of relief and rescue material and team.</p> <p>Ensure smooth traffic flow of vehicles carrying injured and also adequate arrangements for VIPs visiting sites.</p>
9	Civil Defense and Home Guards	Early warning, Response Relief Restoration Rehabilitation	All activities of preparedness, evacuation once alerts /warnings received, Response Relief Restoration Rehabilitation in coordination with EOC, Municipal corporation and line agencies.
10	Indian Meteorological Department	Early warning, Response Relief	Issuing alerts updating weather conditions and forecasts, during disaster on daily/12hourly/6 hourly/2 hourly basis. Setting up Automatic Weather Station (AWS) and Rain gauges network in cities.
11	Public Works Department	Response Relief Restoration Rehabilitation	All activities of preparedness, evacuation once alerts /warnings received, Response Relief Restoration Rehabilitation in coordination with EOC Municipal corporation and line agencies. Repair and restoration of damaged bridges, culverts and roads.
12	Power Supply Department	Response Relief Restoration Rehabilitation	<p>Pre-empt power leakage and electrocution.</p> <p>Take appropriate measure to restore power supply at the earliest.</p> <p>Ensure temporary power arrangements for Temporary Health camps, rescue /relief teams and for rehabilitation shelters.</p>
13	Railways	Response, Relief	<p>Assist in transporting Relief teams, material and assist in evacuation of population and livestock to safe locations</p> <p>Restoration and repairs of damaged railway lines/ tracks.</p>

14	Telecommunication	Early warning Response, Relief	Establishing and ensuring communications during pre and post disaster.
15	Public Transport	Response, Relief	Assist in transporting Relief teams, material and assist in evacuation of population and livestock to safe locations
16	P.H.E Department	Response, Relief Restoration Rehabilitation	Ensuring proper water supply and restoring water supply lines. Supply of water through tankers to affected and rehabilitated. Arrangements of pumps for draining out waterlogged area.
17	Irrigation & Flood control Department	Early Warning phase Response, Relief Restoration Rehabilitation	Monitoring Flood levels of rivers, lakes canals and issuing alerts to EOC and city administration. Dredging of rivers, canals and repair and restoration of embankments of rivers, ponds, canals and other major water bodies.
18	Food and Civil Supplies Department	Relief Restoration Rehabilitation	Ensure adequate supply and distribution of essential food material and fuel to affected people and livestock during evacuation, relief and rehabilitation. Ensure protection of Government Food reserves. Coordination with EOC and City administration and Municipal corporations.
19	NGOs/Others	Response, Relief Restoration Rehabilitation	All activities of evacuation once alerts /warnings received, Response Relief Restoration Rehabilitation in coordination with EOC Municipal corporation and line agencies

The SOP has identified the role of responsibilities of some specific key agencies involved in management and mitigation of floods at city level and is given below:

7.1. TASKS OF MUNICIPAL CORPORATION/ULB:

- Setting up of EOC and CCR in the corporation office and in municipal wards.
- Drain flood waters and remove impediments to movement from all roads under its control.
- Repair, restore and maintain all roads, storm water drains, etc. alongwith other infrastructure.
- Transport/shift/ evacuate stranded/affected persons and Rescue teams.
- Transport injured persons to hospitals/health camps and also dispose of corpse.
- Organize temporary shelters with food and water supply.
- Issue passes/identification stickers for vehicles and personnel on relief duty.
- Coordinate the activities of NGOs and other private entities engaged in relief work.
- Coordinate rescue plan with departments like Industries (Chemical accidents), Fire Brigade, Police (Landslides and collapse), Health Department (Epidemics and Food Poisoning)
- Undertake all duties and functions not specifically assigned to any other public agency.
- Set up information centre for sharing of information with the media and the public.

7.2. TASKS OF CRISIS CONTROL ROOM (CCR)

In addition to performing the tasks listed below, the Municipal Corporation Control Room shall work with the Emergency Operations Centres (EOC) in co-ordination and with the support from all other line departments and involved agencies. The Control Room may seek assistance from the DC for requisitioning of resources such as private transport, temporary shelter and other resources.

On receiving warning from EOC

- Designated officer will take charge of control room operations.
- Disseminate warning to Ward Control Room.
- Setup temporary shelters for evacuation of displaced.
- Relay warning to the public through media (TV, FM Radio, SMS, etc.)

During Flooding

- Co-ordinate with Police, Traffic and Fire Brigade for rescue and relief operations.
- Co-ordinate with Railways for management and evacuation of stranded population.
- Co-ordinate with State Transport authorities for deployment of buses on safe routes.
- Facilitate the temporary shelters with food and water supplies
- Temporary Repairs to damaged infrastructure

Rescue & Relief Operations

- Deploy Search & Rescue teams from the related ESF agencies.
- Co-ordinate with Home Guards and identify voluntary agencies for providing emergency water and food, taking the help of Search & Rescue Team wherever necessary.
- Co-ordinate evacuation of stranded people to the nearest transitory shelter.
- Issue of passes and identification for vehicles and staff on relief duties
- Mobilizing and coordinating volunteers along with identification of NGOs for relief/rescue work.
- Coordinate procurement and disbursement of relief materials received through government and private channels by NGOs, private donors and other organizations.
- Co-ordinate with Health department for deployment of emergency medical relief.

Post Disaster Actions

- Co-ordinate with Police and Health authorities for corpse disposal.
- Co-ordinate with Sanitation Department for disposal of carcasses and epidemic control.

7.3. WARD LEVEL ACTION PLAN

The action plans are to be formulated for wards of cities with specific actions identified for urban local body and RWAs. All such action plans should be integrated by EOC.

The action plan for ward level is given as Annexure – I.

8

SOP of Various Departments

8.1. URBAN LOCAL BODY

	Phase	Activities
I	Preparedness Phase	<ul style="list-style-type: none"> i) Setting up of EOC and CCR with Ham Radio or other relevant technology ii) Issue directions to repair/restore/maintain roads, drains, trees (prune), etc. iii) Prepare city Disaster Management Plan, with ward level DM actions iv) Define triggers for issuing of alerts and warnings – rainfall / special event, etc. v) Update data on flooding spots and landslide prone area vi) Conduct coordination meetings with MTNL/BSNL, Mobile companies, NGO's etc. vii) Undertake TNA & capacity building measures for staff & personnel viii) Conduct Mock Drills ix) Maintain stock of potable water, food packets, insecticide, etc.
II	Early Warning Phase	<ul style="list-style-type: none"> i) Communicate with EOC for issuing alerts to the Crisis Control Room ii) Mobilize staff and reserve equipment for field deployment iii) Maintain inventory of refuge areas and temporary shelters iv) Send out alerts and warnings to Citizens (refer detailed chart) v) Prepare passes/ stickers for vehicles and personnel on duty vi) Monitor flood and landslide prone areas using sensors/ consolidating citizen response/ crowd-sourcing/ physical inspection
III	Response Phase	<ul style="list-style-type: none"> i) Activate emergency alarms and systems ii) Issue public information and advisories iii) Transport/shift/ evacuate stranded/affected persons and deploy Rescue teams iv) Ensure connectivity, clear uprooted trees, dispose of corpses v) Organize temporary shelters with food and water supply vi) Issue passes/identification stickers for vehicles and personnel on duty vii) Coordinate the activities of NGOs and other private entities engaged in relief work viii) Coordinate with CCR and if required with other agencies like for school children, transport, traffic, dewatering pump operators, stand-by boats, etc. ix) Coordinate the activities of NGOs and other private entities engaged in relief work
IV	Relief Phase	<ul style="list-style-type: none"> i) Setup Relief Camps and temporary rescue zones ii) Provide relief material including food, water and other consumables iii) Co-ordinate relief material from various relief supplies iv) Disseminate information for public on relevant platforms/ media
V	Restoration Stage	<ul style="list-style-type: none"> i) Implement Rehabilitation of affected with minimum basic services ii) Restore emergency equipments and stocks iii) Closure of relief camps with handover of land and equipment iv) Disseminate information for public on relevant platforms/ media

8.2. URBAN DEVELOPMENT AUTHORITY

	Phase	Activities
I	Preparedness Phase	i) Assist ULB to prepare city Disaster Management Plan and DM action plan for all emergencies ii) Demarcate River catchments / flood plains/ Low lying areas/flood pathways and prepare Base flood hazard map iii) Map location of man-holes, storm water drains, other critical features iv) Undertake Training Needs Assessment & capacity building measures for Flood mitigation v) Integrate department specific plans and DM concerns into: <ul style="list-style-type: none"> · City drainage plan · Master Plan/CDP · Land Use plan · General Development Control Regulations · Building Bye-laws vi) Submit integrated department specific plans to EOC
II	Early Warning Phase	i) Communicate with EOC for demarcation of high grounds in the city ii) Identify holding and safe stocking zones/areas for relief supplies iii) Identify refuge areas and temporary shelters for affected population and livestock iv) Use field data to map safe transport routes within and out of the city v) Update the digital city map with all linked infrastructure and inventories
III	Response Phase	i) Coordinate with CCR and other agencies for updated status of various infrastructure ii) Provide field agencies and staff with required maps and data
IV	Relief Phase	i) Undertake rapid assessment of affected areas ii) Maintain an inventory of “Transit shelters” with capacity, linked with the spatial base map iii) Maintain an inventory of “Transit shelters” with capacity, linked with the spatial base map
V	Restoration Stage	Prepare Rehabilitation Plans and layouts with minimum basic services.

8.3. HEALTH DEPARTMENT

	Phase	Activities
I	Preparedness Phase	i) Prepare an Emergency Health crisis management plan for prevention of epidemic. ii) To establish an Epidemic Control Unit (ECU) with reliable connectivity iii) Analysis of the data received from hospitals (Public & Pvt.), disease list from ECU. iv) Maintain emergency stock of medicine/equipment/blood. v) Maintain in good working condition, adequate no of Ambulances, mobile dispensaries, Hearse vans for movement of corpses. vi) Prepare a directory of Health officers/professionals and medical facilities. vii) Undertake vaccination and disinfection drives viii) Develop skills and provide training to field staff/medical practitioners
II	Early Warning Phase	i) Alert field staff with proper equipment and kits. ii) Issue alert signal to the Pvt. and other public sector hospital for support. iii) Co-ordinate with EOC, police and transport for deployment of health officers and staff.

III	Response Phase	<p>i) Coordinate with EOC for quick identification of affected zones for surveillance and response</p> <p>ii) Triage of the affected population to be done by experts with experience of emergencies and, if possible, local knowledge.</p> <p>Priority of cases</p> <p>Priority I – Critical and severely ill cases.</p> <p>Priority II – Moderate requiring resuscitation/ surgery within 24 hrs.</p> <p>Priority III – Minor cases / moribund cases.</p> <p>iii) Mobilize Ambulances and mobile dispensaries</p> <p>iv) Establish health facility and treatment centers at disaster/relocation sites.</p> <p>v) Communicate information of affected people to EOC.</p> <p>vi) Establish temporary morgue facilities at temporary shelters</p>
IV	Relief Phase	<p>i) Deployment of field staff as per the need in wards/zones.</p> <p>ii) Ensure adequate supply of medicines, disinfectants, equipment</p> <p>iii) Coordinate with EOC for vector control, fogging</p>
V	Restoration Stage	<p>i) Undertake disinfecting measures in contaminated zones.</p> <p>ii) Coordinate with Police for early disposal of dead bodies.</p> <p>iii) Prepare and Maintain crisis/epidemic management reports and submit final report to EOC.</p>

8.4. IRRIGATION DEPARTMENT/STORM WATER DRAINAGE

	Phase	Activities
I	Preparedness Phase	<p>i) Upkeep and maintenance of drains periodically and update Drainage Master Plan.</p> <p>ii) De silting of storm water drains, culverts and canals periodically.</p> <p>iii) Redesign existing storm water and drainage systems in flood prone areas for adequate flow of volume of drainage.</p> <p>iv) Cleaning of sumps and manholes for clog free flow of waste water.</p> <p>v) Setting up of flood level markers within the city.</p> <p>vi) Monitoring Flood levels of rivers, lakes, canals and other datum.</p>
II	Early Warning Phase	<p>i) On receipt of alert from EOC, field staff to be mobilized to the vulnerable area with all equipment and situation alert.</p> <p>ii) Installation of High capacity pumps in low lying areas.</p> <p>iii) Keep spare pump sets ready for all locations.</p>
III	Response Phase	<p>i) Coordinate with EOC for quick identification of affected drains and flooded areas.</p> <p>ii) Continuous monitoring of flooding spots and critical drains.</p> <p>iii) Update urgent repairs and restoration information to EOC & media.</p>
IV	Relief Phase	<p>i) Repair and maintenance of damaged drain and drainage networks in the flood affected area.</p> <p>ii) Provide contingency toilets and temporary drainage facilities.</p> <p>iii) Pumping out water from submerged low-lying areas.</p>
V	Restoration Stage	<p>i) Restore the damaged drain and refurbish drainage networks.</p> <p>ii) Prepare an Action Taken Report for all wards and zones and update network maps and log information. Submit to EOC.</p>

8.5. PUBLIC WORK DEPARTMENT /WATER BOARD

	Phase	Activities
I	Preparedness Phase	i) Identify and map emergency groundwater resources resistant to disasters to replace damaged public and domestic water sources. ii) Ensure adequate no. of water tankers for emergency supplies. iii) Incorporate technology to identify leakages and breaches in network without onsite inspection iv) Install water supply outlets (taps/ Hand pumps/other) above flood level at identified temporary shelter sites to serve as emergency potable water sources
II	Early Warning Phase	i) Nodal officer to communicate with EOC and control room with updates. ii) Alert field staff on receiving alert/warning from EOC with properly equipped kits for closing/ opening of valves/manholes.
III	Response Phase	i) Close the supply valves of breached supply lines in the flooded zones/contaminated zones. ii) Mobilize resources to extract water from identified "Emergency ground water resources" iii) Make arrangement of on-site arrangements for potable water through tankers.
IV	Relief Phase	i) Provide safe drinking water supply in temporary shelters, hospitals etc. ii) Provide water to mobile toilets for transit and relief camps.
V	Restoration Stage	i) Restore all services to pre-disaster phase and maintain quality check. ii) Prepare an Action Taken Report and report to EOC.

8.6. PUBLIC WORK DEPARTMENT (ROAD AND BRIDGES)

	Phase	Activities
I	Preparedness Phase	i) Maintain an inventory of all roads and bridges by hierarchy, equipment and tools for response and recovery efforts. ii) Train staff in safety assessment of infrastructure assets, strengthening and retrofitting, emergency response measures. iii) Identify core teams for technical/engineering support/decision making in Flood situations. iv) Prepare a Disaster Response map identifying safe routes and exits
II	Early Warning Phase	i) Nodal officer to Communicate with EOC and control room. ii) Identify and Establish emergency connectivity network and routes iii) Secure tools and equipment in safe locations, pre-position if needed. iv) Ensure/undertake checks to ensure infrastructure remains in operational condition, during flooding.
III	Response Phase	i) Undertake emergency structural rehabilitation/retrofitting measures of critical infrastructure.
IV	Relief Phase	i) Create / Provide emergency access in areas which communication links are lost/damaged severely during the event. ii) Construction of emergency structures (levees among others) to control flood risk.
V	Restoration Stage	i) Undertake detailed damage assessment of critical infrastructure. ii) Reestablishment of roads and bridges. iii) Undertake repair/strengthening works iv) Ensure safe construction practices are followed v) Provide technical support as required to other agencies vi) Prepare all Action Taken Report and update "the road network map or inventory and report to EOC and Municipal Corporation.

8.7. PUBLIC WORK DEPARTMENT (BUILDING)

	Phase	Activities
I	Preparedness Phase	<ul style="list-style-type: none"> i) Maintain inventory list of all dilapidated buildings, equipment and tools for response and recovery efforts ii) Identify buildings in the low lying areas and develop strategy for strengthening / retrofitting so as to minimize damage. iii) Undertake prevention/protection/structuralrehabilitation/retrofitting measures of lifeline buildings
II	Early Warning Phase	<ul style="list-style-type: none"> i) Depute the designated officials to EOC for coordination on all activities in the zones/wards of the city on Receipt of Warning from EOC. ii) Communicate with EOC and different agencies or vital inputs. iii) Alert residents of dilapidated buildings iv) Secure tools and equipment in safe locations.
III	Response Phase	<ul style="list-style-type: none"> i) Monitor dilapidated structures and update list of collapsed structures to coordinate with EOC ii) Intimate the action from time to time to EOC.
IV	Relief Phase	<ul style="list-style-type: none"> i) Recce damage to buildings and related infrastructure ii) Undertake repairs/ shoring to buildings and related infrastructure iii) Undertake construction of temporary structures and supporting structures to provide basic services to the affected population iv) Controlled demolition/ shoring of buildings which have turned unsafe
V	Restoration Stage	<ul style="list-style-type: none"> i) Conduct structural damage assessments ii) Undertake reconstruction/retrofitting of buildings/ community infrastructure iii) Submit Action Taken Report to EOC and Municipal Corporation.

8.8. POWER SUPPLY DEPARTMENT

	Phase	Activities
I	Preparedness Phase	<ul style="list-style-type: none"> i) Prepare flood preparedness plan with information on earlier flood level with inventory of equipment. ii) Identify sensitive locations around high risk power installations. iii) Periodical checking, testing, maintenance of all equipment and Instruments. iv) Provision for separate lines/ sources of power for critical substations v) Raise level of transformers and substations above flood level vi) Training of staff about handling the flood situation. vii) Listing of citizen response actions for public dissemination by EOC
II	Early Warning Phase	<ul style="list-style-type: none"> i) On receipt of alert from EOC, coordinate and monitor power installations ii) Secure tools and equipment in safe locations. iii) Disconnection of power in vulnerable areas
III	Response Phase	<ul style="list-style-type: none"> i) Ensure Emergency power supply lines to the Transit camps/Medical camps and temporary relief shelter. ii) Ensure the availability of mobile DG sets/ solar powered batteries of required places like relief camp. iii) Ensure safety from electrical installations or power supply at the disaster site.
IV	Relief Phase	<ul style="list-style-type: none"> i) Restore power supply in phases as per safety.
V	Restoration Stage	<ul style="list-style-type: none"> i) Undertake total restoration in all power supply zones/ any damaged infrastructure. ii) Prepare Action Taken Report for all wards and zones an update the information about power supply line and inventory and share the report with Municipal Corporation and EOC.

8.9. TELECOMMUNICATION

	Phase	Activities
I	Preparedness Phase	<ul style="list-style-type: none"> i) Prepare flood preparedness plan with information on earlier flood level. ii) Identify the high/medium risk telecommunication transmission towers. iii) Regular checking and maintenance of telecommunication towers and networks. iv) Link EOC and other control rooms with necessary communication devices like ham radio, hotlines, VHF, etc. v) Ensure availability of mobile communication devices vi) Training for department staff about handling the flood situation.
II	Early Warning Phase	<ul style="list-style-type: none"> i) Ensure the availability of Equipment and Spares Inventory with the field staff. ii) Ensure power backup for cell phones and telephone exchange.
III	Response Phase	<ul style="list-style-type: none"> i) Deploy portable communicable system in the vulnerable flood site. ii) Establish a temporary communication facility for use by various authorities /department/ agencies involved in Emergency Response tasks. iii) Manage sudden rush of communication traffic. iv) Set-up Emergency Hotlines, Helpline and service integration (Ambulance /Police/Fire) process.
IV	Relief Phase	<ul style="list-style-type: none"> v) Inspect and repair normalization of communication in flood affected areas. vi) Establish a temporary communication facility for use by the public.
V	Restoration Stage	<ul style="list-style-type: none"> i) Restore all telephone lines and telecommunication towers. ii) Prepare Action Taken Report for all wards and zones and update the information about telecommunication infrastructure and inventory log and share the report with Municipal Corporation and EOC.

8.10. EDUCATION DEPARTMENT

	Phase	Activities
I	Preparedness Phase	<ul style="list-style-type: none"> i) Identify Schools/ Institutions located in the high raised area with enough capacity to be used for temporary relief centre during floods. ii) Training of teachers and Students basic first-aid, and rescue methods. iii) Prepare List of vulnerable schools in low lying areas/ in water catchments, etc. iv) Prepare List of Zonal Schools where 24 hours' staff is available v) Organize education programs to raise awareness about action during flood.
II	Early Warning Phase	<ul style="list-style-type: none"> i) Alert relief shelter schools for readiness. ii) Coordinate with EOC for identification of potential "Relief Shelter" and necessary mobilization. iii) Information maps, escape routes, precautions to be taken, emergency communication details and contact of the nodal officer suitable displayed in the School/Institution display board.
III	Response Phase	<ul style="list-style-type: none"> i) Students of low lying area schools will be shifted to shelters ii) Intimate the action from time to time to EOC/ all line departments by action taken report through nodal officer.
IV	Relief Phase	<ul style="list-style-type: none"> i) Coordinate with EOC for updates and information dissemination, provision of supplies, etc.
V	Restoration Stage	<ul style="list-style-type: none"> i) Detailed damage assessment and repair of education infrastructure. ii) Prepare all Action Taken report through Nodal Officer to EOC/ Education Department.

8.11. POLICE DEPARTMENT

	Phase	Activities
I	Preparedness Phase	<ul style="list-style-type: none"> i) Prepare emergency plan with focus on deployment of police personnel. ii) Keep rescue rope and life jackets ready iii) Training of police personnel in handling flood situations
II	Early Warning Phase	<ul style="list-style-type: none"> i) Depute the designated police officials to EOC for coordination on all activities in the zones/wards of the city. ii) Effective Communication system for non-police functions with designated separate channels for rescue, relief and restoration. iii) On receipt of the alert/warning, disseminate information to all police officers/personnel and ensure action is initiated.
III	Response Phase	<ul style="list-style-type: none"> i. Deployment of Policemen and equipment for rescue i) Quick Assessment of law and order situation in affected areas. ii) Active patrolling during disasters for preventing looting. i. Provide assistance to persons with special needs in evacuation shelters such as small children, pregnant women and mothers with nursing infants etc. ii. Intimate the action from time to time to EOC.
IV	Relief Phase	<ul style="list-style-type: none"> i) Maintain law and order and ensure crowd management. ii) Prepare detail report on evacuation and other rescue. iii) Safe transporting of personnel, resources and relief goods to and from the affected area iv) Provide safety for property, people and public peace. v) Provide safety in distribution of relief materials. vi) Provide safety for VIP who visits the affected area. vii) Efforts for identifying of missing persons and notification to the relatives. viii) Coordinating with all other department for rescue and relief.
V	Restoration Stage	<ul style="list-style-type: none"> i) Ensure law and Order for all restoration efforts. ii) Prepare Action taken report and submit to Municipal Corporation and EOC.

8.12. TRAFFIC POLICE

	Phase	Activities
I	Preparedness Phase	<ul style="list-style-type: none"> i) Prepare emergency traffic plan including detail mapping with focus on strategic routing and safe holding terminals. ii) Training to traffic police personnel in handling flooding situations and issues related to them. iii) Prepare flood contingency Plan in consultation with the Development authority, transport department and PWD(Road).
II	Early Warning Phase	<ul style="list-style-type: none"> i) Depute the designated officials to EOC for coordination on all activities in the zones/wards of the city on Receipt of Warning from EOC. ii) Communicate with EOC and different agencies for vital inputs during warning period. iii) Identify alternate routes for traffic in flood prone areas iv) Identify temporary parking lots and seek permission from land owners v) Identify sites for helicopter landing vi) Establish Effective Communication system
III	Response Phase	<ul style="list-style-type: none"> i) Deploy traffic staff to help in identifying and redirect traffic through safe route. i) Give directions whenever necessary to ensure free passage for fire brigade ambulance, police vehicles and vehicles of other respondents. ii) Divert traffic to alternate roads as and when necessary. iii) Provide information about traffic flow through the media, public addressed system, sign boards and display boards. iv) Intimate the action from time to time to EOC.

IV	Relief Phase	v) Control and monitor traffic movements. vi) Organise Clear stranded vehicles obstructing movement of traffic. vii) Clear roads or path-way of uprooted trees in coordination with PWD.
V	Restoration Stage	iv) Prepare operational and management report and submit final report to Municipal Corporation Control Room.

8.13. FIRE DEPARTMENT

	Phase	Activities
I	Preparedness Phase	i) Train officers in basic flood rescue and response ii) Prepare plans for utilization of resources, personnel, equipment and supplies iii) Repair and maintain rescue boats and ancillary equipment iv) Conduct mock drills
II	Early Warning Phase	i) Communicate with EOC and different agencies for vital inputs during warning period. ii) Keep communication devices in a state of readiness iii) Ensure the availability and maintenance of equipment and vehicles. iv) Alert staff for Rescue and evacuation.
III	Response Phase	i) Dissemination of warning to common people by alarms, sirens, to public announcement system like radio, television, loud speakers, hoisting of flags. ii) Rescue stranded persons iii) Evacuate persons from the affected areas iv) Coordination with Transportation, Public Work, Police and Traffic police during Rescue and evacuation. v) Clear roads or path-way of uprooted trees.
IV	Restoration Stage	i) Coordinate with other agencies in the restoration stage. ii) Prepare detail report on evacuation and other rescue.

8.14. INDIAN METEOROLOGICAL DEPARTMENT

	Phase	Activities
I	Preparedness Phase	i) Prepare "Regional Precipitation Study Report "based on earlier data of local rainfall and projections of future precipitation. ii) Maintain rainfall distribution/flood levels, cyclones and tidal waves time series data and patterns.
II	Early Warning Phase	i) Issue alerts based on anticipated water logging /water surge. ii) Deploy staff at weather monitoring stations for regular reports and updates.
III	Response Phase	i) Monitor rainfall data from each observation station and update the City Administration /Control room /EOC
IV	Relief Phase	i) Project data and time of incessant rain/precipitation. ii) Predict cyclones and Depressions/Heavy rains
V	Restoration Stage	i) Consolidate reports of climate and weather submitted to city administration/EOC and Development Authority.

9

Key Officials and Nodal Officers

DESIGNATION

State Level

Principal Secretary/ Representative, (Home), State Secretariat
Principal Secretary/ Representative, Relief and Rehabilitation, State Secretariat
Principal Secretary/ Representative, Home (Law and Order), State Secretariat
Principal Secretary/ Representative, Medical & Education, State Secretariat
Principal Secretary/ Representative, Food and Civil Supplies, State Secretariat
Principal Secretary/ Representative, Public Works, State Secretariat
Director, State Pollution Control Board
Director, Airport Authority of India
Inspector General of Police

District Level

District Collector
Head / In-charge of the following department
Relief and Rehabilitation
Police (Law and Order)
Medical & Education,
Food and Civil Supplies,
Public Works,
District Disaster Management Agency

City Level

Municipal Commissioner, Municipal Corporation
Vice-Chairman, Urban Development Authority
Chief Engineer, Municipal Solid Waste Department
Chief Engineer/ Representative, PWD (Road & Bridges and Building)
GOC, Commander-in-chief
IGP & Additional Commissioner of Police (Traffic)
Chief Fire Officer, Fire Department
Chief Medical Officer
Director of Medical Services
General Manager, Discom

10

Reporting Formats

The institutional arrangements are effectively operationalised by appropriate reporting through simple reporting formats. Reporting formats and the frequency of reporting may be adopted on the basis of the NDMA guidelines/ State Disaster Management Plan norms.

11

References

The Municipal Corporation may refer to the following links wherein Standard Operating Procedures, Reporting and Annexure Formats are given.

- i. National Disaster Management Guidelines by NDMA
<http://www.ndma.gov.in/images/guidelines/flood.pdf>
- ii. Greater Mumbai Disaster Management Action Plan Greater Mumbai Disaster Management Action Plan
[http://www.mcgm.gov.in/irj/portalapps/com.mcgm.aDisasterMgmt/docs/Volume%201%20\(Final\).pdf](http://www.mcgm.gov.in/irj/portalapps/com.mcgm.aDisasterMgmt/docs/Volume%201%20(Final).pdf)
- iii. Standard Operating Procedures for Flood Management in Haryana
<http://www.hdma.gov.in/sdocs/flood.pdf>
- iv. Standard Operating Procedures for Flood Management in Bihar
<http://disastermgmt.bih.nic.in/publications.htm>
- v. Standard Operating Procedures for Flood Management in Uttar Pradesh
http://rahat.up.nic.in/undp/sop_search_rescue.pdf
- vi. Integrated flood management tools series Urban Flood Management in a Changing Climate
http://www.apfm.info/publications/tools/APFM_Tool_14.pdf
- vii. Framework for major emergency management a guide to flood emergencies prepared by Fire Services and Emergency Planning Section, Department of the Environment, Heritage & Local Government, Government of Ireland, 2006
<http://www.housing.gov.ie/sites/default/files/migratedfiles/en/Publications/Community/FireandEmergencyServices/FileDownload%2C17065%2Cen.pdf>

Annexure - 1

General Action Plan at Ward Level

PRE-MONSOON

- Complete the work of reinstatement of potholes and trenches taken by department and by various utility services. Cleaning of storm water entrances, desilting storm water drainage / nallhas and other water bodies in the wards.
- Engineer in-charge of wards must ensure that contractors/ owners should lift the debris, unused material (sand, paver blocks, stores etc.) immediately after completion construction/ repair works.
- To provide adequate generator sets in each ward and to ensure the same are in operational condition.
- Identify land for temporary shelters/ rehabilitation in case of emergencies.
- Identify schools for temporary shelters in coordination with education department and review the facilities available/needed to be provided in the temporary shelters.
- Awareness to be generated among the local residents about various actions to be taken by them and not to create panic situations by displaying boards at the identified locations with emergency contact numbers with the help Resident Welfare Affairs.
- Remove unauthorized encroachments on gutters/water entrances which obstruct the flow of rain water.
- Prune dangerous tree branches and branches that impede vehicular traffic.
- Prop or fence dangerous municipal buildings or otherwise demolish the same in time and arrange to shift the residents to a safe place.
- Alert to be issued to local health centers/ hospitals/ clinics, etc. The medical centers/institutes should be well equipped and maintain sufficient stock of medicines required during emergency.
- Arrange to provide food packets to victims and staff on duty in disaster situation during monsoon period.
- Keep vigil and take preventive measures on mosquito breeding and rodent reproduction.
- Prepare and implement pest control plan.
- Keep sufficient stock of pest control machinery and materials.
- Implement Malaria control & eradication program.
- Check overhead water storage tanks in municipal and private premises for mosquito proof cover and take necessary action.

DURING MONSOON

- During heavy rains, divide the ward staff of municipal drainage and maintenance department into small groups to perform anti flooding activities like removing floating materials, tree leaves and plastics from the storm water entrances in various sections of the ward under the supervision and guidance of Municipal Engineer/ Junior Engineer.
- Pay special attention to identified water logging prone spots and deploy well equipped municipal rescue teams, civil defense and volunteers.
- Municipal engineers to be present at the water logging spots and take necessary steps for speedy disposal of rainwater.
- Start de-watering pump sets if necessary.
- Traffic police need to be alerted for free flow of traffic and rescue vehicles/ vehicles carrying aids.
- Local police should be alerted for security and safety of people and property.
- Alert/ caution citizens residing along the coastal area if high tide exceeds 4.5 mtrs.
- Remove floating and accumulated materials immediately from seashore after high tide.
- Clear roads immediately of uprooted trees and fallen tree branches to ensure smooth vehicular traffic.
- Keep the updated list of dilapidated buildings and land slide prone locations in the ward readily available in the ward control room.
- Deploy extra manpower at ward control room, when alerts of heavy rains given IMD.
- If necessary, N.G.O laborers from registered N.G.O agencies shall be deployed by taking sanction of concerned competent authority.
- Keep the list of all updated important telephone contacts, ward disaster plan readily available in ward control room.
- Ward control room should be in contact with disaster control room at regular intervals.
- During normal situations in the Monsoon, EOC and ward control room manpower shall be utilized to carry out monsoon related work to avoid flooding.
- Undertake fogging at the water logged areas to prevent mosquito nuisance.
- Keep vigil and check various construction sites in the ward to confirm the appointment of doctors for regular health checkup of construction laborers.

POST MONSOON

- Prepare an after action report to identify lessons learnt and improvements needed.
- If new water logging spots are detected during monsoon period, find out the causes and inform the concerned authority to carry out necessary remedial work.
- Implement systematic programme for quick disposal of rain water.
- Remedial measures shall be taken to minimize water logging spots in ward so that fewer dewatering pumps need to be deployed during the monsoon.
- Evacuate affected persons due to floods and the habitat them in temporary shelters.
- Should ensure sufficient food supply and medical facilities in the temporary shelters.
- Ensuring restore water and power supply in the affected areas.



सत्यमेव जयते

Ministry of Urban Development
Government of India