



**DISTRICT DISASTER MANAGEMENT AUTHORITY
MUMBAI CITY DISTRICT**

**DISTRICT DISASTER MANAGEMENT PLAN
MUMBAI CITY DISTRICT**

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About this Document

The Mumbai Emergency Operations Plan provides planning assumptions, emergency management policies, common operating procedures, administrative and financial policies, information on roles and responsibilities, and supplemental references (including the Emergency Support Functions) on how emergency management in Greater Mumbai is organized and managed during response operations. These assumptions, policies, procedures, and roles and responsibilities are based on MCGM and national authorities, legal authorities, as well as known flood and earthquake hazards and risks.

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Abbreviation

AAI	Airport Authority of India
AAR	After Action Report
AC	Area Commander
AC	Assistant Commissioner
ACWCs	Area Cyclone Warning Centres
ADC	Additional District Collector
AEC	Atomic Energy Commission
AERB	Atomic Energy Regulatory Board
AIR	All India Radio
AMC	Additional Municipal Commissioner
ATC	Air Traffic Control
BARC	Bhabha Atomic Research Centre
BIS	Bureau of Indian Standard
BP	Basic Plan
BPL	Below Poverty Line
BMC	Brihan Mumbai Municipal Corporation
CBDM	Community Based Disaster Management
CBO	Community Based Organization
CBRN	Chemical, Biological, Radiological and Nuclear
CD	Civil Defence
CEO	Chief Executive Officer
CFO	Chief Fire Officer
CMO	Chief Medical Officer
CO	Chief Officer
CP	Commissioner of Police
CPMFs	Central Para Military Forces
CRF	Calamity Relief Fund
CS	Chief Secretary
CWC	Central Water Commission
CWCs	Cyclone Warning Centres
CIDM	City Institute of Disaster Management
DAE	Department of Atomic Energy

District Disaster Management Plan

DCR	Disaster Control Room
DDMA	District Disaster Management Authority
DEOC	District Emergency Operations Center
DFO	Divisional Fire Officer
DGIPR	Director General of Information and Public Relation
DISH	Director Industrial Safety and Health
DM	Disaster Management
DMA	Disaster Management Act
DMC	Deputy Municipal Commissioner
DMU	Disaster Management Unit
DRM	Disaster Risk Management
DRMP	Disaster Risk Management Programme
DRR	Disaster Risk Reduction
DRO	District Revenue Officer
Dy	Deputy
EM	Emergency Management
EMS	Emergency Medical Services
EOP	Emergency Operations Plan
EOC	Emergency Operations Centre
ERCs	Emergency Response Centres
ERTs	Emergency Response Teams
ESF	Emergency Support Function
ETA	Expected Time of Arrival
F&ES	Fire And Emergency Services
FB	Finance Branch
FC	Finance Commission
FO	Field Observer
GAD	General Administration Department
GDCR	General Development Control Regulation
GIS	Geographic Information System
GoI	Government of India
GoM	Government of Maharashtra
GPS	Global Positioning System
GSI	Geological Survey of India
GSU	Ground Support Unit
HF / VHF	High Frequency / Very High Frequency

District Disaster Management Plan

HQ	Headquarters
HRVA	Hazard, Risk and Vulnerability Assessment
IAP	Incident Action Plan
IC	Incident Commander
ICP	Incident Command Post
IDP	Incident Demobilization Plan
IEC	Information Education and Communication
IMD	India Meteorological Department
IMO	Information and Media Officer
INCOIS	Indian National Centre for Ocean Information Services
IND	Improvised Nuclear Devices
IRS	Incident Response System
IRTs	Incident Response Teams
ISR	Institute of Seismological Research
ISRO	Indian Space Research Organization
ISS	Indian Status Summary
JT	Joint
LO	Liaison Officer
LS	Logistics Section
LSC	Logistics Section Chief
MFB	Mumbai Fire Brigade
MFRs	Medical First Responders
MHA	Ministry of Home Affairs
MIDC	Maharashtra Industrial Development Corporation
MCGM	Municipal Corporation of Greater Mumbai
MMB	Maharashtra Maritime Board
MEMEx	Mumbai Emergency Management Exercise
MoA	Ministry of Agriculture
MOC & F	Ministry of Chemicals and Fertilizers
MoC & I	Ministry of Commerce and Industry
MoD	Ministry of Defence
MoEF	Ministry of Environment and Forests
MoF	Ministry of Finance
MoP&NG	Ministry of Petroleum and Natural Gas
MoSRT & H	Ministry of Shipping, Road Transport and Highways
MPCB	Maharashtra Pollution Control Board

District Disaster Management Plan

MSDMA	Maharashtra State Disaster Management Authority
NCC	National Cadet Corps
NCCF	National Calamity Contingency Fund
NCMC	National Crisis Management Committee
NDMA	National Disaster Management Authority
NDMG	National Disaster Management Guidelines
NDRF	National Disaster Response Force
NEC	National Executive Committee
NGO	Non-Government Organization
NGRI	National Geophysical Research Institute
NIDM	National Institute of Disaster Management
NO	Nodal Officer
NPCIL	Nuclear Power Corporation of India Ltd
NSS	National Service Scheme
OS	Operations Section
OSC	Operations Section Chief
PD	Project Director
PHCs	Public Health Centers
PHD	Public Health Department
PS	Planning Section
PS	Principal Secretary
PSC	Planning Section Chief
PWD	Public Work Department
QRMTs	Quick Reaction Medical Teams
R & R	Relief and Rehabilitation
RB	Response Branch
RC	Relief Camp
RDD	Radiological Dispersal Device
RDMCs	Regional Disaster Management Centers
RO	Responsible Officer
RSO	Radiological Safety Officer
RTI	Regional Training Institute
SA	Staging Area
SAR	Search & Rescue Team
SBD	Service Branch Director
SCG	State Crisis Management Group

District Disaster Management Plan

SDMA	State Disaster Management Authority
SDMP	State Disaster Management Plan
SDO	Sub Divisional Officer
SDRF	State Disaster Response Force
SDRR	Shelter and Disaster Risk Resiliency
SEC	State Executive Committee
SEOC	State Emergency Operation Centre
SMS	Short Messaging Service
SO	Safety Officer
SoH	Secretary of Health
SOPs	Standard Operating Procedures
SP	Superintendent of Police
SST	Sea Surface Temperature
TB	Transportation Branch
TNA	Training Needs Assessment
TIFR	Tata Institute of Fundamental Research
TS	Technical Specialist
UC	Unified Command
UD	Urban Development
ULBs	Urban Local Bodies
UTs	Union Territories
UNISDR	United Nations International Strategy for Disaster Risk Reduction
YASHADA	Yashwantrao Chavan Academy of Development Administration

Section – 1

Introduction

Introduction

1.1 Background

As per Section 30 (2) (i) of the Disaster Management Act, 2005 “The Authority shall prepare, or cause to be prepared and maintain a master plan for the District”. Apart from this statutory requirement, the hazard profile and disaster history of the district demands for a comprehensive District Disaster Management Plan to be in place for coordinated and streamlined management of disaster in the District.

With the development of a comprehensive **Disaster Management Plan**, the Municipal Corporation of Greater Mumbai (MCGM) is well positioned to implement appropriate policies, structures, and actions to reduce the exposure of Mumbai City district to disaster risks. However, this also places MCGM at a point where decisions are becoming difficult to make, as the priorities are sometimes not clear or there maybe too many competing interests. As such, city officials need tools to understand the priorities and to set up benchmarks and track progress in their disaster management systems, so that they can justify decisions and investments in disaster risk reduction. A successful implementation of DRR options and DRM strategies demands appropriate mechanisms to communicate and transfer the overall knowledge on risk and its underlying drivers to the various stakeholders involved in the disaster risk management process of a city district.

The “Megacity Indicators System” for Disaster Risk Management (MIS) is a tool to communicate risk and promote discussion around relevant local-level risk parameters that would enable DRM professionals and decision-makers to develop appropriate DRM strategies and take concrete DRR actions.

The first component of the MIS are the quantitatively derived Urban Disaster Risk Indicators (UDRI) which provide a holistic view of disaster risk in Mumbai City by capturing the direct physical damages and the aggravating social conditions contributing to total risk.

The second component of the MIS are the Disaster Risk Reduction Resiliency Indicators (DRRRI) which are a group of indicators to establish an initial benchmark and track progress (or lack of progress) on the mainstreaming of risk reduction approaches in the city’s organizational, functional, operational and development systems and processes. The aim of these indicators is to capture the potential for achieving risk resiliency in five key areas analyzed in the Disaster Risk Management Master Plan (DRMMP) of Mumbai.

The DRRI have also been adapted to reflect the context and processes of Disaster Risk Management in Mumbai City, and in particular to the national laws, guidelines and policies in DRR, including the National Disaster Management Act of 2005.

1.2 Vision

Making a resilient Mumbai City where communities respond to disasters with sense of urgency and in a planned way to minimize human, property and environmental loss by developing a holistic, proactive, multi-disaster and technology driven strategy for DM. The entire process will center stage the community and will be provided momentum and sustenance through the collective efforts of all government agencies.

1.3 Policy

Saving human lives with utmost priority and ensuring minimum loss to property and environment. Recognizing the commitment of stakeholders and the need for collaboration across all levels of government, community, industry, commerce, government owned corporations, private and volunteer organizations, and local communities in all aspects of disaster management. Emphasizing, building and maintaining sincere relationships, trust, teamwork, consultative decision-making and shared responsibilities among stakeholders.

1.4 Objectives of the Plan

The aim of the DM plan is to ensure that the following components of DM are addressed to facilitate planning, preparedness, operational, coordination and community participation. The objectives guiding the policy formulation are:

1. To assess various hazard, vulnerability, capacity and risk associated with the City District.
2. To lay down various measures and guidelines for prevention and mitigation.
3. To lay down preparedness measures for all stakeholders.
4. To build the capacity of all stakeholders in the state to cope with the disasters and promote community based disaster management.
5. To mainstream disaster management concerns into the developmental planning process.
6. To develop efficient, streamlined and rapid disaster response and relief mechanism in the City District.
7. To provide clarity on roles and responsibilities for all stakeholders concerned with various phases of disaster management.
8. To ensure co-ordination and promote productive partnership with all other agencies related to disaster management.
9. To commence recovery programme as an opportunity to build back better in case of a future disaster by incorporating community in the programme.

1.5 Themes

Themes behind the Plan

1. Define a system of coordination at the District level
2. Identify all the responder agencies at the district level, and assign functional responsibilities to each of them.
3. Establishment of a central facility in the district, which enables all the responder's agencies to interact and coordinate their efforts.
4. Suggest hazard specific preparedness, response and mitigation measures
5. Plan resource requirements and coordinate with state government for requisitioning more resources.
6. Provide an inventory of resources, key facilities and addresses for deployment and assistance towards preparedness and mitigation.

1.6 Approach

The basis of the Disaster Management Plan is a collaborative planning process that incorporated a synergistic, holistic approach to disaster risk reduction and response for Mumbai City district. This approach allowed the development of the DM Plan, or the operating environment in which Mumbai City responds to disaster.

The local authorities have been assigned functions which include ensuring training of its officers and employees, maintenance of resources relating to disaster management as to be readily available for use in the event of any disaster; ensure all construction projects under it conform to the standards and specifications laid down for prevention and mitigation of disasters and carry out relief, rehabilitation and reconstruction activities in the affected areas. The local authority may take such other measures as may be necessary for disaster management.

1.7 Strategy

Keeping in view the hazard risk profile of the district and its disaster history, Mumbai City district has the following prevention and mitigation strategy:

1. Creating District Disaster Mitigation Fund
2. Creating awareness for disaster risk reduction at all level
3. Appropriate amendments in the legislative and regulatory instruments along with strengthening of the enforcement mechanisms at different levels
4. Conducting micro-zonation surveys
5. Ensuring use of disaster resistant construction techniques, codes and guidelines in all sectors of the society by law and through incentives and disincentives
6. Incorporating the study of disaster engineering subjects in architecture and engineering curriculum

1.8 Scope of the Plan

The term "disaster management" encompasses the complete realm of disaster-related activities. Traditionally people tend to think of disaster management only in terms of the post-disaster actions taken by relief and reconstruction officials; yet disaster management covers a much broader scope, and many modern disaster managers may find themselves far more involved in pre-disaster activities than in post-disaster response. This is because many persons who work in the development field, or who plan routine economic, urban, regional or agricultural development projects, have disaster management responsibilities. For example, housing specialists planning a low-income housing project in a disaster-prone area have the opportunity (and an obligation) to mitigate the impact of a future disaster if the houses incorporate disaster resistant construction technologies. In the same manner, agricultural development projects must be planned in such a way that they help stem environmental degradation and thus lower the farmer's vulnerability to losses from droughts, floods, cyclones, or other natural hazards. In fact, in dealing with natural hazards, the vast majority of disaster management activities are related to development projects; only a small portion are related to emergency response. Of course, disaster management also encompasses the field of emergency assistance and long-term maintenance for refugees and displaced persons. The refugee field of disaster management is highly specialized and requires not only many development skills but also a broader awareness of political, legal, and humanitarian issues.

1.9 Authority and Reference

As per Section 30 (2) (i) of the Disaster Management Act, 2005 "The Authority shall prepare, or cause to be prepared and maintain a master plan for the City District". Apart from this statutory requirement, the hazard profile and disaster history of the district demands for a comprehensive District Disaster Management Plan to be in place for coordinated and streamlined management of disaster in the District.

1.10 Levels of Disasters

'L' concept has been developed to define different levels of disasters in order to facilitate the responses and assistances to states and districts.

Level	Description	Activities
L0	Peace / Normal time	Prevention, Preparation and capacity building activities like training, preparation and updation of plans, mock drills, procurement of equipment etc.
L1	Can be managed at District Level	State and Central remain ready to assist if need arises
L2	Beyond the capacity of District	Require active participation and mobilizations of resources from State Government
L3	Resources of District and State Government have been overwhelmed	Require Central Government for reinstating the state and District machinery as well as for rescue, relief and other response and recovery measures.

1.11 Plan Development and Activation

As per Section 30 (2) (i) of the Disaster Management Act, 2005 the District Plan is to be prepared by the GMDMA following to the guidelines laid down by the National Disaster Management Authority and after consultation with local authorities. The District Plan prepared by the Disaster Management Department shall be approved by the State Authority.

Steps in a collaborative planning process while developing District Plan included – formation of Core Team, Understand Hazards, Vulnerabilities and risk of the District, plan development (develop and analyse course of action, identify resources, identify information needs), plan preparation (write, review, approve and disseminate) plan implementation and maintenance (exercise, review and maintain)

The plan would be activated considering the situation prevailing at a given point of time.

1.12 Review / Updation of DM Plan

Following each annual Monsoon Season, June through September, the Municipal Corporation for Greater Mumbai shall conduct a comprehensive review and revision of its Emergency Operations Plan to ensure the plan remains current, and the revised plan shall be adopted formally. Such review shall also be certified in writing by the Disaster Management Department, the Chief Executive Officer, and each Department Head.

Drafting an emergency operations plan is a MCGM effort and relies heavily on city administrators and experts to provide comprehensive guidance on hazard analysis, exercise design, evacuation planning, emergency response, recovery, emergency preparedness, and educational awareness.

The Director, DM, Municipal Corporation of Greater Mumbai will update the Disaster Management Plan annually. The Director, DM will coordinate with each emergency resource organization and assure the development and maintenance of an appropriate emergency response capability.

As the plan is developed from each current version, it should be reviewed and improved throughout the year to meet Municipal Corporation of Greater Mumbai's requirements.

1.13 Plan Testing

It is the responsibility of the Director, Disaster Management or Emergency Management to assure that the plan is tested and exercised on a scheduled basis. Actual emergency events where the plan is implemented and tested, can substitute for scheduled exercises.

Through formal After Action Reviews following significant disasters, emergency events, or scheduled exercises, suggested plan changes should be documented and compiled. Response planning lessons learned should be documented. Each of these changes should be incorporated into a new plan annually, and republished and redistributed at least every two years.

The plan must be updated upon any jurisdictional changes in areas covered by the plan.

1.14 Exercise

A Tabletop Exercise of the Disaster Management Plan will be held twice a year by the respective agencies; A functional drill for some portion of the plan will be held once a year; and a full-scale exercise will be held as scheduled by MCGM. These exercises or drills can be done in conjunction with other scheduled National or State exercises or drills.

The Director, Disaster Management will maintain the schedule and assure that the appropriate resources are available to complete these activities.

After each drill, exercise or actual event, an after-action review will take place. Any findings from these post-event reviews will be incorporated into a regularly scheduled update of the plan, to occur at least annually.

Section – 2

Institutional Development

Institutional Development

2. Institutional Development

The Disaster Management Act 2005 provides the legal and institutional framework for disaster management in India at the National, State and District level.

	Agencies	Roles & Responsibilities
2.1.1	National Disaster Management Authority (NDMA)	<p>NDMA, as the apex body, is mandated to lay down the policies, plans and guidelines for Disaster Management to ensure timely and effective response to disasters. Towards this, it has the following responsibilities:-</p> <ul style="list-style-type: none"> ▪ Lay down policies on disaster management ; ▪ Approve the National Plan; ▪ Approve plans prepared by the Ministries or Departments of the Government of India in accordance with the National Plan; ▪ Lay down guidelines to be followed by the State Authorities in drawing up the State Plan; ▪ Lay down guidelines to be followed by the different Ministries or Departments of the Government of India for the Purpose of integrating the measures for prevention of disaster or the mitigation of its effects in their development plans and projects; ▪ Coordinate the enforcement and implementation of the policy and plans for disaster management; ▪ Recommend provision of funds for the purpose of mitigation; ▪ Provide such support to other countries affected by major disasters as may be determined by the Central Government; ▪ Take such other measures for the prevention of disaster, or the mitigation, or preparedness and capacity building for dealing with threatening disaster situations or disasters as it may consider necessary; ▪ Lay down broad policies and guidelines for the functioning of the National Institute of Disaster Management.
2.1.2	National Executive Committee (NEC)	<ul style="list-style-type: none"> ▪ The NEC is the executive committee of the NDMA ▪ Assist the NDMA in the discharge of its functions and also ensure compliance of the directions issued by the Central Government. ▪ NEC is to coordinate the response in the event of any threatening disaster situation or disaster. ▪ NEC will prepare the National Plan for Disaster Management based on the National Policy on

		<p>Disaster Management.</p> <ul style="list-style-type: none"> ▪ NEC will monitor the implementation of guidelines issued by NDMA. ▪ It will also perform such other functions as may be prescribed by the Central Government in consultation with the NDMA.
2.1.3	National Institute of Disaster Management (NIDM)	<ul style="list-style-type: none"> ▪ The NIDM, in partnership with other research institutions has capacity development as one of its major responsibilities, along with training, research, documentation and development of a national level information base. ▪ It will network with other knowledge-based institutions and function within the broad policies and guidelines laid down by the NDMA. ▪ It will organize training of trainers, DM officials and other stakeholders. ▪ The NIDM will strive to emerge as a 'Centre of Excellence' in the field of Disaster Management.
2.1.4	National Disaster Response Force (NDRF)	<p>Non-Disaster Period</p> <ul style="list-style-type: none"> ▪ Acquire and continually upgrade its own training and skills ▪ Impart basic and operational level training to State Response Forces (Police, Civil Defence and Home Guards) ▪ Assist in Community Training & Preparedness 4. Liaison, Reconnaissance, Rehearsals and Mock Drills. <p>Impending Disaster</p> <ul style="list-style-type: none"> ▪ Proactive deployment during impending disaster situations <p>During Disaster</p> <ul style="list-style-type: none"> ▪ Specialized Response
2.1.5	Agencies Providing Early Warning Information	<p>1. Central Water Commission (CWC)</p> <ul style="list-style-type: none"> ▪ Under Ministry of Water Resources, GoI ▪ Forecasts flood ▪ Initiates, coordinates and in consultation of the State Governments concerned, furthers schemes for control, conservation and utilization of water resources for purpose of flood control, irrigation, navigation, drinking water supply and water power development <p>2. Indian Meteorological Department (IMD)</p> <ul style="list-style-type: none"> ▪ Monitors weather of Indian subcontinent and provides forecasting and other weather services ▪ During the cyclone and flood seasons, the DM, MCGM keeps close contact with the IMD – Mumbai office for weather related forecasts ▪ Immediately reports to state government all

		<p>earthquakes of magnitude 3.0 and above on Richter Scale occurring in the state</p> <p>3. Indian National Centre for Ocean Information Services (INCOIS)</p> <ul style="list-style-type: none"> ▪ Under Ministry of Earth Sciences, GoI ▪ Provides the coastal and ocean information services, supporting developmental and operational sectors like ports, fisheries, shipping, meteorology, environment, off shore and coastal zone management and promotes advanced oceanographic research in the country. ▪ Provides early warning system for Tsunami ▪ Disseminates critical parameters including wind, wave current, mixed layer depth, heat budget and maps on coral reef, mangroves, shore line change and land use pattern, tracks oil spills, etc.
<p>2.1.6</p>	<p>State Disaster Management Authority (SDMA)</p>	<p>According to the Disaster Management Act 2005 Section 14 each State mandates to establish State Disaster Management Authority (SDMA), which functions under the chairmanship of the Chief Minister. The SDMA has a clearly defined line of command and control.</p> <p>Section 18 : Powers and functions of State Authority.</p> <ol style="list-style-type: none"> 1. Subject to the provisions of this Act, a State Authority shall have the responsibility for laying down policies and plans for disaster management in the State. 2. Without prejudice to the generality of provisions contained in sub-section (1), the State Authority may- <ol style="list-style-type: none"> 1. Lay down the State disaster management policy. 2. Approve the State Plan in accordance with the guidelines laid down by the National Authority. 3. Approve the disaster management plans prepared by the departments of the Government of the State. 4. Lay down guidelines to be followed by the departments of the Government of the State for the purposes of integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefore. 5. Coordinate the implementation of the State Plan. 6. Recommend provision of funds for mitigation and preparedness measures.

		<p>7. Review the development plans of the different departments of the State and ensure that prevention and mitigation measures are integrated therein.</p> <p>8. Review the measures being taken for mitigation, capacity building and preparedness by the departments of the Government of the State and issue such guidelines as may be necessary.</p> <p>3. The Chairperson of the State Authority shall, in the case of emergency, have power to exercise all or any of the powers of the State Authority but the exercise of such powers shall be subject to ex post facto ratification of the State Authority".</p>
<p>2.1.7</p>	<p>State Executive Committee</p>	<p>According to the Disaster Management Act 2005 Section 20, there is provision that the State Executive Committee will be formed under the Chairmanship of (ex-officio) of Chief Secretary with four secretaries to the Government of the State of such departments as the State Government may thin fit, ex official, as committee members.</p> <p>The Maharashtra State Executive Committee was established in 2006.</p> <ul style="list-style-type: none"> • The SEC shall have the responsibility for implementing National Plan and State Plan and act as the coordinating and monitoring body for management of disaster in the State. • Coordinate and monitor the implementation of the National Policy, the National Plan and State Plan. • Examine the vulnerability of different parts of the State to different forms of disasters and specify measures to be taken for their prevention or mitigation. • Lay down guidelines for preparation of disaster management plans by the departments of the Government of the State and District Authorities. • Monitor the implementation of disaster management plans by the departments of the Government of the State and District Authorities. • Monitor the implementation of disaster management plans prepared by the departments of the Government of the State and District Authorities. • Monitor the implementation of the guidelines laid down by the State Authority for integrating of measures for prevention of disasters and mitigation by the departments in their development plans and projects.

		<ul style="list-style-type: none">• Evaluate preparedness at all governmental or non-governmental levels to respond to any threatening disaster situation or disaster and give directions, where necessary, for enhancing such preparedness.• Coordinate response in the event of any threatening disaster situation or disaster• Give directions to any Department of the Government of the State or any other authority or body in the State regarding actions to be taken in response to any threatening disaster situation or disaster.• Advise, assist and coordinate the activities of the Departments of the Government of the State, District Authorities, Statutory bodies and other governmental and non-governmental organizations engaged in disaster management.• Provide necessary technical assistance or give advice to District Authorities and local authorities for carrying out their functions effectively.• Advise, assist and coordinate the activities of the Departments of the Government of the State, District Authorities, statutory bodies and other governmental and non-governmental organisations engaged in disaster management.• Provide necessary technical assistance or give advice to District Authorities and local authorities for carrying out their functions effectively.• Advise the State Government regarding all financial matters in relation to disaster management.• Examine the construction, in any local area in the State and, if it is of the opinion that standards laid for such construction for the prevention of disaster is not being or has not been followed, may direct the District Authority or the local authority, as the case may be, to take such action as may be necessary to secure compliance of such standards.• Lay down, review and update State level response plans and guidelines and ensure that the district level plans are prepared, reviewed and updated.• Ensure that communication systems are in order and the disaster management drills are carried out periodically.
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		<ul style="list-style-type: none"> • Perform such other functions as may be assigned to it by the State Authority or as it may consider necessary.
2.1.8	State Institute of Disaster Management (SIDM)	<ul style="list-style-type: none"> ▪ The SIDM, in partnership with other research institutions has capacity development as one of its major responsibilities, along with training, research, documentation and development of a state level information base. ▪ It will network with other knowledge-based institutions and function within the broad policies and guidelines laid down by the SDMA. ▪ It will organize training of trainers, DM officials and other stakeholders. <p>The SIDM will strive to emerge as a 'Centre of Excellence' in the field of Disaster Management.</p>
2.1.9	State Disaster Response Force (SDRF)	<p>Maharashtra is a multi-disaster prone State. It is vulnerable to natural disasters like floods, cyclones, earthquakes, landslides etc. as well as manmade disasters like fire, building collapses etc. The NDRF has been constituted at the National level for effective response to such disasters. One battalion of the NDRF is posted in Mumbai for responding to disasters. However, this battalion is responsible for covering MMR regions. It is also the mandate of the NDMA that every state has to become self-sufficient in this regard and constitute a SDRF on their own. For the State of Maharashtra creation of a standalone SDRF was unanimously approved by the Cabinet. The following decisions in this regard were taken:</p> <ol style="list-style-type: none"> 1. Two Companies of the SDRF will be created in the State of the lines of the NDRF 2. Every company will consist of 3 teams. Every team will have 45 members. In total the SDRF will consist of 428 members. This will include the field level officials as well as the support staff. 3. Initially the posts will be filled on deputation basis from SRPF for a period for 5 years. The selection criteria will be finalized by a committee consisting of the Secretary, DMU, DG Maharashtra Police and Commandant NDRF. The salary component will be borne by the SDMA with a 10% incentive to the members of the SDRF over their current salary. 4. The NDRF and State Reserve Police Force (SRPF) will impart trainings to SDRF. 5. The other matters regarding the positioning of the force, establishment matters, location of headquarters, etc. will be decided by the State Executive Committee of the SDMA

2.2 Greater Mumbai Disaster Management Authority (GMDMA)

DMU 2017/CR344 (A)/DM1- In exercise of the powers conferred by sub-sections (1), (2) and (4) of section 25 of the Disaster Management Act, 2005 (53 of 2005) and rule 2 of the Maharashtra District Disaster Management (Composition of District Disaster Management Authorities for Districts of Mumbai City and Mumbai Suburban) Rules, 2018, and in supersession of the Government Notification, Revenue and Forests Department, the Government of Maharashtra hereby establishes the District Disaster Management Authority for the Mumbai City Districts, consisting of the following Chairperson and members for the purposes of the said Act, namely:-

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| (1) Senior Most, Additional Municipal Commissioner for Mumbai City, Municipal Corporation of Brihan Mumbai | <i>ex-officio Chairperson;</i> |
| (2) Commissioner of Police | <i>ex-officio Member;</i> |
| (3) Vice President, Maharashtra Housing and Area Development Authority (MHADA) | <i>ex-officio Member;</i> |
| (4) General Manager, Central Railway | <i>ex-officio Member;</i> |
| (5) General Manager, Western Railway | <i>ex-officio Member;</i> |
| (6) Additional Commissioner, Mumbai Metropolitan Region Development Authority (MMRDA) | <i>ex-officio Member;</i> |
| (7) Collector, Mumbai City District | <i>ex-officio Member;</i> |

	Agencies	Roles & Responsibilities
2.2.1	Greater Mumbai Disaster Management Authority (GMDMA)	<p>Section 30 (i): The District Authority shall act as the district planning, coordinating and implementing body for disaster management and take all measures for the purposes of disaster management in the district in accordance with the guidelines laid down by the National Authority and the State Authority.</p> <p>4. Without prejudice to the generality of the provisions contained in sub-section (1), the District Authority may-</p> <ul style="list-style-type: none"> i) Prepare a disaster management plan including district response plan for the district. ii) Coordinate and monitor the implementation of the National Policy, State Policy, National Plan, State Plan and District Plan iii) Ensure that the areas in the district vulnerable to disasters are identified and measures for the prevention of disasters and the mitigation of its effects are undertaken by the departments of the Government at the district level as well as by the local authorities iv) Ensure that the guidelines for prevention of disasters, mitigation of its effects, preparedness and response measures as laid down by the National Authority and the State Authority are followed by all departments of the Government at the district level and the local authorities in the district. v) Give directions to different authorities at the district level and local authorities to take such other measures

		<p>for the prevention or mitigation of disasters as may be necessary</p> <ul style="list-style-type: none"> vi) Lay down guidelines for prevention of disaster management plans by the department of the Government at the districts level and local authorities in the district. vii) Monitor the implementation of disaster management plans prepared by the Departments of the Government at the district level. viii) Lay down guidelines to be followed by the Departments of the Government at the district level for purposes of integration of measures for prevention of disasters and mitigation in their developments plans and projects and provide necessary technical assistance therefor ix) Monitor the implementation of measures referred to in clause (viii) x) Review the state of capabilities for responding to any disaster or threatening disaster situation in the district and given directions to the relevant departments of authorities at the district level for their upgradation as may be necessary. xi) Review the preparedness measures and given directions to the concerned departments at the district level or other concerned authorities where necessary for bringing the preparedness measures to the levels required for responding effectively to any disaster or threatening disaster situation xii) Organise and coordinate specialized training programmes for different levels of officers, employees and voluntary rescue workers in the district xiii) Facilitate community training and awareness programmes for prevention of disaster or mitigation with the support of local authorities, governmental and non-governmental organizations. xiv) Set up, maintain, review and upgrade the mechanism for early warnings and dissemination of proper information to public; xv) Prepare, review and update district level response plan and guidelines; xvi) Coordinate response to any threatening disaster situation or disaster; xvii) Ensure that the Departments of the Government at the district level and the local authorities prepare their response plans in accordance with the district response plan; xviii) Lay down guidelines for, or give direction to, the concerned Department of the Government at the
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	<p>district level or any other authorities within the local limits of the district to take measures to respond effectively to any threatening disaster situation or disaster;</p> <p>xix) Advise, assist and coordinate the activities of the Departments of the Government at the district level, statutory bodies and other governmental and non-governmental organisations in the district engaged in the disaster management;</p> <p>xx) Coordinate with, and given guidelines to, local authorities in the district to ensure that measures for the prevention or mitigation of threatening disaster situation or disaster in the district are carried out promptly and effectively;</p> <p>xxi) Provide necessary technical assistance or give advise to the local authorities in the district for carrying out their functions;</p> <p>xxii) Review development plans prepared by the Departments of the Government at the district level, statutory authorities or local authorities with a view to make necessary provisions therein for prevention of disaster or mitigation;</p> <p>xxiii) Examine the construction in any area in the district and, if it is of the opinion that the standards for the prevention of disaster or mitigation laid down for such construction is not being or has not been followed, may direct the concerned authority to take such action as may be necessary to secure compliance of such standards;</p> <p>xxiv) Identify buildings and places which could, in the event of any threatening disaster on or disaster be used as relief centers or and make arrangement for water in such building</p> <p>xxv) Establish stockpiles of relief and rescue materials or ensure preparedness to make such materials or ensure preparedness to make such materials available at a short notice;</p> <p>xxvi) Provide information to the State Authority relating to different aspects of disaster management.</p> <p>xxvii) Encourage the involvement of non-governmental organisations and voluntary social-welfare institutions working at the grassroots level in the district for disaster management;</p> <p>xxviii) Ensure communication systems are in order, and disaster management drills are carried out periodically;</p> <p>xxix) Perform such other functions as the State Government or State Authority may assign to it or as it deems necessary for disaster management in the District.</p> <p>The Chairperson of the State Authority shall, in the case of emergency, have power to exercise all or any of the powers of</p>
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		the State Authority but the exercise of such powers shall be subject to ex post facto ratification of the State Authority".
2.2.2	City Institute of Disaster Management (CIDM)	<ul style="list-style-type: none"> ▪ Provides training related to disaster management in coordination with SIDM. ▪ Undertakes activities for human resource development, public education and community awareness, safety etc. in disaster education and management
2.2.3	Mumbai Fire Brigade	<ul style="list-style-type: none"> ▪ Provides crucial immediate response during any disaster ▪ Provides regular training to the fire staff in using and maintaining the equipment
2.2.4	Emergency Support Functions (ESF)	<p>Emergency Support Functions (ESF) are the essentials of Emergency Management that provide the coordination mechanisms among the various agencies; they provide the organization and process to plan, manage and coordinate specific response and preparedness activities common to - any hazardous event that can result in an emergency from the most frequent one to the most extreme one. Each ESF is headed by a lead agency and is supported by identified support agencies. These ESFs form an integral part of the Emergency Operation Centers and each ESF would coordinate its activities from the Municipal Corporation of Greater Mumbai Emergency Operations Center (EOC).</p> <ul style="list-style-type: none"> ▪ To carry out pre-event planning and preparedness, response during the event and immediate recovery. ▪ In case of disaster or an emergency, the Lead Agency will take actions to identify requirements and work with the support agencies and other ESFs to mobilize and deploy resources to the affected area. ▪ During regular times, each ESF plans and prepares for emergencies through reviews of the planning assumptions, drills, table top exercises and preparation and reviews of the Standard Operation Procedures ▪ Preparedness and planning activities are essentials to ensure adequate response and to identify areas of action that would ultimately reduce disaster risk.
2.2.5	Civil Defence	<p>As per DM Act 2005, it is mandatory for NDMA to ensure Civil Defence Preparedness for disaster Management. In the light of Section 10 (p) of DM Act 2005, i.e. to promote general education & awareness related to disaster management, suggested roles of Civil Defence in various phases of disaster are enumerated below for information and necessary action.</p> <p>Pre-disaster</p> <p>a) Educating the Community</p> <ul style="list-style-type: none"> ▪ Taking a lead role in spreading public awareness about the various kinds of disasters and possible community responses to them. ▪ Educating/training the people at grass-roots level in vulnerable areas as a part of community capacity building to respond to any disaster situation. ▪ Liaising with print and electronic media for regular

		<p>publicity of civil Defence activities, including utilization of local TV channels to conduct discussion, debated, etc., on civil defence.</p> <ul style="list-style-type: none"> ▪ Holding regular mock drills, exercises and rehearsal of civil defence activities, to generate public interest. ▪ Preparing publicity material, literature and brochures about Civil Defence and distributing these in events related to Civil Defence. ▪ Organizing public functions to honour persons who have contributed to the Civil Defence cause by participating in its activities. <p>b) Civil Defence Awareness in Schools</p> <ul style="list-style-type: none"> ▪ Taking guest lecturers in schools, holding demonstrations, showing films, visits to Civil Defence establishments, etc. ▪ Holding camps for students to provide them basic training in skills for Civil Defence/Disaster Management. <p>c) Sensitizing Government Servants</p> <ul style="list-style-type: none"> ▪ Holding seminars and workshops in government departments to sensitize government servants at various levels about Civil Defence functions and their role in a disaster scenario. ▪ Identifying suitable personnel in local government offices, in consultation with the Head of Office, and sponsoring them for various courses in Civil Defence. ▪ Maintaining a record of ‘trained government servants’ and keeping in regular communication with them to ensure their constant association with Civil Defence activities. ▪ Developing resource personnel particularly in those government departments which would not be directly involved in any Disaster Management effort, since officials of police, health, supplies, revenue, etc., may not be available to Civil Defence in the event of a disaster. <p>d) During Disasters</p> <ul style="list-style-type: none"> ▪ Assisting in taking precautionary measures whenever any advance warning is received about any Natural disaster. ▪ Helping in evacuation of population to less vulnerable areas depending on the nature of disaster. ▪ Launching search and rescue operations. ▪ Providing first aid to injure and transporting them to nearby medical centers / hospitals ▪ Setting up ‘Information and Guidance Centers’ for providing information regarding missing persons, injured, etc., and also information about the nature of facilities and assistance available to affected people ▪ Participating in distribution of relief material to affected people. ▪ Assisting police/traffic police in ensuring smooth
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		<p>movement of emergency vehicles in the affected areas.</p> <ul style="list-style-type: none"> ▪ Helping the local administration in assessing the extent of loss to life and property. ▪ Training Infrastructure in States have been upgraded ▪ Disaster Awareness Training is conducted involving Civil Defence, NCC, NSS in Districts.
2.2.6	Regional Meteorological Centre, Colaba	<ul style="list-style-type: none"> ▪ To take meteorological observations and to provide current and forecast meteorological information for optimum operation of weather-sensitive activities like agriculture, irrigation, shipping, aviation, offshore oil explorations, etc. ▪ To warn against severe weather phenomena like tropical cyclones, nor westers, dust storms, heavy rains and snow, cold and heat waves, etc., which cause destruction of life and property. ▪ To provide meteorological statistics required for agriculture, water resource management, industries, oil exploration and other nation-building activities. ▪ To conduct and promote research in meteorology and allied disciplines. ▪ To detect and locate earthquakes and to evaluate seismicity in different parts of the country for development projects.
2.2.7	NDRF	<p>3 teams of National Disasters Response Force are positioned in Mumbai to respond emergencies / disasters</p> <p>Non-Disaster Period</p> <ul style="list-style-type: none"> ▪ Acquire and continually upgrade its own training and skills ▪ Impart basic and operational level training to State Response Forces (Police, Civil Defence and Home Guards) ▪ Assist in Community Training & Preparedness ▪ Liaison, Reconnaissance, Rehearsals and Mock Drills. <p>Impending Disaster</p> <ul style="list-style-type: none"> ▪ Proactive deployment during impending disaster situations <p>During Disaster</p> <ul style="list-style-type: none"> ▪ Specialized Response
2.2.8	Emergency Operation Centre	<p>This facility is available at Municipal Head Office at Mumbai. Main & Back Up EOCs are functional. Both EOCs at MCGM Head Office & Parel are functioning 24 x 7 round the year. During non-emergency time it is functioning as “Watch & Ward” regime and during emergencies, it activated to a full scale within a short time frame. It is closely connect with other agencies who provide early warning. The Mumbai Emergency Operations Center’s structure, detailed SOPs on role and responsibilities of the stakeholders and the functional aspects are given separately along with its equipment profiling.</p> <p>In case of L1 emergency in Mumbai City, Chairman, DDMA, Mumbai City District will take charge of Main EOC.</p>

<p>2.2.8.1</p>		<p>Activation: The Municipal Commissioner or Director, Disaster Management, CCRS, MCGM may activate the EOC if the following conditions exist:</p> <ul style="list-style-type: none"> ▪ If there exists an imminent threat to public safety or health on a large scale; ▪ If an extensive State government, District government, or National government ▪ Response and coordination will be required to resolve or recover from the emergency or disaster event; ▪ If the disaster affects multiple Wards within MCGM that rely on the same resources to resolve major emergency incidents; or ▪ If the Local Emergency Declaration Ordinance is implemented to control the major emergency or disaster event. (Note: this mechanism is not currently in place)
<p>2.2.8.2</p>		<p>Functions During Non-Emergency Period</p> <ol style="list-style-type: none"> 1. Keep the EOC functional in all respects so as to perform the duties effectively during emergency time. 2. Keep maps updated with latest development 3. Keep resource data and GIS map updated and update the resource inventory. 4. Keep communication links active 5. Receive daily feedback from the ward as well as other stakeholders regarding any incidences, maintain telephone, and radio logs. 6. Keep contact details of all stakeholders and response forces. 7. Update Mumbai Disaster Management Plan including mutual aid schemes. 8. Media management as and when required with only the authorized PR Officer interacting. 9. Internal funds accounting and management. 10. Keep EOC staff well trained. <p>During Emergency Time:</p> <ol style="list-style-type: none"> 1. Ensure updating of information to the Chief Secretary, Mayor, Chairman's, Municipal Commissioner, Addl MC and all the members of the GMDMA. 2. Maintain communication between the EOC and affected Wards and get periodic feedbacks. 3. Maintain log of activities carried out during emergency. 4. Make arrangements of meetings of stakeholders in the EOC. 5. Keep track of all info and intelligence for dissemination to all concerned. 6. Ensure dissemination of orders / information to all Wards & Stakeholders 7. Media management

		8. Management of funds, resource and aid																														
2.2.9	Back up Emergency Operation Centre	As a disaster recovery site, a backup EOC is established at Parel with replica of primary EOC. .																														
2.3	Command and Control	Being a key communication hub, EOC works under the control of Municipal Commissioner at district level. Its involvement in coordination, monitoring and supporting the overall emergency instantly.																														
2.4	Ward Emergency Operations Centers	<p>During disaster situation the respective wards will activate their SOPs for managing the disasters.</p> <p>The response structure given in the ward plan essentially limits itself to micro-level intervention. When more than one wards are affected, EOC, MHO which is the coordinating authority, would expect the ward officers to co-ordinate the activities at the ward level with the line agencies such as fire Brigade, police etc. The responsibilities for the ward level functionaries have been identified.</p> <table border="1"> <thead> <tr> <th>Sr No.</th> <th>Ward EOC</th> <th>Areas</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>A</td> <td>CST, Colaba, Churchgate</td> </tr> <tr> <td>2.</td> <td>B</td> <td>Sandhurst Road, Part of Maszid</td> </tr> <tr> <td>3.</td> <td>C</td> <td>Marine Lines</td> </tr> <tr> <td>4.</td> <td>D</td> <td>Mumbai Central, Grant Road, Tardeo</td> </tr> <tr> <td>5.</td> <td>E</td> <td>Byculla</td> </tr> <tr> <td>6.</td> <td>F/S</td> <td>Parel, Siwri</td> </tr> <tr> <td>7.</td> <td>F/N</td> <td>Sion to Matunga</td> </tr> <tr> <td>8.</td> <td>G/S</td> <td>Parel, Mahalxmi</td> </tr> <tr> <td>9.</td> <td>G/N</td> <td>Dadar, Matunga, Mahim</td> </tr> </tbody> </table>	Sr No.	Ward EOC	Areas	1.	A	CST, Colaba, Churchgate	2.	B	Sandhurst Road, Part of Maszid	3.	C	Marine Lines	4.	D	Mumbai Central, Grant Road, Tardeo	5.	E	Byculla	6.	F/S	Parel, Siwri	7.	F/N	Sion to Matunga	8.	G/S	Parel, Mahalxmi	9.	G/N	Dadar, Matunga, Mahim
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2.5	Planning Authorities	<p>There are 4 main Planning Authorities in Mumbai</p> <ol style="list-style-type: none"> 1. MCGM 2. MMRDA 3. MHADA 4. PWD <p>These bodies have their own Disaster Management Department & Plans. They will ensure capacity building of their officers and employees for managing disasters; carry out relief, rehabilitation and reconstruction activities in the affected areas.</p>																														
2.6	Stakeholder of the Mumbai DM Plan	<p>MCGM has also established links with other organizations and stakeholders, such as academic institutions and professional organizations working in the city in order to increase participation and mobilize additional technical and financial support for DRM activities in Greater Mumbai. This resource list includes the following organizations and stakeholders</p> <table border="1"> <thead> <tr> <th>Disaster</th> <th>Agencies</th> </tr> </thead> <tbody> <tr> <td>Earthquake</td> <td>IMD, MERI, NGRI, GIS, NDRF</td> </tr> <tr> <td>Floods</td> <td>IMD, MCGM, NDRF</td> </tr> <tr> <td>Cyclones</td> <td>IMD, NDRF</td> </tr> <tr> <td>Epidemics</td> <td>Public Health Dept, MCGM & GoM</td> </tr> <tr> <td>Road Accidents</td> <td>Police, Medical Services</td> </tr> </tbody> </table>	Disaster	Agencies	Earthquake	IMD, MERI, NGRI, GIS, NDRF	Floods	IMD, MCGM, NDRF	Cyclones	IMD, NDRF	Epidemics	Public Health Dept, MCGM & GoM	Road Accidents	Police, Medical Services																		
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		Industrial & Chemical Accidents	Industry, MARG, Police, BARC, DISH, NDRF
		Fires	Fire Brigade, Police
2.6.1	Stakeholders located in Mumbai but not within the juridical control of Mumbai but would be co-opted during emergencies	<ol style="list-style-type: none"> 1. NDRF 2. Armed Forces 3. IMD 4. BARC 5. IIT 6. CISF 7. Railways 8. Airport Authority of India 9. Mumbai Port Trust 10. Pawan Hans 11. MSEB 12. Reliance Energy 	
2.7	Fund Provision	<p>2.7.1 Under Disaster Management Act, 2005 Chapter IX following provisions are made</p> <p>46- National Response Fund The Central Government may, by notification in the Official Gazette, constitute a fund to be called the National Disaster Response Fund for meeting any threatening disaster situation or disaster and there shall be credited thereto---</p> <ol style="list-style-type: none"> 1. An amount which the Central Government may, after due appropriation made by Parliament by law in this behalf provide; 2. Any grants that may be made by any person or institution for the purpose of disaster management <p>The National Response Fund shall be made available to the National Executive committee to be applied towards the meeting expenses for emergency response, relief and rehabilitation in accordance with the guidelines laid down by the Central Government in consultation with the National Authority.</p> <p>47 - National Disaster Mitigation Fund:</p> <ol style="list-style-type: none"> 1. The Central Government may, by notification in the official Gazette, constitute a fund to be called the National Disaster Mitigation Fund for projects exclusively for the purpose of mitigation and there shall be a credited thereto such amount which the Central Government may, after due appropriation made by the Parliament by law in this behalf, provide. 2. The National Disaster Mitigation Fund shall be applied by the National Authority. <p>48 - Establishment of funds by State Government:-</p> <ol style="list-style-type: none"> 1. The State Government shall, immediately after notification issued for constituting the State Authority and the District Authorities, establish for the purposes of this Act the following funds namely:- <ol style="list-style-type: none"> a. The fund to be called State Disaster Response Fund: b. The fund to be called the District Disaster Response Fund: 	

		<p>c. The fund to be called State Disaster Mitigation Fund: d. The fund to be called the District Disaster Mitigation Fund.</p> <p>2. The State Government shall ensure that the funds established – (i) Under clause (a) of sub section (1) is available to the State Executive Committee: (ii) Under sub-clause © of sub section (1) is available to the State Authority. (iii) Under clause (b) and (d) of sub section (1) are available to the District Authority.</p> <p>Funds available with Municipal Corporation of Greater Mumbai: - Provision of Rs. 5 Crore made under ‘Natural Disaster Response Fund’ for Greater Mumbai by MCGM. It was proposed to devide the fund in two districts with the name District Disaster Response Fund’ & ‘District Disaster Mitigation Fund’. Approval is awaited from Chairmans of the Authroity.</p>
<p>2.7.2</p>		<p>Disaster Management Act, 2005, Section 50, Emergency Procurement and Accounting</p> <p>Where by reason of any threatening disaster situation or disaster, the National Authority, or the District Authority is satisfied that immediate procurement of provisions or materials or immediate application of resources are necessary for rescue or relief,- (a) It may authorize the concerned department or authority to make the emergency procurement and such case, the standard procedure requiring inviting of tenders shall be deemed to waived: (b) A certificate about utilization of provisions or materials by the controlling officer authorized by National Authority, State Authority, or District Authority, as the case may be, shall be deemed to be a valid document or voucher for the purpose of accounting of emergency, procurement of such provisions or materials.</p>
<p>2.7.3</p>		<p>B.M.C. Act 1888 Section 119 Financial Management Regulations</p> <p>119 – (1) On the written requisition of a Secretary to 1(the2 (state) Government), the Commissioner may at any time undertake the execution of any work certified by such Secretary to be urgently required in the public service, and for this purpose may temporarily make payment from the Municipal fund, so far as the same can be made without unduly interfering with the regular working of the Municipal administration. The cost of all work so executed and of the establishment engaged in executing the same shall be paid by the 1(the 2 (state) Government) and credited to the Municipal fund.</p> <p>A- General Information</p> <ul style="list-style-type: none"> ▪ Policy concerning purchasing, supplies, material, equipment and contractual services for MCGM Disaster

		<p>Management will be made by Deputy Municipal Commissioner (C.P.A.). All fund received, regardless of their sources, are to be expended under the procedure set forth herein.</p> <ul style="list-style-type: none"> ▪ As per powers delegated, competent officer has the sole authority for ordering, supplies, materials, equipment and contractual services. ▪ Procurement requirements shall not be artificially divided so as to constitute a small purchase. ▪ Personal items will not be allowed to be purchased from MCGM fund at any time. ▪ Purchase orders are required for the procurement of any furniture and fixtures, equipment, materials, supplies and contractual services. Approved requisitions are forwarded to purchasing for processing. <p>B- Allowable expenditures</p> <ul style="list-style-type: none"> ▪ Allowable expenditure are those ordinary and necessary for items required to carry out the mission of the department. ▪ The following procedures for procurement of goods and services. No purchase will be allowed without an approved purchase order. Purchase requisition in triplicate (Two copies for purchasing, one retained in department). ▪ Proper digit account number, Complete vendor name, complete vendor address, Description of the physical and/or functional characteristics of the items or services to be purchased, quality where applicable, quantity, approximate or actual amount, date and location of supply. <p>C- Requisitions will not be processed without sufficient budget.</p> <p>D- Open purchase order may be established for routine purchases. When an encumbrance is expended, a new purchase requisition is required to establish another open purchase order.</p> <p>E- If an emergency situation arises, please notify the purchasing office right away so that arrangement for establishing a purchase order can be made promptly. “An emergency condition is a situation which creates a threat to public health, welfare, or safety such as may arise by reason of floods, epidemics, riots, equipment failures or similar events. The existence of emergency condition creates an immediate and serious need for services, construction, or items of tangible personal property that cannot be met through normal procurement methods and lack of which would seriously threaten:</p> <ul style="list-style-type: none"> ▪ The functioning of Government. ▪ The preservation or protection of property. ▪ The health or safety of any person. <p>The purchase without using the bidding process for items, if</p>
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		the items or services are under the contract with State or Central Government agencies, the contract number and contract ending date must be included on the purchase requisition. This requires some preplanning.
2.7.4		<p>MCGM Procedures for Reimbursement of Expenditure</p> <p>Disaster Management Department of MCGM maintains a small petty cash fund for small purchase reimbursement only. The receipt approved by Head of the Department for the petty cash purchase should be submitted for payment. Rs. 1 lacs in advance are given to Assistant Commissioners of the wards to manage the expenditure during disaster situation and if required more, sanction of competent authority is required.</p>
2.7.5		<p>MCGM Financial Management Responsibilities</p> <p>MCGM has its own Disaster Management Cell with well equipped Emergency Operation Centre with an around-the-clock staff with own budget for day-to-day expenditures, various disaster related projects and expenses occurred in disaster period. In MCGM, various departments are directly related to disasters such as Fire-Brigade, Storm Water Drain, Solid Waste Management, Hydraulic Engineer, Roads, Sewer, Health and others they made their own budget provisions for prevention, mitigation (Response) and post disaster activities. As far as payment to resources arranged during disaster, DMU pays the same after getting approval of competent authority.</p>

Section- 3

Hazard, Risk and Vulnerability Profile

Hazard, Risk and Vulnerability Profile

3.1 City Profile

The city of Mumbai lies on Salsette Island. Administratively it has two official divisions: Mumbai City district and Mumbai Suburban district. Mumbai City district consists of the island city that lies to the south of Salsette Island. This region is called South Mumbai. The western part of Mumbai Suburban district (to the west of Sanjay Gandhi National Park) is called the Western Suburbs and the eastern part of the district is called the Eastern Suburbs.

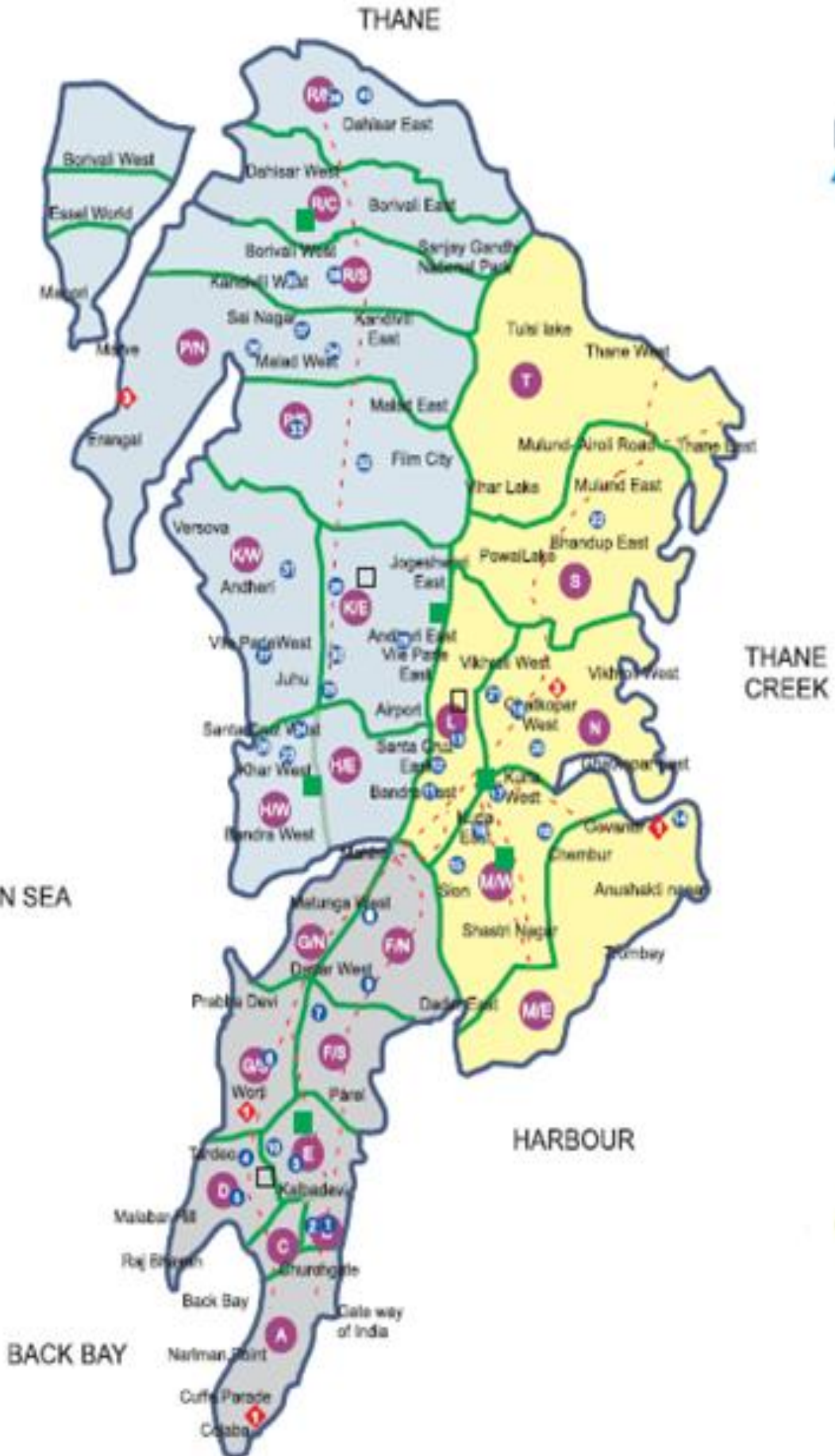
The Mumbai Metropolitan Region is largely comprised of lowlands located west of the Sayhadri hills with an average elevation of less than 100 metres above sea level. The Region has a varied landscape. A series of North-South hill ranges mark the centre and East, several rivers run across the land and there is a long coastline with estuaries, bays and creeks in the North and the South.

Geologically, the region is in the Deccan lava country with basalt constituting major formations with the exception of Greater Mumbai, which has a different geology. Hot springs are found at Vajreshwari, Ganeshpuri and Akloli. Other features of geological value include several features within Greater Mumbai viz. Gilbert Hill at Andheri (with hexagonal basaltic columns), Sewri (with pillow lavas), Worli Hills (frog beds- intra-trappean beds of great scientific value) and the raised beaches of Manori (which are a record of significant historical geological processes).

The climate of MMR is equable with no large seasonal variations. Proximity to the sea results in high humidity. The region experiences a hot, humid summer and a mild winter. The monsoons are marked by particularly heavy rains and the average rainfall is over 2000 mm per annum. Temperatures have been increasing over the years and summers have been.

3.1.1 Administrative Profile of Mumbai City District

Area	Size	Administrative Unit (Wards)
City	67.71 sq.km.	9



3.1.2 Geographical Profile:

<p>Area</p>	<ul style="list-style-type: none"> • Mumbai is located on the western sea o o coast of India from 18 53' North to 19 16' North o o Latitude and from 72 East to 72 59' East Longitude. • It was originally a cluster of seven islands. Later on these islands were joined to form present Mumbai. • The total land of Greater Mumbai identified in Earlier Draft Development Plan 2034 (EDDP) was 458.28 sq km. • The Municipal Corporation of Greater Mumbai (MCGM), however, was the Planning Authority of area that was more modest, since about 9.43% of the cited area fell under the jurisdiction of Special Planning Authorities (SPA).Three such SPA exist in Fgreater Mumbai- MMRDA, SRA, MIDC. • The EDDP therefore prepared a development plan for 415.05 sq.km. Total area specified by Surveyor General is 603 sq.km., which includes territorial waters extended into sea up to 12 nautical miles measured from appropriate base line. Its maximum width is 17 km. (East to West) and length is 42 km. (North to South).
<p>Metropolitan Region</p>	<ul style="list-style-type: none"> • Spread over the districts of Thane and Raigad, the Mumbai Metropolitan Region (MMR) covers an area over 4,355 sq. km comprising eight Municipal Corporations, 9 Municipal Councils along with other towns and villages. The population of the Mumbai Metropolitan. Region is 22.8 million (Census 2011) • The climate of MMR is equable with no large seasonal variations. Proximity to the sea results in high humidity. The region experiences a hot, humid summer and a mild winter. The monsoons are marked by particularly heavy rains and the average rainfall is over 2000 mm per annum. Temperatures have been increasing over the years and summers have been getting hotter. Monsoons also have been recording very heavy rains of high intensity within 24-hour duration.
<p>Major Rivers</p>	<ul style="list-style-type: none"> • No river in Mumbai City district but in adjoining suburban district four small rivers are flowing <ul style="list-style-type: none"> ○ Mithi River ○ Dahisar River ○ Poinisar (or Poisar) ○ Ohiwara (or Oshiwara) • These rivers originating in the National Park. The Mithi River originates from Tulsi Lake and gathers water overflowing from Vihar and Powai Lakes. • Three lakes are located within the metropolitan limits – <ul style="list-style-type: none"> ○ Tulsi Lake

	<ul style="list-style-type: none"> ○ Vihar Lake ○ Powai Lake ● The first two are located within the Borivali National Park and supply part of the city's drinking water. ● Other lakes that supply water to the city include Lower Vaitarna, Upper Vaitarna and Tansa Lake. 																																	
Coastline	<ul style="list-style-type: none"> ● Over 146.43 Kms. ● The coastline of the city is indented with numerous creeks and bays stretching from Thane creek on the eastern to Madh Marve on the western front. The eastern coast of Salsette Island is covered with large mangrove swamps, rich in biodiversity, while the western coast is mostly sandy and rocky. 																																	
Mangrove Cover	<ul style="list-style-type: none"> ● 3961.9 ha ● An area of 14.96 sq km, newly identified in the ELU, is proposed to be merged within municipal limits and form a part of the City's Natural Area. ● For Greater Mumbai the environmental features play a crucial role. The mangroves guard against tidal erosions and support an ecosystem of flora & fauna; rivers & natural drains prevent flooding and the greens function as lungs aside from supporting flora & fauna. In addition to maintaining ecological balance, the environmental features can become excellent recreational spaces, improve the quality of urban environment and contribute to the city's image. A significant amount such of land could be utilized smartly to transform Mumbai into a very attractive and livable city, offering great quality of life. 																																	
Tree Cover	<table border="1"> <thead> <tr> <th>Sr No.</th> <th>Ward</th> <th>No. of Trees</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>A</td> <td>83201</td> </tr> <tr> <td>2</td> <td>B</td> <td>7816</td> </tr> <tr> <td>3</td> <td>C</td> <td>5756</td> </tr> <tr> <td>4</td> <td>D</td> <td>100317</td> </tr> <tr> <td>5</td> <td>E</td> <td>58028</td> </tr> <tr> <td>6</td> <td>F_South</td> <td>184837</td> </tr> <tr> <td>7</td> <td>F_North</td> <td>87240</td> </tr> <tr> <td>8</td> <td>G_South</td> <td>96620</td> </tr> <tr> <td>9</td> <td>G_North</td> <td>94774</td> </tr> <tr> <td colspan="2">Total</td> <td>718589</td> </tr> </tbody> </table>	Sr No.	Ward	No. of Trees	1	A	83201	2	B	7816	3	C	5756	4	D	100317	5	E	58028	6	F_South	184837	7	F_North	87240	8	G_South	96620	9	G_North	94774	Total		718589
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3.1.3 Demography

Population	Census Year	Population	Decadal Variation	% Decadal Variation
	1961	2,771,933	442,913	19.02
	1971	3,070,378	298,445	10.77
	1981	3,285,040	214,662	6.99

	1991	3,174,889	-110,151	-3.35	
	2001	3,338,031	163,142	5.14	
	2011	3,085,411	-252,620	-7.57	
Population Distribution	Within Greater Mumbai, the population of the Suburban District is larger than that of the Island City. Further, the share of Suburban population has been increasing consistently since 1981 with City population showing the opposite trend.				
	Area	% of Population to total population			
		1981	1991	2001	2011
	City	39.85	31.99	27.87	24.79
Ward wise population	Ward	Area (ha)	Population	Gross Density 2011 (PP ha)	
	A	1121	185,014	165	
	B	266	127,290	479	
	C	191	166,161	869	
	D	830	346,866	418	
	E	717	393,286	548	
	F_South	965	360,972	374	
	F_North	1,201	529,034	441	
	G_South	929	377,749	407	
	G_North	876	599,039	684	
Slum Population	In 2001 the slum population in Greater Mumbai constituted 52.52% of the total population (excluding the areas notified under SPAs). In 2011 this figure came down to 41.85% (including the areas notified under SPAs). However, the extent of slums has increased as per satellite images. Slums are mostly located along watercourses/creeks, on precarious hillsides, in lowlying areas, on the periphery of forests and along railway tracks.				
	Ward	Slum Population			
	A	63,400			
	B	14,400			
	C	0			
	D	33,000			
	E	77,800			
	F_South	95,200			
	F_North	308,400			
	G_South	78,300			
	G_North	189,600			

Sex Ratio	As per Census 2011, the overall sex ratio of Greater Mumbai is 853, lower than the State average of 925 and the National average of 940. The figure has grown from 809 in the 2001 Census. The ratio for population below the age of 6 is 913, higher than the State average of 883 and in line with the National average of 914. This ratio has however declined from the figure of 922 recorded in 2001.	
Literacy Rate	The districts of Greater Mumbai lead the State in literacy rates. Mumbai suburban recorded 89.2 literacy rate	
Birth Rate	12.14 per 1000	
Death Rate	6.98 per 1000	
Infant Mortality Rate (IMR)	26.33 per 1000	

3.1.4. Climate

The climate of MMR is equable with no large seasonal variations. Proximity to the sea results in high humidity. The region experiences a hot, humid summer and a mild winter. The monsoons are marked by particularly heavy rains and the average rainfall is over 2000 mm per annum. Temperatures have been increasing over the years and summers have been getting hotter. Monsoons also have been recording very heavy rains of high intensity within 24-hour duration.

Year / Month	June	July	August	September	Total
Year					Colaba Average Rainfall
2007	848	500	678	95	2120
2008	933	675	368	342	2319
2009	264	742	204	519	1729
2010	948	1182	882	156	3169
2011	462	1387	704	333	2886
2012	255	332	528	319	1434
2013	955	881	228	307	2371
2014	58	1408	438	276	2179
2015	866	285	188	265	1605
2016	585	738	450	733	2507
2017	565	524	646	518	2253
2018	794	739	188	59	1780
Average	613	787	483	351	2234

3.1.5 Social Profile

3.1.5.1 Religion

Hinduism is majority religion in Greater Mumbai with 65.99 % followers. Islam is second most popular religion in city of Mumbai with approximately 20.65 % following it. In Mumbai city, Christianity is followed by 3.27 %, Jainism by 4.10 %, Sikhism by 0.49 % and Buddhism by 0.49 %. Around 0.40 % stated 'Other Religion', approximately 0.26 % stated 'No Particular Religion'.

Religion wise population of the District is mentioned in Table 2.4

Religion	Total	Percent of total Population (2011)
Hindu	82,10,894	65.99%
Muslim	25,68,961	20.65%
Buddhists	6,03,825	4.85%
Jain	5,09,639	4.10%
Christian	4,07,031	3.27%
Sikh	60,759	0.49%
Others	49,439	0.40%
Not stated	31,825	0.26%

3.1.6 Economic Profile

Greater Mumbai's economy has transformed over time from a major trading port to a manufacturing hub (particularly famous for textiles) and then into a services and financial centre. While the decline of the textile industry was due to a variety of factors, the intention of the Government to decongest the City and to disperse industrial activity saw re-location of many manufacturing units.

Further, with the unleashing of economic reforms in 1991, new economic opportunities were opened up in sectors such as IT & ITES, entertainment, hospitality, banking, financial services and insurance. Mumbai which already had a firm base in some of these sectors established its leadership in these new services activities. Many economic indicators such as banking transactions, stock exchange trading volumes, tax revenue share, and foreign investors' presence all testify to the City's dominance of these spheres. These have led to ambitious plans for establishing Mumbai as an International Financial Centre. The capital of Maharashtra has an estimated GDP of \$310 billion. The financial and commercial capital of country contributes more than 6 percent of nation's GDP, 10 percent of factory employment, 60 percent of customs duty collection, and 30 percent of income tax collections. Mumbai is ranked sixth among the top ten cities with most billionaires; the city has presence of 28 billionaires.

Mumbai houses the headquarters of a large number of major Indian companies like Tata Group, Reliance Industries, Aditya Birla Group, Larsen & Toubro, Godrej Group, and Hindustan Petroleum among others. The city is also headquarters Reserve Bank of India, National Stock Exchange, and Bombay Stock Exchange.

Greater Mumbai's economy has undergone transformation from manufacturing activity to services activity. Around 70% of industrial activity is in the services sector. Greater Mumbai's economy has grown at a remarkable rate of 9%. At constant prices in the year 2008-09, the Net District Domestic Product of Mumbai was pegged at over Rs. 138,007 Crores accounting for around 24% of Maharashtra's Net State Domestic Product. The per capita income in Greater Mumbai is about twice the national average.

Only 9% of the population of Greater Mumbai earns more than Rs. 60,000 per month and 25% of the households earn less than Rs. 12,500 per month. Given that the cost of housing is much higher than the affordable range (median income at Rs 20,000) of 4-5 times a family's annual gross income, nearly half of the population is unable to afford to own a house, even of minimum standards.

3.1.7 Land Use Planning

The Planning Area of Greater Mumbai is substantially already developed. The ELU 2012 placed the developed area at 65.34%. 34.66% contains Natural Areas, Vacant Lands, Plantations and Salt Pans. 24.88% is occupied by Residential uses, 5.40% by Industrial uses, 2.20% by Commercial uses and 0.87% by Offices. The ELU 2012 also tells that there is a large proportion of mixed use of residential and commercial land use across Greater Mumbai and distinct urban fabrics displaying distinct character and history.

Residential (R): The Residential Zone will have predominant residential use. However, a number of compatible commercial uses would be allowable in this Zone. This is in keeping with the mixed use character of the City. Commercial activities allowed in this zone are designed to serve retail local needs that would be available in the neighbourhood. They would positively impact convenience, quality of life, more pedestrian trips and a diminished use of vehicles.

Commercial (C): The Commercial Zone will have a predominant commercial use with Office, Retail and Service spaces. However, this Zone will also have a mixed use character. Here, residential use will be permitted. In addition, service industries will be allowed. Apart from positive transportation impacts, provision of residential space and services would prevent this Zone from becoming lifeless after working hours. Areas to carry out logistic activities, truck terminals, some manufacturing activities that deal with rubber, plastic, metal, electronic goods, leather, etc. that are not permitted in the Residential Zone are permissible in this Zone. However, warehousing activities of hazardous materials, manufacturing and processing of chemicals, textile products etc would not be permissible.

Industrial Zone (I): The primary land use in the Industrial Zone will be manufacturing industries. New industrial activity shall be non-polluting, non-hazardous and subject to clearance from MPCB. Existing Industrial users are protected subject to certification from MPCB. However, conversion of land use to R or C can be permitted as specified in the DCRs. No residential development shall be permitted adjacent to existing hazardous industries in Industrial Zone to ensure safety and insulate residential communities from industrial traffic and other irritants, and to shield industry from complaints generated from nuisance.

Natural Area Zone (NA): Greater Mumbai area is home to ecologically sensitive areas like mangroves, coastal wetlands, forests, parts of salt pan lands in CRZ I and natural water courses such as lakes, rivers, nallas, streams, ponds, etc. These nurture the city's ecology and biodiversity. The Sanjay Gandhi National Park and estuarine mangrove patches are standout

features of Mumbai's natural biodiversity. These areas need to be unremittingly protected from the march of the built environment in

the long-term interest of the city. The RDDP, therefore, has retained the EDDP categorization of such lands in the Natural Areas. No buildable development on these lands would be permissible, except for Municipal facilities.

No Development Zone (NDZ): SRDP 1991 demarcated certain environmentally sensitive lands such as marshy lands along the creek, hilly areas, agricultural lands, high tide areas and barren lands and some lands under primary activity as No Development Zone. These erstwhile NDZ areas occupied a total area of 13,706 Ha. The EDDP showed that of the total area forests, water bodies, areas under SPAs, unclassified area and area under CRZ I cover majority of the land use, at 75.52%. Of the balance land, 17.29% is presently under Gaothans, Slums and Industries. 12.49% of NDZ had been included as designation and reservation of land for public purpose.

Sr No.	Landuse	Area in Ha	Area in Sq Km
1.	Natural Area	10593	105.93
2.	Natural Water Course	2189	21.89
3.	Defense Wireless Centre	128	1.28
4.	Aarey Colony	800	8.00
5.	CRZ-I (Excl. NA)	1416	14.16
6.	CRZ - III (Excl. NA)	706	7.06
7.	Archeological Survey (100m)	43	0.43
8.	POS-Designations	1634	16.34
9.	POS-Reservations	1892	18.92
	Total	19401	194.01

Areas in which Development is allowed with restriction:-

Sr No.	Landuse	Area Ha	Area in Sq Km
1.	CRZ - II	3474	34.74
2.	Railway Buffer	1093	10.93
3.	Archeological Survey (100m-300m)	346	3.46
4.	Grade I Heritage	44	0.44
5.	Grade I Heritage Buffer	362	3.62
6.	Grade I & II Heritage Precinct	16	0.16
7.	Airport Funnel	4208	42.08
8.	Film City	165	1.65
9.	BPCL	25	0.25
10.	HPCL	201	2.01
11.	RCF	70	0.70
12.	BARC	1043	10.43
13.	Jail	5	0.05
14.	MbPT	750	7.50
	Total	11802	118.02

3.1.7.1 Coastal Regulation Zone:

According to the approved CZMP prepared under CRZ Notification, 1991 of MoEF, the coastal stretches of Greater Mumbai are divided into following three zones.

1. **CRZ - I:** In case of Mumbai this is essentially an area between the Low Tide Line and High Tide Line. The North West coastal area like Gorai, Uttan, areas around Manori river, area where Mithi river meets Mahim creek and on eastern side Godrej Vikroli grassland and mangrove forest along Thane creek etc are demarcated as CRZ-I, which is environmentally sensitive zone. This CRZ-I area covers 40.44 sq. km in Greater Mumbai. In addition to this, areas along coastal road and allied open space reservations are the new proposals within CRZ-I.

2. **CRZ - II:** This is a coastal area within 500m buffer from sea and 100 m or equal to the width of the creeks whichever is lesser that is already developed. The development is permissible in this zone only on landward side of the existing road or structure, provided the land use and FSI remain same as permissible prior to 13th Feb. 1991. CRZ-II covers 43.48 sq. km of area in Mumbai.

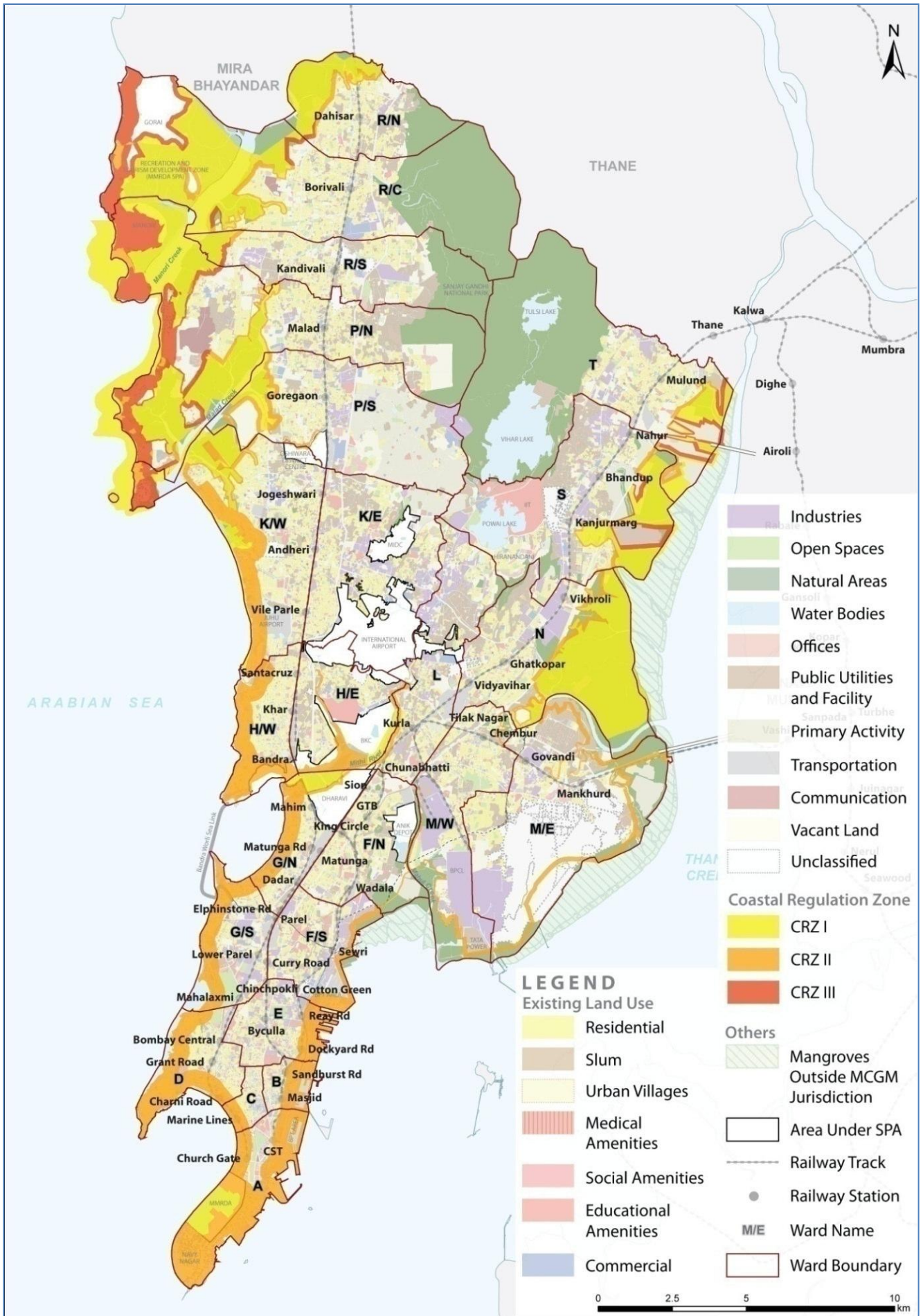
3. **CRZ-III:** It includes areas that are relatively undisturbed and those do not belong to either CRZ-I or II which include coastal zone in the rural areas (developed and undeveloped) and also areas within municipal limits which are not substantially built. Within CRZ-III area up to 200mts from HTL on the landward side in case of seafront and 100 m along tidal influenced water bodies or width of the creek whichever is less is earmarked as “No Development Zone (NDZ)”. CRZ-III covers 13.14 sq.km area in Mumbai. Significant CRZ-III area is located on North Western edges of the MCGM and some parts along Thane creek.

Greater Mumbai: Total area under CRZ I, II & III

Zone	Total Area (Ha)	Area within CRZ (Ha)	Area within CRZ (%)
Island City	6,480.56	2,418.09	37.31
Western Suburbs	18,736.89	5,932.38	31.66
Eastern Suburbs	16,228	2,573.85	15.86
Greater Mumbai	41,505.71	10,924.32	26.32

Above table reveals that 26.32% of the total area of Greater Mumbai is affected by CRZ. About 37.31% of the total area of the Island City, 31.66% of the total area of the Western Suburbs and 15.86% of the total area of the Eastern Suburbs are affected by different types of CRZ. A new CZMP is to be prepared under a new CRZ Notification, 1991 of MoEF. However, the revised HTL and Hazard Line as specified in the notification are not yet available.

District Disaster Management Plan



3.1.8 Mangroves in Mumbai:

Greater Mumbai's ecology and biodiversity is very rich in spite of pronounced urban growth. The key features of the region are Sanjay Gandhi National Park and the Marine Ecosystem along Mumbai's West and East coast. Mumbai is the only mega city in the world having a National Park within its boundaries. Other Natural Areas include mangroves, salt pans & hills. An area of 14.96 sq km, newly identified in the ELU, is proposed to be merged within municipal limits and form a part of the City's Natural Area.

For Greater Mumbai the environmental features play a crucial role. The mangroves guard against tidal erosions and support an ecosystem of flora & fauna; rivers & natural drains prevent flooding and the greens function as lungs aside from supporting flora & fauna. In addition to maintaining ecological balance, the environmental features can become excellent recreational spaces, improve the quality of urban environment and contribute to the city's image. A significant amount such of land could be utilized smartly to transform Mumbai into a very attractive and livable city, offering great quality of life.

In order to conserve all ecologically sensitive areas which include forests, mangroves, water bodies and all areas under CRZ-I, the DP 2034 has demarcated these as Natural Areas. A separate category called Natural Areas has been formed in the Proposed Land Use to reflect these environmental features, where any kind of buildable development is not permitted.

.For conservation of mangroves, Chief Conservator, 'Mangrove Cell' carried out following works:

- 3 lakh mangrove saplings were raised in nurseries.
- In Mumbai and New Mumbai areas 5 Mangrove nurseries have been formed on 56 Hectare land.
- Assisted natural re-generation works in Mumbai at 3 locations namely, Bhandup, Mahul and Gorai extending to 22 hectares to facilitate tidal water flow in mangrove areas.
- Display boards, signage etc. to create awareness about the need for mangrove conservation.
- Plantation programs in collaboration with NGO's.
- Promenades at the landward edge of mangrove areas being planned with the support MCGM and residential association.
- Legal action to evict encroachments on mangrove land will be initiated by MNCU in Mumbai.
- Training awareness generation and publicity works will be scaled up.

Total Protected Forest of Mumbai and Mumbai Suburb

Name		Area (In Ha)
Mumbai City		276.65
Mumbai Suburbs	Kurla	2285.6332
	Borivali	1365.2245
	Andheri	70.1068

3.1.9 Recreation Facilities

Providing recreational amenities to the public is a discretionary duty of the Corporation under section 63 of MMC Act 1888. For balanced environment, abatement of air pollution and Green Mumbai, beautiful and clean Mumbai, MCGM provides recreational amenities to the citizens of this city by way of maintaining gardens and providing playgrounds (PG), recreational centers, water fountains, etc. In addition to recreation, MCGM also encourages sports, art, cultural programs etc. Whereas health education and health promotion of citizens being its objective. These facilities are utilized by citizens as well as others from different places.

Recreational Facilities upto 31.03.2018

Sr. No.	Particulars	City	W.S.	E.S.	Total
1.	Garden (except greenbelts)	14	133	82	229
2.	Recreation Grounds	163	184	85	432
3.	Playgrounds	42	182	95	319
4.	Parks	5	15	5	25
5.	Fountains	16	2	8	26
6.	Band Stands	2	1	2	5
7.	Nurseries	10	6	6	22
8.	Plant sale counters	3	4	1	8
9.	Statues	39	5	9	53
10.	Tree Plantation	2255	5845	3377	11477
11.	Distribution of Trees	18850	3942	5290	27452
12.	Total No. of Trees	718589	1221737	1034957	2975283

3.1.10 Water Supply

Water supply requirement of Greater Mumbai including domestic, commercial and industrial is around 4000 million litres per day (MLD). The total water supplied at present is about 3,350 MLD, comprising domestic, commercial and industrial uses.

Extent of Supply

As per the Revised City Development Plan by MCGM, there are 3,61,862 water connections across 3,76,991 properties in Greater Mumbai, with coverage of around 96%. On average, one domestic water supply connection serves 8 households, whereas slum areas are provided with group connections with one connection for 15 families. Per capita supply of 268 LPCD is higher than general Indian standards. However, this figure varies widely across wards. Of the total supply, only 62% is billed.

Water Sources

The entire water supply is based on lakes created by impounding rainwater by constructing dams across rivers and valleys at locations as far away as 173 km. The existing water supply system consists mainly of a network of pipelines, tunnels, balancing reservoirs, pumping stations and lakes as detailed in Table.

Sr No.	Source Name	Water Yield	Distance from City	Treatment Plant
1.	Vihar Lake	90	Withing city limits	Vihar
2.	Tulsi Lake	18	Within city limits	Tulsi
3.	Tansa Lake	472	100 km from city	Bhandup Complex
4.	Modak Sagar	455	100 km from city	Bhandup Complex

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5.	Upper Vaitarna	635	173 km from city	Bhandup Complex
6.	Bhatsa	1,800	100 km from city	Partly at Panjarapur & partly at Bhandup Complex
7.	Sub - Total	3470		
8.	En route supply	-120		
	Total supply	3,350		

Water Treatment and Distribution System

Water is mainly treated at two major water treatment plants, which are Bhandup and Panjarapur treatment plants. Above table explains the capacity of the treatment plants.

Major Water Treatment Plants

Name of the Water Treatment Plant	Design capacity (MLD)	Peak operational flow (MLD)
Bhandup	1,910+910	2,100+910
Panjarapur	1,365	1,365
Vihar	90	--
Tulsi	18	--

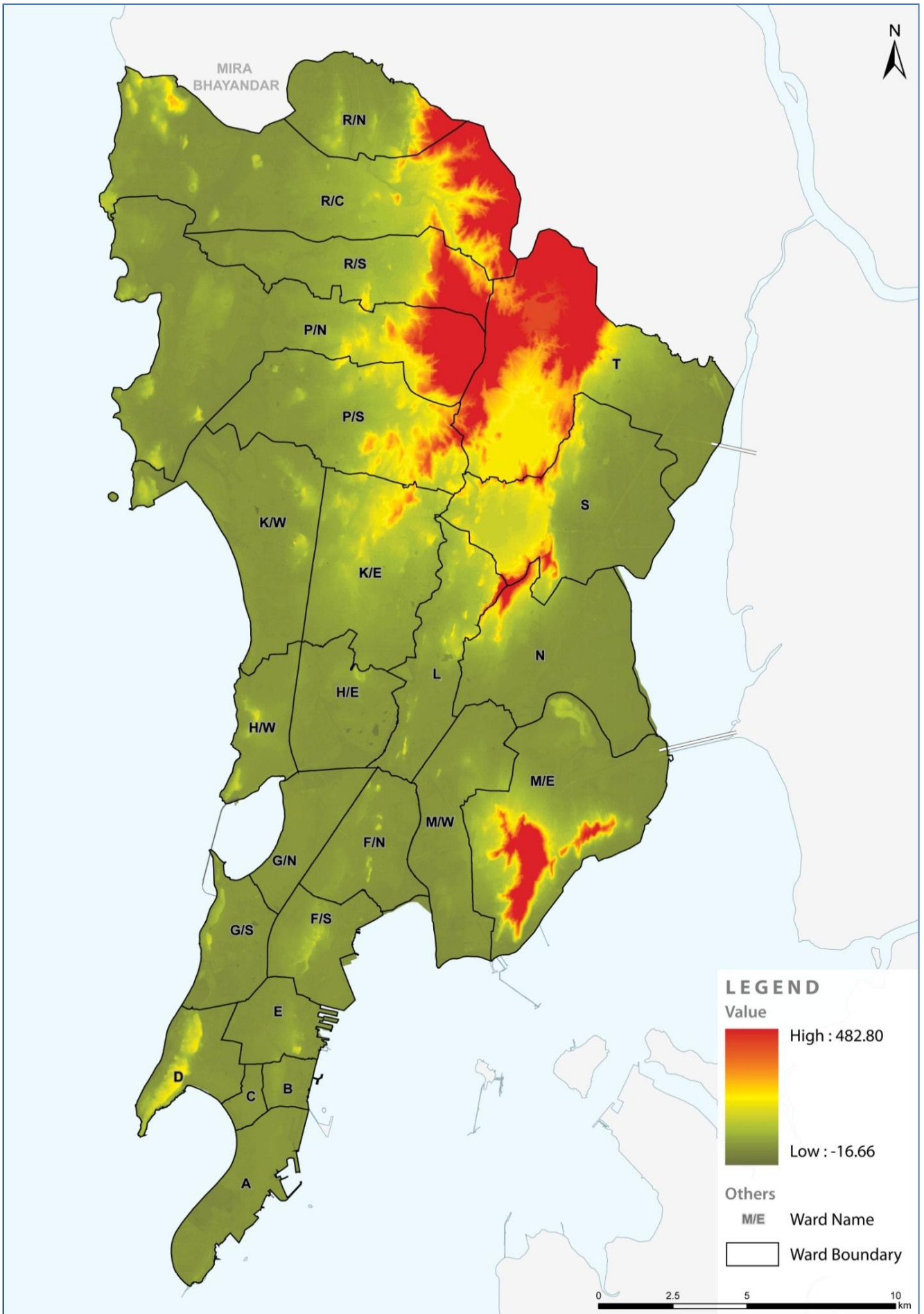
The treated water is then stored in the Master Balancing Reservoirs at Bhandup Complex and Yewai. It is further distributed to 26 service reservoirs spread through the city by a network of inlet mains that remains charged for 24 hours. Duration of water supply to consumers is between 2 to 6 hours daily. The supply pressure is in the range of 1 to 1.5. Water mains are about 4000 km long and have 800 numbers of valves operating daily. The city is divided into 109 distribution zones with 615 leak detection zones.

Challenges pertaining to the Water Supply System

Water supply system is required to be upgraded at multiple dimensions to meet the future demand. Several projects are being undertaken by MCGM. Following are the major issues to be addressed.

- MCGM supplies about 268 LPCD, which is well above the adequacy standard. However, coverage of water supply network remains an issue. On an average, 8 households are served by a single domestic connection whereas it serves 15 households in the case of slums. However, many slums, which have developed post 1995, are not provided with water connections.
- Ageing of pipeline network in the city causes risk of water contamination as water pipes run parallel and close to the sewers.
- Need for improving efficiency and reducing non-revenue water levels.
- Inequitable distribution ranging from 2 to 24 hours of supply.

If the proposed schemes progress as scheduled, current shortfall and future demands can be met.



3.1.12 Education

Education is the important basic need to increase general awareness. Education at School level improves the knowledge of students about protection and conservation of Environment which makes them responsible citizens.

Under section 61(q) of the Mumbai Municipal Corporation Act 1888, it is an obligatory duty of the Corporation to provide primary education. Education Department of MCGM has been carrying out this responsibility since 1907.

In the academic year 2016-17, Education Department of MCGM runs 1048 Municipal primary Schools in 8 different medium and 287979 students are studying in these schools. There are 803 students in 17 schools. There are schools for mentally challenged. MCGM started English medium Mumbai Public Schools since year 2007-2008, wherein the educational facility is made available right from Junior K.G. Education Department also regulates the Private Primary Schools by giving them recognition through registration.

As per rules and directives of Maharashtra State Government, Right of Children to Free and Compulsory Education Act, 2009 is being implemented.

In addition to primary education, MCGM runs Secondary schools since 1965. At present, 49 aided secondary schools are providing free secondary education. Efforts are being made to provide additional facility of free secondary education by starting 99 secondary schools on Un-Aided basis, since 2008-09. In all 35926 students are studying in secondary schools. MCGM runs 2 D.T.Ed colleges. For higher education students who score high percentage in SSC examination, 3 Junior colleges of Science facility have been started since 2009-10. For the students in MCGM Schools activities emphasizing the importance of health and environment are included in day-to-day learning –teaching process.

Students of Municipal Schools undergo regular free medical check-up by the Medical Officer of MCGM students with minor ailments are treated in the School or referred to near by municipal dispensaries. Those with major ailment are referred for medical /surgical treatment to nearby municipal hospitals or school clinics situated at Nair hospital/Coopar hospital and Nair Dental hospital where they are treated free of Cost. Students with defective vision are provided Spectacles free of Cost. Students with heart ailments are provided financial assistance for corrective surgeries.

Children with disability are identified and corrective aids such as hearing aid, Wheel Chair, Jaipur foot etc. are given with the help of funds from 'Sarva Shiksha Abhiyan'

Services and facilities are provided to 3212 students under "Children with special need" on Medical check up (CWSN) During the period of 2016-17 services and facilities for blind, dumb and deaf, mentally challenged, handicapped, physically disordered etc. are provided with Spectacles, Travelling Allowance, Assistance Allowance, Therapy Service, M.R. Kit, Hearing Aid, Wheel Chair, Crutches, Braille Books, Tricycle, Rotator as per requirements.

3.1.13 Health

Health is the level of functional or metabolic efficiency of a living being. In layman terms, health usually means to be free from illness, injury or pain. The World Health Organization (WHO) defined health as a state of complete physical, mental and social well-being and not

merely the absence of disease or infirmity. To lead and enjoy a wholesome life one must have sound health.

In Mumbai, the MCGM largely takes care of Health Care Services. The State Government, Private organizations and Private medical practitioners also contribute in providing the health care services. Health care is a primary responsibility of MCGM. MCGM's health infrastructure in Mumbai is a 3-tier system as shown in the table below.

PRIMARY	Health Posts	208
	Dispensaries	185
	Maternity Homes	28
	Post-Partum Centers	21
SECONDARY	Peripheral Hospitals	17
	Specialty Hospitals	5
TERTIARY	Major Hospitals (Medical & Dental Colleges) (5 main hospitals and 1 H.B.T. hospital joint with Cooper Hospital)	5

Epidemiology Cell

Key activities of Epidemiology Cell:

- Reporting of communicable diseases is done on weekly and daily basis. Information of admitted patients is received from all Municipal hospitals, Government Hospitals and major Private Hospitals.
The reports are analyzed for monitoring the diseases trend and feedback is given to respective MOH for preventive measures to be undertaken in the community.
- Regular drinking water quality surveillance is undertaken daily by Municipal laboratory by collecting samples from all 24 wards, water from the hawkers and ice-water surveillance. Reports of unfit water are submitted to the Wards along with the preventive measures.
- Continuous liaison with other departments like Insecticide Office, Municipal Analyst, IEC, Training and MIS as well as State and National authorities for prevention and control of communicable diseases.
- Training of the Health Staff working under MCGM and sensitization of Private Health care providers.
- During any outbreak of communicable disease the Mobile Health Unit (MHU) team is made available
- to control further spread and containment of disease in community.

Additional activities during monsoon:

- 1) Control room- In Monsoon, control room is activated from 1st of June every year for monitoring the disease surveillance activities.
- 2) Health Camps – “Special Sunday camps” are organized in collaboration with Secondary and Tertiary hospitals in high risk area of Mumbai. The reports of the same are analyzed and compiled to monitor the disease morbidity in the high risk pockets.
- 3) Medicines are made available for controlling the outbreak of communicable disease, as per need.

3.1.17 Industries Waste and Hazards

Environmental pollution is a by-product of industrialization. However, with the modern technologies, pollution potential of industries / factorioies are lowering. Total 8449 No. Of industries are covered under section 390 of Mumbai Municipal Corporation Act 1888. These industries pay Air Pollution Prevention Fees on the basis of horsepower of the connected load.

Ward-wise distribution of industries are shown in table:-

Sr No.	Ward	No of Industries
1)	A	128
2)	B	262
3)	C	432
4)	D	746
5)	E	1946
6)	F_South	1204
7)	F_North	275
8)	G_South	2455
9)	G_North	1001
Total		8449

Industries are categorized by MPCB on the basis of emission levels. Heavily polluting industries are in "RED" category. e . g . Fertilizers, Petrochemicals , Pharmaceuticals, Cement, Thermal Power are some of the industries under RED category. "ORANGE" category industries are comparatively less polluting industries like Hotels and Restaurants, Fruit & Vegetable processing, Fish processing, Stone crushers, etc. Industries which are not in above two categories, are included in "GREEN" category. Some of the GREEN category industries are Mineral water, Salt mills, Ice cream, Handlooms, Candle industries, etc.

To control air pollution measures such as cyclones, scrubbers, filters, electrostatic precipitators, etc. are adopted by existing industries. They also use clean fuel and High end technology to produce the products. Treatment of effluent is carried out to control water pollution.

3.1.18 Transport and Communication

In Mumbai, the total length of the roads is 1941.15 Km. Out of which, 506.46 Km. length is in City division.

Area Traffic Control: Out of 610 existing Traffic signals, 256 has already upgraded into Area Traffic Control System (Real time adaptive system) & they are working satisfactorily. Regular maintenance of 354 conventional Road. Traffic Signals & 223 flashing Beacons is also done properly.

The digital countdown timers are already been installed on conventional traffic signal (Non ATC) at City, Western & Eastern Suburb. The maintenance of 241 CCTV installed at traffic signal junction utilized for traffic regulation and vehicle detection cameras for ATC signal system are properly carried out.

The maintenance of control room installed for ATC system at TPHQ & Engineering Hub are carried out properly. The Automatic Number Plate Recognition (ANPR) camera installed at

Eastern free way to detect the over speeding vehicles are working satisfactorily. ANPR cameras are installed at 37 accident prone locations in Greater Mumbai.

Updated important statistical information

Sr No.	Inforamtion	Numbers
1	Total Number of Roads Lamps	1,36,392
2	Total No.of Flash beacons	223
3	Total No. High Masts	352
4	Total No. of Traffic Signals	610
5	Road Length in Kms	1941.16 Kms

Surface Transport:-

There are different types of vehicles plying on the roads of Mumbai every day. They consist of cars, taxis, trucks, buses, three-wheelers, two-wheelers etc. The total number of vehicles in Mumbai as on March 2018 is 3352640. Their composition is 59.45% two-wheelers, 32.07% cars, jeeps & station wagons, 3.48% taxis/cabs, 4.20% auto rickshaws, 0.44% buses, 0.25% Goods vehicles, 0.01% tractors/ trailers and others 0.10%. Table 16.1 shows number of different vehicles in Mumbai.

**Category-Wise Comparison of vehicle Population in the City
2016-2018 (Provisional)**

Sr. No.	Category	As on 31 st March		
		2016	2017	2018
1.	Two Wheelers		1968019	1952955
2.	Cars, Jeep, Station Wagons	884882	1061395	1011878
3.	Taxi / Cabs	78473	115260	127892
4.	Auto – riskshaws	132424	139065	182069
5.	Buses	14282	14498	14839
6.	Trucks & Lorries	72309	8307	61040
7.	Tractor / Trailors	298	336	304
8.	Other	2846	3086	1663
Total		2786512	3309966	3352640

Category-Wise Vehicles Using Various Fuel Types As ON 31st March 2018

Sr No.	Category	Diesel	Petrol	LPG	CNG	Others	Total
1	Two- Wheelers	6	1784598	0	0	53	1784657
2	Cars, Jeeps, Station Wagons	321903	549569	16440	56875	296	945083
3	Taxi / Cabs	34440	20178	1371	62520	53	118562
4	Auto Rickshaws	1	10536	0	127113	0	137650
5	Stage Carriages	2751	502	0	1698	0	4951
6	Contract Carriages	2969	466	0	489	0	3924

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7	Trucks, Lorries, Tankers	4211	7	0	103	0	4321
8	Ambulances	812	188	0	163	0	1163
9	School Buses	386	920	1	1310	1	2618
10	Private Service Vehicles	729	86	9	197	0	1021
11	Trainlors	191	0	0	0	0	191
12	Tractors	96	0	0	0	6	102
13	Delivery – Van (4 Wheelers)	21908	2724	5	1819	0	26456
14	Delivery – Van (3 Wheelers)	16288	3690	9	386	0	20373
15	Ulti-Multi Vehicles	11	0	0	0	0	11
16	Others	1290	35	0	28	2	1355
Total		344680	2221123	11100	242600	138	2819641

Source : This information is received from RTO,GOM

BEST – Transport

BEST undertaking operates 3404 buses on 413 Routes, commuting around 26 Lakhs passengers daily in the area of Brihan Mumbai Municipal Corporation and it's align cities like Navi Mumbai, Thane and Mira-Bhayander.

In order to reduce the pollution in the city, the Undertaking has implemented fleet up-gradation programme, under which buses operated on “Compressed Natural Gas” are being included in the fleet. At present 60% i.e. 2038 buses are operated on ‘CNG’. The CNG pumps are made available in 15 Bus depotes to facilitate easy fueling of the buses. It is ensured that smoke emission of all diesel vehicles is kept below self imposed limit of 45 HSI (Hat-ridge Smoke unit). In the year 2017-18, Undertaking had included low polluting 185 Euro IV compliant buses in it’s fleet.

In November 2017 for the first time in India, BEST Undertaking has included 4 new zero emission electric buses into it’s fleet and also 2 more electric buses were put into operation from February 2018. As electric buses are zero emission vehicles, Undertaking has decided to induct more number of electric buses into it’s fleet to reduce the vehicular pollution in Mumbai. Accordingly, BEST Undertaking has placed an order of 80 numbers of electric buses.

To save the fuel, which is a valuable natural resource of the Nation, it is necessary to reduce the no. of private vehicles on road. Considering this aspect the Undertaking has taken initiative to operate "Air-conditional buses", so as to attract the Private Car Owners to Bus service from their private cars. As such 266 Air-conditioned buses are inducted in the fleet.

Further BEST Undertaking in collaboration with Mumbai Mahanagar Region Development Authority (MMRDA) has introduced 25 Hybrid Buses in Bandra-Kurla Complex area. These buses are operated on Electric supply which is Environment friendly type of fuel. With this initiative, BEST is striving to achieve reduction in the air pollution in the city and improve the air quality. The CNG pumps are made available in 15 Bus depots to facilitate easy fueling of the buses.

Railways: Mumbai Suburban Railways covers the Mumbai Metropolitan Region, spread over an area of 465 kms. It is called the life-line of Mumbai as it runs form 4 am to 1 am and serves nearly 7.5 million commuters daily. The Mumbai Suburban Railway sytem is operated by Indian Railways two zonal divisions Western Railway (WR) and Central Railway (CR). The Central

Railway runs from Chhatrapati Shivaji Terminus (CST) to Kalyan (54 km), from where it bifurcates into two lines – one to Khopoli (61 km) in the south – east and other to Kasara (67 km) in the north-east. Western Railway is operated by Western Railway (WR). It starts from Churcharge railway station to Dahanu Road and covers 36 stations. The Harbour Line is part of the Central Railway, and runs from Chhatrapati Shivaji Terminus (CST) to Andheri and Panvel. The Trans-Harbour Line connected Navi Mumbai to Thane. It runs from Thane to Vashi, Nerul and Panvel.

Metro and Monorail Services: Mumbai, the financial capital of India, is the heart of commercial and trade activities of the country. 11 million people travel daily by public transport with modal share of Rail & Bus together at 75% of total trips.

The existing suburban rail system is under extreme pressure and existing role of the bus system is limited for providing feeder services to suburban railways. There are constraints to expand the existing roads and rail networks capacity. Many pockets in Island city & suburbs are not served by rail based mass transports system.

Metro Line – 1:

- Versova-Andheri-Ghatkopar corridor is 11.40 km elevated corridor.
- It provided connectivity of Eastern & Western suburbs to Western & Central Railway.
- Facilitates smooth and efficient interchange between suburban rail system and MRT System at Andheri and Ghatkopar Stations.
- Reduced the Journey time from 71 minutes to 21 minutes, between Versova and Ghatkopar.
- Provide rail based access to the MIDC, SEEPZ and commercial developments.

Metro Line – 2:

- Dahisar-Charkop-Bandra-Mankhurd corridor length is 40 Km (fully Underground).
- Metro Line -2 will connected to North- South and East- West Suburban areas.
- After the commencement will benefit 21 Lakhs passengers up to 2031.
- After the commencement the distance between Dahisar & Mankhurd will be covered within 80 minutes.
- Comfortable, speedy and Air-condition Journey.
- Due to this quality public transport system the use of private vehicles, auto rickshaws etc. will reduce & hence will reduce traffic congestion on the road and also save fuel consumption.
- Substantial saving in time & reduction in Air, Noise pollution.

Metro Line – 4:

- Wadala-Ghatkopar-Teen Hath Naka (Thane)- Kasarwadavli corridor length is 32 Km (27 Km. Underground , 5 Km. Elevated).
- Metro Line 4 will connect Mumbai with Thane City.
- After the commencement will benefit 12 Lakhs passengers up to 2031.
- After the commencement the distance between Wadala & Kasarwadavli will be covered within 64 minutes.
- Comfortable, speedy and Air-condition Journey.

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- Due to this quality public transport system the use of private vehicles, auto rickshaws etc. will reduce & hence will reduce traffic congestion on the road and also save fuel consumption.
- Substantial saving in time & reduction in Air, Noise pollution.

Original Mumbai Metro Master Plan

Phase	Line	Name of the Corridor	Length (km)
Phase I (2006-2011)	1	Versova – Andheri – Ghatkopar	11.07
	2	Colaba – Bandra – Charkop	38.24
	3	Bandra –Kurla –Mankhurd	13.37
Phase II (2011-2016)	4	Charkop – Dahisar	7.5
	5	Ghatkopar – Mulund	12.4
Phase III (2016-2021)	6	BKC – Kanjur Marg Via Airport	9.5
	7	Andheri (E) – Dahisar (E)	16.5
	8	Hutatma Chowk – Ghatkopar	21.8
	9	Sewri – Prabhadevi	3.5

Proposed Metro-Mono network (Plan) in Mumbai

Road Transport:

Major North-South arterial road networks in Greater Mumbai are the Western Express Highway, Eastern Express Highway and Sion-Panvel Highway. They extend and connect to important centres in the MMR and are therefore also considered as backbones of the MMR's road transport system. In general there is insufficient East-West cross road links in Greater Mumbai. Street networks in Greater Mumbai are largely narrow in their Right of Way, and their capacity is seriously reduced by lack of appropriate management of traffic and parking.

Main expressways in Greater Mumbai are:

- Western Express Highway connecting Bandra to Dahisar;
- Eastern Express Highway connecting Sion to Thane;
- Sion-Panvel Highway; and
- Eastern Freeway connecting Mankhurd to P. D'Mello Road.

Main arterial roads in Island City are:

- Western corridor (Netaji Subhash Marg, Peddar Road, Anne Besant Road);
- Central corridor (Baba Saheb Ambedkar Road, Senapati Bapat Marg and Maulana Azad Marg);
- Eastern Corridor (P.D'Mello Road and Rafi Ahmed Kidwai Marg).

Main roads in the Suburban District are:

- Swami Vivekananda Road;
- Linking Road and the New Link Road (Western Relief Road); and

- Lalbahadur Shastri Marg.

Major East-West cross-links in Suburban District are:

- Jogeshwari -Vikhroli Road (JVLR);
- Andheri-Ghatkopar Link road;
- Santacruz Chembur Link Road;
- Sion-Mahim Link Road.

Road Reformation:

Road is an important and visible infrastructure. With the increase in traffic intensity & loading, related norms have been upgraded and project approach has been adopted. As per new approach road works also include the provision/improvement of footpath, provision/

augmentation of municipal utilities such as water mains, sewer lines, SW drains etc. as per necessity, provision of traffic amenities, beautification etc.

In Mumbai, the total length of the roads is 1941.15 Km. Out of which, 506.46 Km. length is in City division, 927.64 Km. length is in Western Suburbs division and 507.06 Km. length is in Eastern Suburbs.

As per the consultation with STAC Committee, the norms for repair/ reconstruction of roads are fixed in 56th STAC on 28 Dec 2016 and circular is issued to utilized the budget in most efficient and economical way & more road can be taken up now for repairs. In this view, if particular road need to be reconstructed then only such roads shall be undertaken for reconstruction with design crust, this new approach shall substantially reduce the cost of repairs and time needed for completion. Based on the strategy, the roads are being improved based on the priority depending on the condition of roads. Also, at certain roads where utilities are in existence C.T.B.T. is applied for improvement of the side strips.

As per the policy approved by MCGM, optimum utilisation of the budget is done for the better quality the roads. Cement concretization of major roads and junctions are taken up on priority basis.

Cement Concrete Roads:

- In City area approximately 2.827 k.m of road were concretised in the year 2017-18. In city, Major roads such as Balaram Street in D ward, R.S.Nimkar Road in E Ward, Loop Road Wadala in F/North Ward, Shirodkar Road in F/South Ward have been concretised.
- In Eastern Suburbs approximately 4.636 of roads were concretised in year 2017-18. In Eastern Suburb, Hari Om Nagar Road in T Ward have been concretised.
- In western suburbs approximately 15.67 k.m of ward were concretised in 2017-18. It includes important roads such as Viceroy Park Road, Thakur Village road in R/S ward; 13th Road Khar (West) in H/W ward and Ramkrishna Paramahans road in H/E ward have been concretized.

Asphalt Roads:

- In City section, 21.634 km of Asphalt roads were improved /widened in the year 2017-18. Important roads such as Temkar Street in E Ward, Sai Baba Road in F/South Ward, L.T. Marg- Mohd. Ali Road Junction in B Ward, Rajni Patel Chowk in G/South Ward, R.K.Vaidya Marg in G/North Ward are completed.
- In Eastern Suburbs around 35.612 km of Asphalt roads were improved/widened in the year 2017-18. In eastern suburbs, important roads such as L.B.S Marg from Madhuban

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Garden to Bhandup Station Road, Bhandup(West) & Swami Narayan Mandir Marg Powai in S-Ward are completed.

- In western Suburbs around 35.14 km of Asphalt roads were improved/widened in the year 2017-18. In western suburbs Road no.16 Khar (West), North Avenue Road in H/west ward are completed.

Flyover and Bridges: Currently, MCGM maintains 11 flyovers, 47 ROB's and 104 bridges. In addition to pedestrian facilitation, MCGM has constructed 68 FOB's and 28 pedestrian subways. As a measure to improve road infrastructure, to facilitate smooth traffic flow, a committee appointed by Government of Maharashtra had recommended the construction of 55 flyovers. FSRDC was appointed by GoM to implement the proposed work, of which 45 flyovers have been constructed already.



Waterways & Ports:

Mumbai Port has long been the principal gateway to India and has played a pivotal role in the development of the national economy, trade & commerce and prosperity of Mumbai city in particular. The port has achieved this position through continuous endeavor to serve the changing needs of maritime trade. Though traditionally designed to handle general cargo, over the years, the port has adapted to changing shipping trends and cargo packaging from break bulk to unitisation/palletisation and containerisation. Besides, it has also developed specialised berths for handling POL and chemicals. For decades, Mumbai Port was India's premier port. Even today, with the development of other ports, it caters to 10% of the country's sea-borne trade handled by Major Ports of the country in terms of volume. It caters about 19% of POL Traffic handled by Major Ports.

Having weathered and survived many a changes in maritime trade in its long history, Mumbai Port is today facing challenges posed by competition from adjoining ports and private ports, changing traffic patterns, inherent physical constraints and continuing labour intensive operations, etc. However, Mumbai Port is taking various measures to render cost effective and quality services to the trade.

The Port of Mumbai is situated almost midway (Latitude 18° 54' N, Longitude 72° 49' E) on the West coast of India and is gifted with a natural deep water Harbour of about 400 square kilometres protected by the mainland of Konkan on its East and Island of Mumbai on its West. The deep waters in the Harbour provide ample shelter for shipping throughout the year. The approaches to the Harbour are well lighted, with the Prongs Lighthouse to the North, visible 27 kilometres and the Kennery Light House to the south visible 29 kms. The entrance of the Harbour which has approaches from the South-west is between Prongs Reef and the Thull Reef lying off the mainland to the South-east, a distance of about 9 kilometres.

The main navigational Harbour Channel is, for the great part, a natural deep-water fairway. The channel has been deepened to 11 metres. With a mean high water neap tide of 3.3 metres, the channel is adequate to meet the requirement of a large number of cargo vessels, passenger ships and deep drafted tankers. With good lighting arrangements navigation is allowed at the port round the clock.

Dry Cargo Handling

There is an enclosed wet dock namely Indira Dock having a total water area of 24.04 hectares and a quayage of about 4000 metres. The Indira Dock, has an Entrance Lock 228.6 metres long and 30.5 metres wide through which vessels can enter or leave the docks at any state of tide. There are 21 berths inside the basin and 5 berths along the harbour wall, with a designed depth of 9.14 metres and 7.5 metres respectively. The depth of berths inside the basin can be increased by 1.20 metres by impounding water by electric pumps. There are two berths on the Southward extension of East arm of the Indira Dock, namely Ballard Pier Station and Ballard Pier Extension. The Ballard Pier Extension berth, is 244 metres long and has a modern passenger Terminal Building. It has a designed depth of 9.75 metres CD. The Ballard Pier Station berth caters to container vessels and has a designed depth of 9.1 metres CD.

Marine Oil Terminals

For handling Crude oil and Petroleum products, there are four jetties at Jawahar Dweep. One of the jetties at Jawahar Dweep, which was commissioned in 1984 can handle tankers with the maximum loaded draft of 12.7 metres corresponding to 125,000 Displacement tons. Two of the jetties can accommodate tankers upto 70,000 Displacement Tons and 228.6 m length and the third one can take tankers of 213.4 m length and upto 48,000 Displacement Tons. Chemical and POL products are handled at two jetties at Pir Pau. Old Pir Pau jetty can accommodate tankers of 170.7 m length while the new one commissioned in December 1996 can handle tankers with a length of 197 m and a draft of 10.5 m. All the jetties are connected to Oil Refineries by a network of pipelines.

Bunders

Besides the wet docks, there are along the harbour front a number of bunders and open wharves where the traffic carried by barges/sailing vessels are handled.

Dry Dock

The port has one dry dock, inside the Indira Dock, viz. Hughes Dry Dock which is 304 metres long.

Storage

There are transit sheds at most of the berths and a number of warehouses in the Port area for storage of uncleared cargo and pre-shipment storage of export cargo.

3.1.19 Religious Places:

One can safely call Mumbai a secular city because of the existence of various beautiful temples, glorious mosques, serene churches, elegant synagogues and other various places of worship. Mumbai is named after the local deity known as 'Goddess Mumbadevi', who is believed to protect the citizens of this city. Some of the famous monuments in India are found in Mumbai and these unique structures date back centuries. The remarkable monuments signify the religious sentiments of the people in Mumbai. Even though this incredible city is one of the most modern cities in India, it is blessed with many religious places and monuments that one must see. No matter how fast-paced the lives of Mumbaikars are, the people always find time to visit Mumbai's religious places.

Mumba Devi Temple

Mumba Devi Temple is a renowned ancient temple dedicated to 'Goddess Mumbadevi'. This beautiful temple situated in Mumbai was built in the 18th century. The 'Koli' fishermen or the early inhabitants of Mumbai greatly respect and honor Goddess Mumbadevi and consider her as their guardian.

Mahalaxmi Temple

Mahalaxmi Temple is an ancient temple dedicated to honor 'Goddess Mahalaxmi' who is also known as the 'Goddess of Wealth'. This beautiful temple is situated in Mumbai and was constructed in 1785. Many devotees visit this temple to offer their prayers to Goddess Mahalaxmi

Siddhivinayak Temple

One of the most beautiful temples situated in Mumbai, the Siddhivinayak temple is a standing testament of beauty and architecture. This ancient temple was constructed in 1801 and is dedicated to the elephant-head deity of Hinduism, 'Lord Ganesh'. This venerated temple in Mumbai was constructed by Deubai Patil and Laxman Vithu.

St. Thomas Cathedral

The Cathedral of St. Thomas is one of the most prestigious landmarks in the city of Mumbai. Built in 1718, the cathedral is a standing example and symbol of the early British settlement. The Cathedral was built in an effort to maintain and possibly improve the standards of the British settlement. The first Anglican Church in the city, St.

Haji Ali

The Haji Ali Dargah is a historical landmark in Mumbai, and is also one of the most prestigious Islamic symbols situated in South Mumbai. The Haji Ali was built by a wealthy Muslim merchant who became a saint named Haji Ali Shah Bukhari. He renounced all worldly pleasures before embarking on a pilgrimage to Mecca.

St. Michael's Church

St. Michael's Church is one of the oldest Catholic Churches in India, let alone Mumbai. The present structure of the church was built in 1973, although the original church was formed way back in the 16th century. The Christmas Mass is immensely popular here and so are the Novena services, which began way back in 1948.

3.1.20 Food

Mumbai known for its rich culture, cuisine & customs. The authentic delicacies prepared from the well-knit traditional Maharashtrian communities. The diet mainly consists of cereals, pulses, green vegetables, lentils curries, fruits, milk, ghee, butter-milk, etc. A non-vegetarian food such as fish, chicken, mutton, etc finds its place in many Mumbaikar's dishes regularly. A variety of cuisine sub-ordinates like pickles, chutney, papad, yoghurt, etc serve as fillings on main menu.

The metropolis has a roadside fast food consisting of Maharashtrian Pav Bhaji, Vada pavs, Dabeli, Panipuri, Bhelpuri, etc. South Indian and Chinese food is also popular in the city. Other cuisines in the city are Lebanese, Korean, Thai, Italian and Mexican. Other than Chinese and South Indian cuisines, Mughalai, Punjabi, Mālvani and Continental are also popular in Mumbai

Mumbai being the financial capital has a large number of migrant population. Members of the migrating families are working with no other family support, hence ordering food from close

by restaurants or calling for pre-packaged meal (dabba as called locally) is an accepted thing. Owing to these recent trends there have been some online food ordering services that have cropped.

Tea is the most popular beverage followed by coffee. There are tea stalls in almost all roads and corners. Other drinks include fruit juices and coconut water. Irani cafés are a part of Mumbai's cosmopolitan heritage

3.1.21 Fairs and Festivals

Festivals are linked with traditional values, cultures and customs. These festivals depict the nature of human relationships and popular beliefs. Also, these festivals pass on past traditions to the present generation to make them aware of the associated rich culture and tradition. The most common festivals of the city account to Dusshera, Moharram, Shivratri, Christmas, Budha Purnima etc. which add more color and vibrancy to Indian culture. Festivals are generally celebrated either to honor religious occasions or to welcome various seasons of the year etc. Most of these festivals are common throughout the country but might be known by different names and marked by different rituals in different regions. Even though Mumbai is a cosmopolitan city, all the festivals are welcome with great vigor and color.

For instance, Mumbai has a great section of Parsi population and hence the Parsi New Year is celebrated with great passion. Ganesh Chaturthi is the major festival of Mumbai, which lasts for ten days and is held during August- September. This festival is seen as a truly feisty celebration of the people of Mumbai. The festivals of Holi, Raksha Bandhan, Dusshera, Navratri and Diwali are the prime occasions for the Hindus, while Eid is celebrated with great fervor by the Muslims. Easter & Christmas are celebrated among Christians and non-Christians alike. Though associated with certain religions, in most of the cases, these festivals are celebrated beyond the specific religion, cast and creed. All the festivals have a lot to reveal about the religion, its history and related rituals. Apart from religious festival, Mumbai also hosts arts festivals like Elephanta festival, Kala Ghoda festival and Banganga festival. Tourists from all over the world travel to Mumbai to witness splendor and vigor of the people during the celebrations.

3.1.22 Tourism

Mumbai is in all ways a mega-city driven by power, wealth, glamour and fame which attracts people to give shape to their dreams and aspirations. But it is also a city with strong historical links, wonderful British architecture, museums, beaches, places of worship, and above all, a true galaxy of stars where Bollywood reigns supreme.

It is said that every train that comes to Mumbai brings on it hundreds of people from across India who are not only drawn to 'experience' the city's mesmerizing attractions but would also like to make it their home. A city of diverse cultures and a melting pot of commerce, industry, entertainment, enterprise, and politics, Mumbai's trysts with wealth and fame have, however, been recent. It wasn't a cosmopolitan finance centre to begin with. Its history has witnessed several shifts in power, and the seven islands changed hands frequently.

The seven islands that came to constitute Mumbai were earlier home to communities of fishing colonies. For centuries, the islands were under the control of successive indigenous empires before being ceded to the Portuguese and subsequently to the British East India Company. During the mid-18th century, Bombay was reshaped by the Hornby Vellard Project, which undertook reclamation of the area between the seven islands from the sea. Along with construction of major roads and railways, the reclamation project, completed in 1845, transformed Bombay into a major seaport on the Arabian Sea.

Bombay in the 19th century was characterised by economic and educational development. During the early 20th century it became a strong base for the Indian independence movement. Upon India's independence in 1947 the city was incorporated into Bombay State. In 1960, following the Samyukta Maharashtra movement, a new state of Maharashtra was created with Bombay as the capital. The city was renamed Mumbai in 1996. And in this short period of development, the city has transformed into the commercial and entertainment capital of India.

Mumbai houses important financial institutions such as the Reserve Bank of India, the Bombay Stock Exchange, the National Stock Exchange of India, the SEBI and the corporate headquarters of numerous Indian companies and multinational corporations. It is also home to some of India's premier scientific and nuclear institutes like BARC, NPCL, IREL, TIFR, AERB, AECI, and the Department of Atomic Energy. And of course there is the huge Hindi film and television industry that has given it its starry appeal.

3.2 History of Natural Disasters in the City

Natural Disasters	Past History	Vulnerable Area
Floods	Mumbai Suburbs in 2005	City as well as suburbs
Flood like situation	Mumbai City & Suburbs 2017	City as well as suburbs
Cyclones	6 June 1882. The cyclone is known to have caused floods that killed at least 100,000 people in Mumbai alone.	Coastal areas in City & Suburbs
Hail Storms	No major history	
Extreme Heavy rainfalls sometime resulting cloud bursts	26 th July 2005 Mumbai Suburban Area	Mumbai City & Suburban Area
Heat Wave	No major history	
Drought	No major history	
Earthquake	Last earthquake in Mumbai was in 1618 as per books	
Tsunami	No history	
Landslides	12 th July 2000	Suburban Area
Landslides	26 th July 2005	Suburban Area
Flood like situation	29 th August 2017	Greater Mumbai
Flood like situation	1 st July 2019	Greater Mumbai

Manmade Disasters

Manmade disasters such as road accidents, industrial accidents, fires in industries, slums and high rise buildings, drowning, Bomb Blast, Terrorist Attack, stampede may occur due to technical blunders or man made changes in the environment.

Date	City	Fatalities	Injured
12 th March 1993	Mumbai City - bombings	259	713
07 th March 1996	Building Collapse in Western Suburb	29	--
17 th April 1997	Building Collapse in Western Suburb	18	--
16 th Sept 1997	Building Collapse in City	19	--
03 rd August 1998	Building Collapse in Western Suburb	35	--
12 th July 2000	Landslide in Eastern Suburb	78	--
27 th January 2003	Mumbai City - bombings	1	28
13 th March 2003	Mumbai Train bombings	10	70
28 th July 2003	Mumbai Bus bombing	4	32
25 th August 2003	Mumbai Bombing	52	244
11 th July, 2006	Mumbai Suburban Train bombing	209	500
18 th July 2007	Building Collapse in Suburbs	29	14
13 th August 2008	Building Collapse in City	22	18
26 th November 2008	Mumbai Terrorist Attacks	171	239
10 th June 2013	Building Collapse in City	08	06
14 th July 2010	Chlorine Leakage in City	--	111
13 th July 2011	Mumbai City - Bombing	26	130
27 th Sept 2013	Building Collapse in City	61	30
18 th January 2014	Stampede in City	18	5
14 th March 2014	Building Collapse in Suburbs	07	04
27 th July 2017	Building Collapse in Suburbs	17	07
31 st August 2017	Building Collapse in City	33	20
29 th Sept 2017	Stampede in City	23	38
29 th Dec 2017	Fire in City	14	55
28 th June 2018	Aircraft Crashed	05	03
3 rd July 2018	Railway Bridge Collapsed	02	03
22 nd August 2018	Major Fire in City	04	23
16 th August 2018	Food Poisoning in Suburbs	00	17

District Disaster Management Plan

30 th October 2018	Major fire in Refinery	00	22
2 nd Dec 2018	Major fire in City	02	47
17 th Dec 2018	Major fire in Suburban Hospital	13	176
27 th Dec 2018	Major Fire in Suburbs	05	02
2 nd July 2019	Wall Collapse in Suburbs	31	101
16 th July 2019	Building Collapse in City	13	10

Road Accidents

In 2017, a total 3014 accidental deaths were reported along the 474.66 km long railway route. The number of deaths on railway tracks reduced by 33 in 2018.

2981 deaths occurred in 2018. The number of deaths by falling off suburban trains increased by 61 in 2018 as compared to the previous year. 711 people died after falling from local trains between January 2018 and December 2018, 16% rise from 654 in 2017. The number of deaths on railway tracks reduced by 33 in 2018, while 3014 people died on railway tracks in 2017, the number fell to 2,981 in 2018. According to the report of the Commissioner of Police, Railways, Mumbai of the 711 lives lost after falling from running local trains, 482 deaths took place on the Central Railway, while 229 were reported on Western Railway.

Major Chemicals Use in Factories

In MMR region lakhs of workers are exposed every day to harmful chemicals, metals and minerals such as lead, aniline, benzene, cadmium, mercury, asbestos and silica.

Fire Accidents

There are many cause of fire in the district such as accidents, electrical short-circuit, carelessness, gas leaks, mishandling of flammable chemicals and products, etc. Further, Mumbai being highly industrialized district there is increased threat of fire incidents. Fire causes huge losses of life and property every year.

The fire risk either can arise from industrial processes, accidents in storage godowns or closed built timber framed buildings. Many areas in Mumbai have faced fire accidents in Godowns, during manufacturing in factories, short circuits and festival seasons. The number of fire staff who died while performing their duties in Mumbai is more than 100 since 1944.

Oil Spill

Oil Spill incident is a serious threat to marine environment. Such spills may start from collision of ships at sea, loading and unloading operation in tankers at port, grounding and sinking of vessels, pipeline leaks and blow-out of oil drilling platform. Mumbai is susceptible to such disaster since it has a long coast area and resultant clean up operations can range from product loss, clean up measures, and restoration to the costs associated with interrupted use of

navigational channels and loss of business at resort facilities. The oil spill of Mumbai coast as a big disaster occurred in 2010 and caused a great environmental and economic loss.

The 2010 Mumbai oil spill occurred after the Panama-flagged MV MSC Chitra (IMO: 7814838) and MV Khalijia 3 collided off the coast of India near Mumbai on Saturday, 7 August 2010 at around 9:50 A.M local time. MSC Chitra, which was outbound from South Mumbai's Nava Sheva port, collided with the inbound Khalijia-III, which caused about 200 cargo containers from MSC Chitra to be thrown into the Arabian Sea. Khalijia-III was apparently involved with another mishap on 18 July 2010.

Stampede

Mumbai is a culturally vibrant district; it celebrates and hosts many national and regional festivals and fairs with huge enthusiasm. This attracts large number of people at one place. Apart from it, Mumbai attracts large number of religious and other tourists from across the world. This makes it prone to stampede like incidents if proper arrangements of crowd management are not put in place or in case of any rumour or any disaster. Two incidents of stampede reported in last decade in Mumbai City area which caused into 18 and 23 deaths respectively.

3.3 Hazard, Risk Assessment and Vulnerability Mapping

Owing to its geo-climatic, geological and physical features, Mumbai is vulnerable to all major natural hazards namely, flood, cyclone, earthquake, tsunami, drought etc. The district is also under constant threat of various human made hazards like that of industrial (chemical) hazards, transportation accidents, terror attacks, epidemic, road accidents, etc.

GMDMA has done Risk & vulnerability assessment for two disasters viz. earthquake & Flood covering whole Mumbai district.

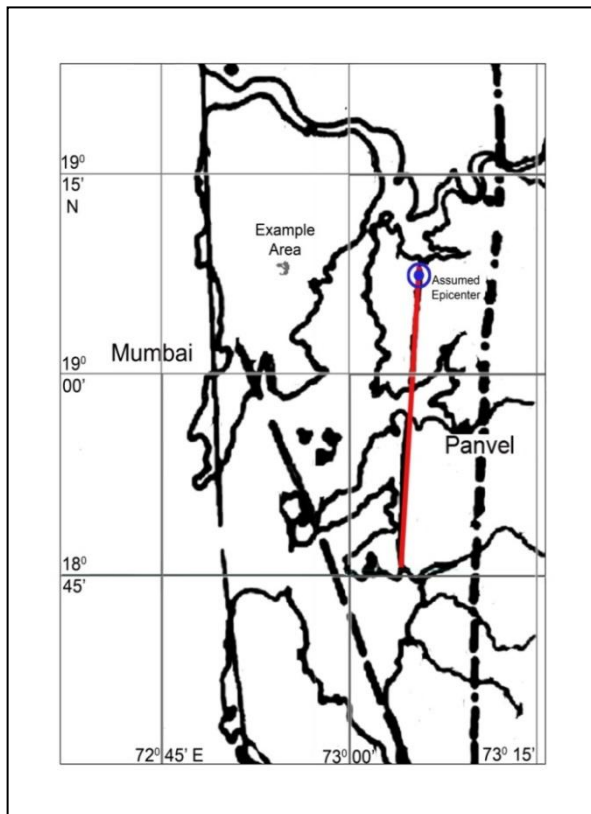
Following are the major hazards in the district:

3.3.1 Earthquake: As per Indian Zone Map, Mumbai district is lies in Zone III. Earthquake and its secondary effects like fires, chemical spills, landslides etc. An earthquake is a phenomenon that occurs without warning and involves violent shaking of the ground and everything over it. Earthquakes are tectonic in origin; that is the moving plates are responsible of the occurrence of the violent shaking. The occurrence of an earthquake in a populated area may cause numerous casualties, injuries, and extensive property damage.

Mumbai is in the Panvel zone, which is seismically active. This zone strikes in the north-northwest direction along the west coast. Its extent is from 16 to 21°N approximately, within which Mumbai is located. A large vertical fault with the same strike is exposed on the western slopes of the Western Ghats in the Belgaum –Vengurla region. Hence a system of N–NW striking faults is surmised to exist below the Deccan Traps in this zone. It has again been identified the N–S trending Panvel flexure as an active fault (Nandy, 1995). He has highlighted the importance of the west coast fault zone running nearly N–S in the Koyna region. There are also a few NW–SE faults cutting across the shoreline and extending into the land mass. There is evidence to

conclude that the old land surface has subsided by some 10 m along the coast. This would be a signature of recent tectonic activity in the region under consideration. Studies show that there are basically four fault zones surrounding Mumbai.

These are the Cambay-structure, Narmada–Tapti tectonic zone, Kukdi–Ghod lineament zone and the Sahyadri mountain ranges. It is also observed that parallel to the Panvel fault, a number of short faults exist in the area. Faults along Thane Creek, Panvel Creek and Dharmator Creek in and around Mumbai are identified as being active. It has also been pointed out that the tremor ($M = 3.6$) felt in Mumbai on 31 May 1998, had its epicentre in Panvel Creek (Subrahmanyam, 2001). The epicentres of earthquake that have occurred in this region and having $M_c > 2.5$ are listed in Table 2.10, where M_c is coda magnitude which is given in terms of intensity.



Scenario: Mw 6.5 earthquake on Panvel flexure at 10:00 AM

Injuries	720,000
Deaths	169,000
Direct Economic Loss (Rs. Million)	501,000

3.3.2 Cyclones: Cyclones are caused by atmospheric disturbances around a low-pressure area distinguished by swift and often destructive air circulation. They are usually accompanied by violent storms and bad weather. The World Meteorological Organisation (WMO, 1976) uses the term ‘tropical cyclone’ to cover weather systems in which winds exceed ‘gale force’ (minimum of 34 knots or 63 Kph). Tropical cyclones are the progeny of ocean and atmosphere, powered by the heat from the sea, driven by the easterly trades and temperate westerlies, the high planetary winds and their own fierce energy.

Mumbai experienced PHAYAN cyclone in 2009. High Alert was issued in states of Gujarat and Maharashtra as heavy rainfall of over 25 cm was expected. Massive damage to property was reported in coastal districts of Maharashtra, such as Ratnagiri, Raigad, Sindhudurg, Thane and Palghar.

3.3.3 Floods: Floods are meteorological events conditioned by the characteristics of the drainage basins. Floods are extreme events, usually triggered by extreme precipitation (river/inland floods) and/or storms (coastal floods). If these rainfalls exceed the retention capacity of the basins, drainage is increasing both in speed and volume and causes floods. Three different types of flooding are evident in Mumbai: localized flooding due to inadequate drainage; flooding due to overflows from Mithi River, where settlements have taken place in the flood plains, and flooding due to combination of high tides and high river flows. Localized flooding occurs mainly due to informal settlements in the drain path, improper drainage network, reduction in drain capacity due to siltation. Land use practices, solid waste management practices and drainage maintenance in the city have influenced flood hazard.

Mumbai is located on the windward side of the Western Ghats of India and receives high rainfall, both in magnitude and intensity, due to orographic effect from strong westerly southwesterly monsoon flows over the Arabian Sea. 70 % of the average annual rainfall occurs in July and August and 50 % of this occurs in just two or three events. During these two or three events, it usually rains uniformly over the city and severe flooding occurs in many parts of the city. Average rainfall is around 2000mm of which 70% of the rainfall is received during July and August. The original geography of the area is intercepted by a network of creeks, rivers and system of drains that play a major role in storm water drainage in Greater Mumbai. This Storm Water Drainage (SWD) network of rivers, major and minor nallas, underground drains and closed pipes is also affected by tidal variation while releasing water into the sea.

3.3.4 Landslide

Landslides/slope failures constitute major natural hazards in Mumbai and are common in parts of its suburban regions specifically in the areas located in close proximity of the natural hill slopes and cutslopes of abandoned stone quarries etc. During the last two decades, the incidences of landslides/slope failures caused excessive loss to life and property in parts of Mumbai urban agglomeration, after heavy rainfall.

Geomorphologically, the area forms part of western Konkan plain/coast, comprising Residual hills, ridges with intervening valleys, piedmont zones, Coastal plains, sand bars, mud flats and rock cut benches. Geologically the study area exposes basaltic lava flow sequences belonging to the Bombay Volcanic Province (BVP) comprising varied basic and acidic volcanic rocks including basalt, agglomerate, tuff, trachyte, rhyolite, andesite with intertrappean beds.

The hill slopes are either barren rocky slopes or are overlain by thin silty to clayey overburden soil and colluvium skirting the hill slopes. Based on the landslide related studies, rock slide/fall with debris flow type of failures are identified in Mumbai U/A.

There were several requests from Municipal Corporation of Greater Mumbai (MCGM) for landslide related studies, not only for the affected areas, but also for the areas which are conceived to be prone to slope failures. Therefore, present item was formulated for field season 2017-18 with a view to (i) identify 70 vulnerable locations susceptible to the landslide/slope failures and (ii) undertake preliminary reconnaissance assessment of such locations. The methodology followed for the study includes pre-field, field and post-field studies. In pre-field studies i) old reports of GSI and IIT, Mumbai on landslide studies ii) list of old landslide

incidences and landslide prone locations shared by Municipal Corporation of Greater Mumbai (MCGM) iii) Toposheets/geological maps of the area and iv) Multitemporal Google Earth imageries were consulted. On the basis of pre-field studies, commonalities and slope instability parameters observed in major slope failures by Project: Landslide earlier were listed. MCGM shared a ward wise list mentioning about total 299 locations, which was further shortlisted area wise for study of locations vulnerable to landslide hazard only.

Out of the total 299 listed locations, MCGM representatives from the ward (especially S-ward) could not show/locate 42 locations on ground during visit to those areas and 08 locations were found more than once in the list; thus making the total sites studied as 249 only.

During field studies, some additional parameters were also considered for further shortlisting of the locations, which includes a) physical nature and thickness of slope forming material b) inclination of back slope/angle of rock-overburden interface ($>25^\circ$) c) presence of slope instability signatures (like ground cracks, subsidence, opening along joint planes etc.) d) hydro-geological conditions/local drainage/sewerage system e) anthropogenic activities and f) risk factor. Accordingly, out of 249 locations, total 74 locations in different wards were shortlisted and considered for the study.

In post field studies, the data synthesis/analysis was done and based on the vulnerability ratings of the different available geo-factors, their influence and final vulnerability scores, the sequencing of all the 74 locations was done and order was decided from highest to lowest vulnerability score (from 10 to 1). Accordingly, the top 45 locations were finally shortlisted as most vulnerable/risky inhabited slopes.

The entire study reiterated that majority of the vulnerable inhabited hill slopes are found in L, M-East, S and T wards (in parts of Kurla, Sakinaka, Chembur, Bhandup, Vikhroli, Ghatkopar and Mulund areas). The habitations are located in slum areas, which are quite bigger in size, crowded and bear a huge population. The settlements are constructed at closer intervals at different levels by cutting back slopes at steeper inclinations. The drainage network was found to be poor, as sewage water from upslope is allowed to flow freely on downslopes thus increasing the saturation and decreasing rock mass strength. In some wards the natural drainages/topographic depressions are directed toward the settlements and are either constricted or pass through the locality. It is also seen that, the penetration of tree roots into the jointed rockmass also facilitates in opening of joint planes and thus acts as accelerating factor in causing a slope failure.

As the landslides are complex phenomena involving an interaction of many factors it cannot be solely explained by a single factor. Hence, it can be concluded that, the nature of rock mass/soil may be a factor for slope preparedness and heavy rainfall may be the factor responsible for triggering the slide, but inclination & height of the slope, inclination of the rock-overburden interface and anthropogenic activities in the form of tampering of slope would be the major contributing factors for slope instability in the study area and risk would be more to those habitations, which are in close proximity to such slopes. Certain recommendations have also been given for planning, awareness and risk reduction purposes.

The study would be helpful in i) pin pointing the most vulnerable locations in the area ii) Spreading awareness about landslide hazard and its impact iii) Planning for developing land use

policies iv) Identification of places where precautionary/ mitigation measures are required to be planned v) identifying locations for installing early warning systems and rain gauges vi) identifying places where monitoring of hill slopes is required vii) Preparedness / readiness during the emergency situations and viii) understanding the differences between the landslide characters in Mumbai U/A and other landslide prone districts of western Maharashtra.

Landslide Prone areas & landslide incidents in Mumbai

Year / Zone	Number of Landslide Prone Areas			Number of Incident reported			No. of injured	No. of deaths
	City	E.Sub.	W.Sub	City	E.Sub.	W.Sub.		
2011	35	96	25	5	7	3	7	1
2012	37	117	24	2	5	2	2	0
2013	37	203	24	3	8	1	6	5
2014	34	203	26	0	6	1	0	3
2015	37	219	29	0	6	1	7	0
2016	35	219	30	3	10	5	1	0
2017	36	220	31	1	9	4	3	0
2018	38	219	33	2	7	3	0	0

3.3.5 Chemical, Biological and Radiological disasters: Major Chemical (Industrial) disasters are low in frequency but are very significant in the terms of loss of lives, injuries, environmental impact and property damage. Frequency and severity of chemical disasters has increased in last few years due to rapid development of chemical and petrochemical industries and increase in size of plants, storage and carriers, specifically in densely populated areas. Biological disasters are scenarios involving disease, disability or death on a large scale among humans, animals and plants due to toxins or disease caused by live organisms or their products. Such disasters may be natural in the form of epidemics or pandemics of existing, emerging or re-emerging diseases and pestilences or man-made by the intentional use of disease causing agents in Biological Warfare (BW) operations or incidents of Bioterrorism (BT). In view of large programme on nuclear power generation and applications of radioisotopes and radiation technology, its possibility of radiation emergency in India cannot be ruled out, particularly because of the possibility of nuclear materials falling in the hands of the terrorists that can be used in the form of Radiological Dispersal Device (RDD), definite likelihood of popularly known as “dirty bomb”.

3.3.6 Epidemics: The introduction of a pathogen capable of establishing a transmission chain into a susceptible population will result in an epidemic. In nature, the initial primary infection(s) are followed by rounds of secondary and tertiary infections and so on. In the past, Mumbai has faced severed epidemic or epidemic like situations, which includes Swine Flu outbreak during 2008.

Additionally, there are also high chances of outbreak of epidemic in the aftermath of any disaster due to overstressed health resources, infrastructure and compromised conditions of hygiene and sanitation. This is particularly seen in case of hydrological disasters like flood leading to threats of water borne diseases and epidemic.

Epidemic History of Mumbai Malaria

Year	Total B.S. Coll*	No. of Positive Cases	SPR **	No. of Deaths
2014	1321977	9068	0.6	18
2015	1428265	7517	0.5	16
2016	1529875	5845	0.3	12
2017	1389440	6019	0.3	06
2018	1376185	5051	0.2	03

Dengue

Year	Cases	Deaths
2014	861	12
2015	919	8
2016	1180	7
2017	1134	17
2018	1003	14

H1N1

Year	Cases	Deaths
2014	11	1
2015	3029	52
2016	1	0
2017	403	23

3.4 Structural vulnerability

Concerns regarding poor light and ventilation, inadequate water and sanitation facilities and also the structural safety of buildings has led the MCGM and government to adopt building codes to control, guide and monitor building construction. Building bye laws of Mumbai used parameters like ground coverage, maximum height, light angle, height in relation to width of the road to control the volume of built up area on a given plot of land. In 1964, the concept of Floor Space Index (FSI) was introduced for the first time in the draft Development Control Rules (1964 DCRs) of Mumbai formulated under the then Bombay Town Planning Act 1955. With the emergence of reinforced cement concrete and high-speed lifts, control of building volume through the parameters mentioned earlier was seen to be too restrictive. Instead FSI was seen to

be flexible as it only specified the ratio of total floor space (on all storeys) to the plot area. This gave architects adequate flexibility in designing individual buildings. This simple physical ratio however soon acquired many connotations: some explicitly stated, some imputed. It would be relevant to sketch this growing complexity since 1964.

3.5 Economic Vulnerability

Economy of Mumbai is measured by the GDDP and NDDP (Gross District Domestic and Net District Domestic Product respectively) both in current and constant prices. These estimates are a part of the National Accounts compiled by the Director of Economics and Statistics and published annually in Maharashtra Economic Review. This is a good source of data to understand the growth rate of Mumbai with reference to that of Maharashtra and India. However the sectoral composition of DDP is currently not disclosed and therefore growing and declining sectors of economy cannot be identified.

Greater Mumbai is neither a geographically closed labour market nor a closed housing market.

Population census provides data of workers by their place of residence. However, Mumbai attracts commuters from outside and also Mumbaikars travel outside for work. The source of data for employment by place of work is rather weak. Economic Survey is a source, but its data for Greater Mumbai is confined to establishment sector and not reliable for trend analysis. MCGM's own data from administering Shops and Establishment Act could be a source for assessing part of the labour market.

Demographic data is available from decennial census. However, reliable methods of annual estimates are yet to be established. Systematic use of housing production, grant of electric meters, issue of ration cards, electoral rolls and birth and death statistics could eventually provide better annual assessment. Economic growth of Mumbai would depend upon its competitiveness with reference to other Indian and international cities. By now there are established periodic surveys that measure and rank cities along various parameters of competitiveness. Illustratively, surveys of Doing Business carried out by the World Bank rank nations and cities in terms of ease of doing business. Quality of Living surveys by Mercer provide intercity comparisons of quality of living to help MNCs decide compensation policies. Inter city comparison of office rentals by CB Richard Ellis would indicate competitiveness of particular sector. Similarly, National Housing Bank regularly compiles RESIDEX - an index of residential prices for various cities in India.

3.6 Environmental Vulnerability:

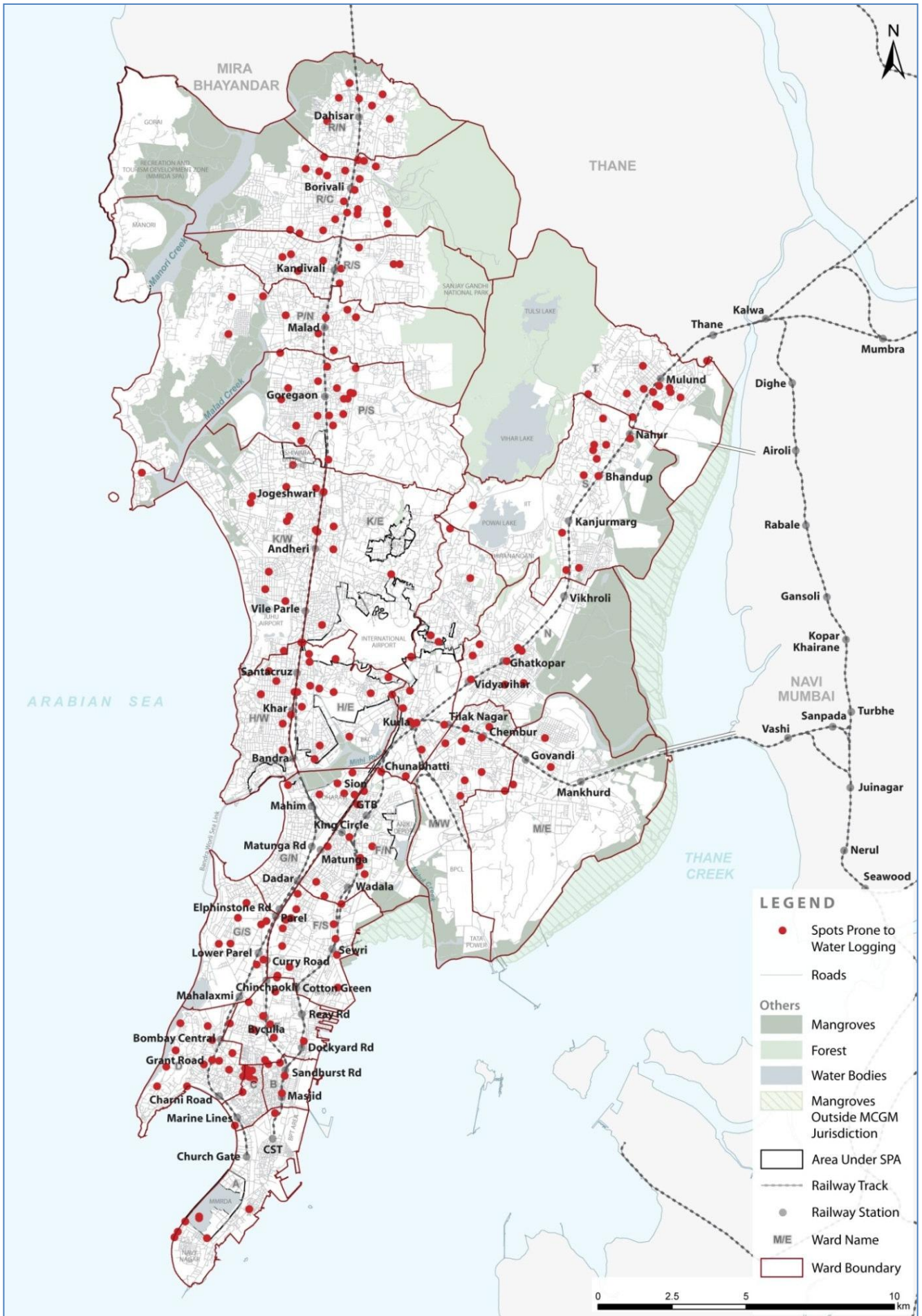
Greater Mumbai areas are prone to three potential natural hazards of flooding, landslides and earthquake. Of these, flooding is considered to be major threat by various studies because of its greater impact on life and property seen in the past. The section below describes the areas prone to these hazards.

3.6.1 Areas Prone to Flooding:

The unusual geography and location of Greater Mumbai renders it vulnerable to environmental risks like flooding and landslides, caused due to heavy annual rainfall.

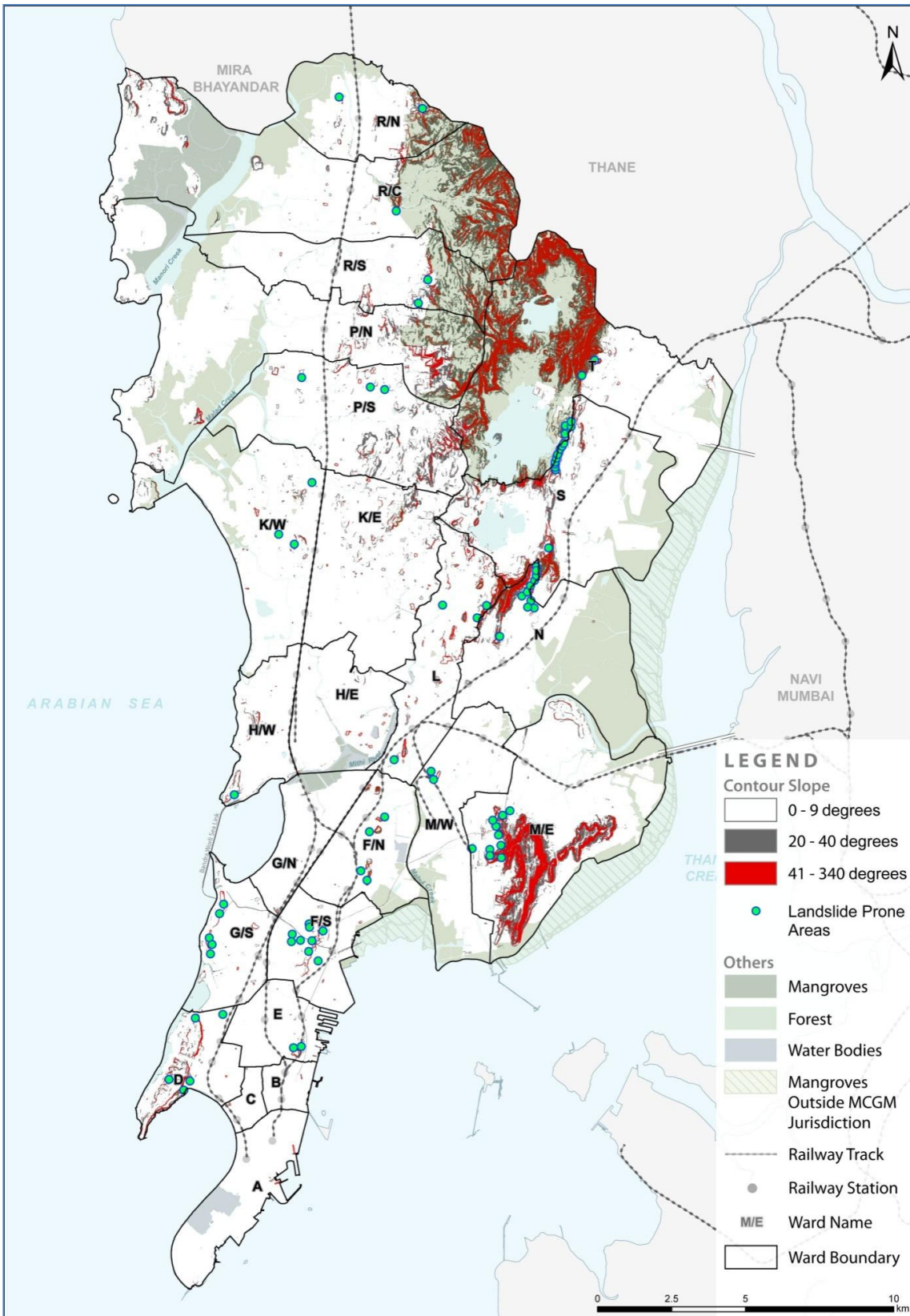
- Its estuarine setting, coupled with continuous reclamation and development in marsh lands and low lying areas have lead to an obstruction in the natural flow of water bodies and drains.
- The increased surface runoff makes the city prone to potential natural hazards including flooding triggered by high intensity rainfall.
- Most of Greater Mumbai is on reclaimed lands that are almost flat, which makes the city naturally prone to flooding. Prime city locations are lower than high tide level.
- Similarly, low lying coastal edges and river floodplains are susceptible to flooding.

District Disaster Management Plan



3.6.2 Areas Prone to Landslides

Several areas around hill slopes in Greater Mumbai are prone to landslides. The risk is more during the monsoon and heavy rains. Areas around hill slopes in Ghatkopar, Bhandup and Kurla in the Eastern Suburbs are prone to landslides resulting in increased exposure of slopes to erosion and water infiltration. Slum populations residing on these hill slopes are at high risk.



3.6.3 Climate change risk

Increased intensity of climatic events like increased rainfall, floods, unseasonal rain or drought, intense heat, sea level rise, cyclonic storm surges and increasing outbreaks of tropical diseases and epidemics are all predicted outcomes of climate change and accompanying global warming. Greater Mumbai's coastal location along with a large population living in close proximity to the coast render it highly vulnerable to a range of effects due to climate change, especially sea level rise and flooding.

The fact that most of Mumbai is only a few metres above sea level and the city has four rivers that flow through it further increases its vulnerability to flooding.

MCGM has prepared a separate storm water drainage plan to deal with the risks of flooding.

3.6.4. Health & Hygiene Impacts of Pollution and Current Infrastructure Management:

Public health impacts are largely attributed to environmental pollution, in particular, the illnesses and diseases spread as a result of the following environmental problems:

- Poor Air quality (pollutants from transportation, domestic and construction-demolition activities)
- High levels of noise pollution
- Flooding during rains
- Poor quality of potable water
- Inadequate light and ventilation
- Inadequate sanitation facility
- Insufficient water and sanitation facility at schools

The top five sensitive diseases in Greater Mumbai are diarrhoea, tuberculosis, hypertension, malaria and diabetes⁴⁷. These diseases are directly a result of either environmental pollution or due to the state of the current infrastructure management, with water related diseases forming the majority.

3.6.5 Environmental Impacts on Livelihoods and Economy:

The link between the state of the environment, health and therefore economic well being has been written about and is well established. In Mumbai's context, the floods of 2005 caused havoc and resulted in huge economic losses. Some of the environmental costs are direct and tangible while others are less obvious. Livelihoods of 50,000 Koli fisher folk are directly dependant on the state of our coastal environment while adivasipadas are dependent on forest lands. Many more people would be directly affected by the pollution of Mumbai's coastal waters and by poor quality of drinking water. Many residents especially children in the city are adversely impacted due to poor air quality in the city. Increase in morbidity due to poor environmental conditions results in decreased productivity and poor quality of life. The poor are at increased risk due to the degraded environments that they live in. Lack of access to basic sanitation and water supply compound the risks that they are exposed to. Enhancing biodiversity and mitigating pollution will have a direct impact on the quality of life of all residents of the city regardless of income.

3.7 Resources:

3.7.1 Human Resources

Staff and officials of various line departments form a huge human resource for various critical functions in both pre and post disaster phase. List of various emergency contacts and contact of various line departments are mentioned.

Trainings are regularly conducted at district level by DMU, MFB and NDRF. Trainings are also delivered at district level under Disaster Risk Management Programme. These trainings include trainings on search and rescue, first responders, EOC management, architect and engineer’s training for safe construction, flood rescue and many other training of trainers also. This has created a large trained human resource both in district and at state level.

3.7.2 Equipment

Over the years MCGM, Govt of Maharashtra has provided various fire fighting, search & rescue and other emergency equipment to Mumbai Fire Brigade. The detail of same in mentioned in Annexure -

3.8 Seasonality of Hazards

By understanding the approximate occurrence of hazard, the Mumbai may remain prepared for the respective hazards by activating the relevant departments for the same. The table below is indicative of the occurrence.

Hazards	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Cyclone												
Earthquake												
Epidemic												
Fire												
Flood												
Landslide												
Industrial & Chemical Disasters												
Road / Train accidents												
Stampede												
Terrorist Attack												
Legend	High Occurrence				Moderate Occurrence				Low Occurrence			

Fig Seasonality of Hazards

Risk Assessment:

WARD VULNERABILITY (2019)

Sr. No.	Ward	Water Logging Spots	Landslide Spots	Vulnerable Settlements	Dilapidated Buildings in C1* Category (C1* – Complete Demolition)			Emergency Assembly Points
					MHADA / Govt	MCGM	Private	
1	A	10	0	7	1	1	2	2
2	B	5	0	0	0	1	0	3
3	C	3	0	0	0	1	2	2
4	D	4	16	10	0	0	13	6
5	E	5	2	10	0	0	6	7
6	F/S	7	6	1	0	3	5	5
7	F/N	15	4	0	3	2	26	6
8	G/S	9	10	5	0	1	1	5
9	G/N	7	0	1	0	3	7	5
Total		65	38	34	4	12	62	41

Section – 4

Prevention and Mitigation Measures

Prevention and Mitigation Measures

Mitigation:

Disaster Preparedness needs to be followed by disaster mitigation, which is essential for providing long-term succor to the victims of disasters. Disaster mitigation involves measures to reduce the effects of disaster-causing phenomena. Mitigation involves all actions to reduce the effects of disaster –causing phenomena. Mitigation involves all actions to reduce the impact of a disaster that can be taken prior to its occurrence, including preparedness and long-term risk reduction measures. It also includes the planning implementation of measures to reduce the risks of human-made hazards, and the process of planning for effective response to disasters.

Disaster mitigation includes scientific analysis of risk assessment, social, economic, legal and technical process in the application of these measures. The most important part of implementing any mitigation programme is an understanding of the nature of the threat. Mitigation is required in all types of hazards.

Principals of disaster mitigation

- a. Creating awareness of risk at community level
- b. Promoting local actions through community participation to reduce such risks
- c. Assisting decision makers to understand the nature and extent of various risks faced by communities
- d. Pre-disaster mitigation helps ensure fast recovery of a community from the economic and other impacts of a disaster.
- e. Hazard reduction measures should take into account the various hazards faced by the community, including technological hazards.
- f. Mitigation measures should protect natural and cultural resources of the community.

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. In order for mitigation to be effective, we need to take action now—before the next disaster—to reduce human and financial consequences later (analyzing risk, reducing risk, and insuring against risk). It is important to know that disasters can happen at anytime and anywhere and if we are not prepared, consequences can be fatal.

Effective mitigation requires understand local risks, address the hard choices, and invest in long-term community well-being. Without mitigation actions, we jeopardize our safety, financial security and self-reliance.

- Disasters can happen at anytime and anywhere; their human and financial consequences are hard to predict.
- The number of disasters each year is increasing but only 50% of events trigger Federal assistance.
- Mitigation programs help to reduce the impact of events—and dependence on taxpayers and the Treasury for disaster relief.

The magnitude of damage wreaked by natural disasters can be reduced considerably by adopting the twin strategies of “culture of prevention” and “Spirit of Cooperation” through awareness, knowledge, training and proper use of new technologies.

Municipal Corporation of Greater Mumbai has adopted both mitigation and prevention components for disaster management.

4.1 Prevention and Mitigation Strategy

Keeping in view the hazard risk profile of the district and its disaster history, Mumbai has the following prevention and mitigation strategy:

- a. Creating District Disaster Mitigation Fund
- b. Creating awareness for disaster risk reduction at all level
- c. Appropriate amendments in the legislative and regulatory instruments along with strengthening of the enforcement mechanisms at different levels
- d. Conducting micro-zonation surveys
- e. Ensuring use of disaster resistant construction techniques, codes and guidelines in all sectors of the society by law and through incentives and disincentives
- f. Incorporating the study of disaster engineering subjects in architecture and engineering curriculum

4.2 Prevention and Mitigation Measures

Broadly, the prevention and mitigation measures could be divided into structural and non-structural measures.

- a. Structural mitigation measures generally refer to capital investment on physical constructions or other development works. These include engineering measures and construction of hazard resistant and protective structures.
- b. Non-structural measures refer to awareness and education, policies, techno-legal systems and practices, training, capacity development etc.

These measures are diverse in nature and hence the inter department participation plays a crucial role in achieving these. Each department is required to prioritise and implement these measures.

4.3 Disaster Mitigation Measures

4.3.1 Earthquake

A comprehensive programme has been taken up for earthquake mitigation. The Bureau of Indian Standards (BIS) has laid down the standards for construction in the seismic zones; these are not being adhered to. The building construction in urban and suburban areas is regulated by the Town and Country Planning Acts and building regulations. In many cases, the building regulations do not incorporate the BIS codes. Even where they do, the lack of knowledge regarding seismically safe construction among the architects and engineers as well as awareness regarding their vulnerability among the population has resulted in most of the construction in the urban / sub urban areas being done without reference to BIS standards. The increasing population has led to settlements in vulnerable areas close to the riverbed areas, which are prone to liquefaction. Earthquake mitigation requires engineered structures to withstand seismic forces, compliance to building codes, regulations, appropriate location planning, land-use regulations.

In case of earthquakes, it is not yet possible to make forecasts about the impending event. Therefore, there can be no warning. Thus to ensure the earthquake risk mitigation, it is necessary to prepare the community for:

- Hazard resistant construction or retrofitting of building / houses to reduce the vulnerability of the structures
- Proper land use planning to avoid potentially high hazard zone; and
- Community preparedness through awareness generation, mutual assistance, and adherence to a set of Do's and Don'ts

It is poorly built structures, not earthquakes that kill people. It is a well-known fact that most earthquake related deaths and financial losses are due to the structural collapse of houses and other buildings and structures. The impact of an earthquake on a structure is greatly influenced by the building material used, design of the building and techniques employed for construction. In general, houses built with mud, adobe, burnt brick and stones are poor against seismic forces. While no building or house can be earthquake-proof, it will certainly help to adopt earthquake- resistant design and construction of buildings as per the guidelines/codes available for this purpose. - The Bureau of Indian Standards has brought out codes for earthquake resistant design and construction of buildings. These codes must be used for constructing all new buildings/structures, while existing ones should be retrofitted to acquire appropriate strength to resist the seismic forces. It has been estimated that the cost difference is not more than 5 to 10 percent between an earthquake- resistant building and the one without earthquake resistant features.

In principle, high-risk areas must be avoided to reduce the impact of an earthquake. For example, efforts need to be made towards avoiding soft soils or landfills sites for constructing important structures. Micro zonation is one such method generally used to identify the local site characteristics.

Community preparedness programmes are the key to mitigate the impact of an earthquake-- Community is the first responder to any emergency. A properly trained society performs better during situations arising due to severe earthquake.

The best way to cope with the problem of earthquakes is to build earthquake resistant buildings and infrastructure and to prepare earthquake mitigation plans to take care of every stage of earthquake management. The following Do's and Don'ts, if observed before, during and after an earthquake, will definitely help in mitigation of the consequences of an earthquake disaster.

Task	Activities	Responsibility
Micro Zonation	<ol style="list-style-type: none"> 1. Undertake micro zonation study according to priority area 2. Provide or make available seismic micro zonation map 3. Provide vulnerability and risk assessment map 	<ol style="list-style-type: none"> 1. Revenue Dept., GoM 2. SDMA 3. UD Dept 4. GMDMA 5. Planning Authorities
Earthquake Resistance Design for Different Earthquake Zones	<ol style="list-style-type: none"> 1. Develop earthquake resistant design features for the construction of public utility structures 2. Develop earthquake resistant design features for the construction of residential structures 3. Provide earthquake resistant design for incorporating in different types of structures of the line departments 	<ol style="list-style-type: none"> 1. Revenue Dept., GoM 2. GMDMA 3. Planning Authorities
Retrofitting of Existing Structure	<ol style="list-style-type: none"> 1. Create a database of existing structure (both public and private) in the district. 2. Identify the available resources 3. Identify structures that require retrofitting 4. Prepare a scheme/programme for retrofitting 5. Identification and removal of unsafe buildings/structure 	<ol style="list-style-type: none"> 1. Revenue Dept. 2. SDMA 3. UD Dept 4. PWD Dept 5. GMDMA 6. Planning Authorities
Non Structural Measures		
Monitoring of Seismic Activities	<ol style="list-style-type: none"> 1. Establish seismological network and round the clock monitoring 2. Dissemination of information and reporting 3. Conduct seismological research 	<ol style="list-style-type: none"> 1. IMD 2. SDMA 3. GMDMA 4. GSI 5. Planning Authorities
Capacity Building	<ol style="list-style-type: none"> 1. Prepare departmental earthquake contingency plan 2. Ensure earthquake related departmental action plan and SOP 3. Include earthquake engineering topics in curriculum 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Collectors 4. YASHADA 5. Planning Authorities 6. CIDM

	<ol style="list-style-type: none"> 5. Provide professional training about earthquake resistance construction to engineers and architects 6. Provide training to masons. 7. Encourage soil and material testing in laboratories 	
Safety Audit	<ol style="list-style-type: none"> 1. Carry out structural safety audit of all critical lifeline structures 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Planning Authorities 4. Collectors 5. GSI 6. IIT
Awareness	<ol style="list-style-type: none"> 1. Disseminate earthquake risk to general public residing in earthquake prone zones 2. Campaign for Earthquake safety tips 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Collectors 4. Planning Authorities

6.3.2 Flood

Floods are extreme events, usually triggered by extreme precipitation (river/inland floods) and/or storms (coastal floods). If these rainfalls exceed the retention capacity of the basins, drainage speed and volume, it causes floods. Three different types of flooding are evident in Mumbai: localized flooding due to inadequate drainage; flooding due to overflows from Mithi River, where settlements have taken place in the flood plains, and flooding due to combination of high tides and high river flows. Localized flooding occurs mainly due to informal settlements in the drain path, improper drainage network, reduction in drain capacity due to siltation. Land use practices, solid waste management practices and drainage maintenance in the city have influenced and exacerbated the flood hazard.

1. Floods are the most frequent and most widespread of all the natural disasters.
2. They result in death, destruction, degradation, disease and displacement.
3. Whether a flood is of sudden onset type or develops slowly, it takes long to subside and leaves behind prolonged ill effects.
4. Economically and socially disadvantaged sections of the community suffer the most.
5. Recurrent nature of floods aggravates the disaster.
6. The natural hazard of flood turns into a long persisting socio-economic disaster.

Loss of lives and property can be reduced significantly by giving advance information about the likelihood of floods. People, cattle and valuable moveable property can be transferred to safer places in that case. Therefore, forecasting, warning and monitoring of floods are accepted as important and cost effective non-structural, i.e. non-engineering methods of flood hazard mitigation. Modern advancements in technical and scientific knowhow have led to establishment of a credible forecasting and warning system.

Various approaches are available to deal with floods and to mitigate their adverse impact. As each situation is different, different approaches or their combination is adopted. Basically, these approaches fall under the following three categories:

1. Modify the floods i.e., do not allow water to accumulate. In other words, keep floodwater away from people.

2. Modify the susceptibility of the people to flood damages i.e., keep the people away from floodwater.
3. Modify the loss burden inflicted by floods on the people.

Modification of floods would involve measures such as weather modification (if possible), catchment and land use modification, physical control works such as reservoirs and embankments. Modification of the susceptibility of the people would involve flood forecasting, warning, flood proofing and flood plain management. Modifying the loss burden is possible through evacuation, pumping out water, avoidance of epidemics, flood insurance and compensation.

Modification of the hazard is possible through structural and non-structural measures.

Task	Activities	Responsibility
Structural Measures		
Construction	<ol style="list-style-type: none"> 1. Improve design for irrigation and flood protective structures 2. Construct dams, flood protection wall, flood diverting channels etc. 3. Strengthen /repair of existing roads and bridges and other critical infrastructure in flood plains. 4. Strengthen dams and canals. 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Collectors 4. Planning Authorities
Flood Plain Zoning	<ol style="list-style-type: none"> 1. Demarcation of areas liable to floods on large scale maps 2. Demarcation of areas likely to be inundated for different flood frequencies 3. Delineation of the type of use to which the different zones as demarcated in flood plains could be put. 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Planning Authorities
Development of Catchment area	<ol style="list-style-type: none"> 1. Develop catchment area of the flood plain <ul style="list-style-type: none"> ▪ Forestation ▪ Land sloping ▪ Small reservoirs / Check dams / ponds etc 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Planning Authorities
Flood Proofing	<ol style="list-style-type: none"> 1. Implement specific building by laws for buildings and structures in the flood plains 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Planning Authorities
Techno - Legal Regime	<ol style="list-style-type: none"> 1. Enact and enforce laws regulating developmental activities in flood plain 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Planning Authorities
Forecasting	<ol style="list-style-type: none"> 1. Strengthen and upgrade existing flood forecasting system 2. Establish infrastructure for flood warning and dissemination. 	<ol style="list-style-type: none"> 1. IMD 2. MCGM

Non-Structural Measures		
Capacity Building	<ol style="list-style-type: none"> 1. Prepare departmental flood contingency plan 2. Develop flood related departmental action plan and SOP 3. Impart training to the stakeholders involved in flood mitigation and management 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Collectors 4. Planning Authorities
Awareness	<ol style="list-style-type: none"> 1. Disseminate flood risk to general public residing in flood prone zones 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Planning Authorities
Safety Audit	<ol style="list-style-type: none"> 1. Carry out structural safety audit of all critical lifeline structures 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Planning Authorities
Review of Rules	<ol style="list-style-type: none"> 1. Review operational rules for reservoirs 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Planning Authorities

MCGM’s overall responsibility in case of flood

- Drain floodwaters and remove impediments to movement from all roads under its control.
- Repair, restore and maintain all roads, storm water drains, etc. under its control.
- Repair, restore and maintain all other municipal infrastructure, services, facilities, amenities, etc.
- Rescue persons.
- Transport injured persons to hospitals.
- Transport and dispose of corpses.
- Transport/shift/ evacuate stranded/affected persons.
- Organise temporary shelters with food and water supply.
- Issue passes/identification stickers for vehicles on relief duty.
- Issue passes/identity cards to persons on relief duty.
- Coordinate the activities of NGOs and other private entities engage in relief work.
- Aid and supplement efforts and activities of all other departments and agencies with regard to disaster management.
- Undertake and perform 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.

Wards Overall Responsibilities

- Man round the clock the Ward Control Rooms.
- Keep ward response teams along with equipment ready for deployment in very short time.
- Contact locals and schools in low-lying areas.
- Assess on ground situation and provide feedback to EOC.
- Provide assistance to schools, NGOs and other departments in establishment of shelters along with provisions.

- Arrange and deploy labourers for clearing water entrances, floating materials, clean mouth of direct outfalls.
- Opening of manholes and placing guard tripods.
- Check floodgate operation.
- Deployment of pumps.
- Clearance of debris.

6.3.3 Cyclone

Cyclones are caused by atmospheric disturbances around a low-pressure area distinguished by swift and often destructive air circulation. They are usually accompanied by violent storms and bad weather. Tropical cyclones are the progeny of ocean and atmosphere, powered by the heat from the sea, driven by the easterly trades and temperate westerlies, the high planetary winds and their own fierce energy.

It's now possible to warn the affected population at least 24 to 36 hours in advance about the danger from a cyclone. It will be recognized that taking advantage of reliable cyclone warning services, the human loss due to tropical cyclone can be minimized.

The essentials of an efficient cyclone warning systems are:

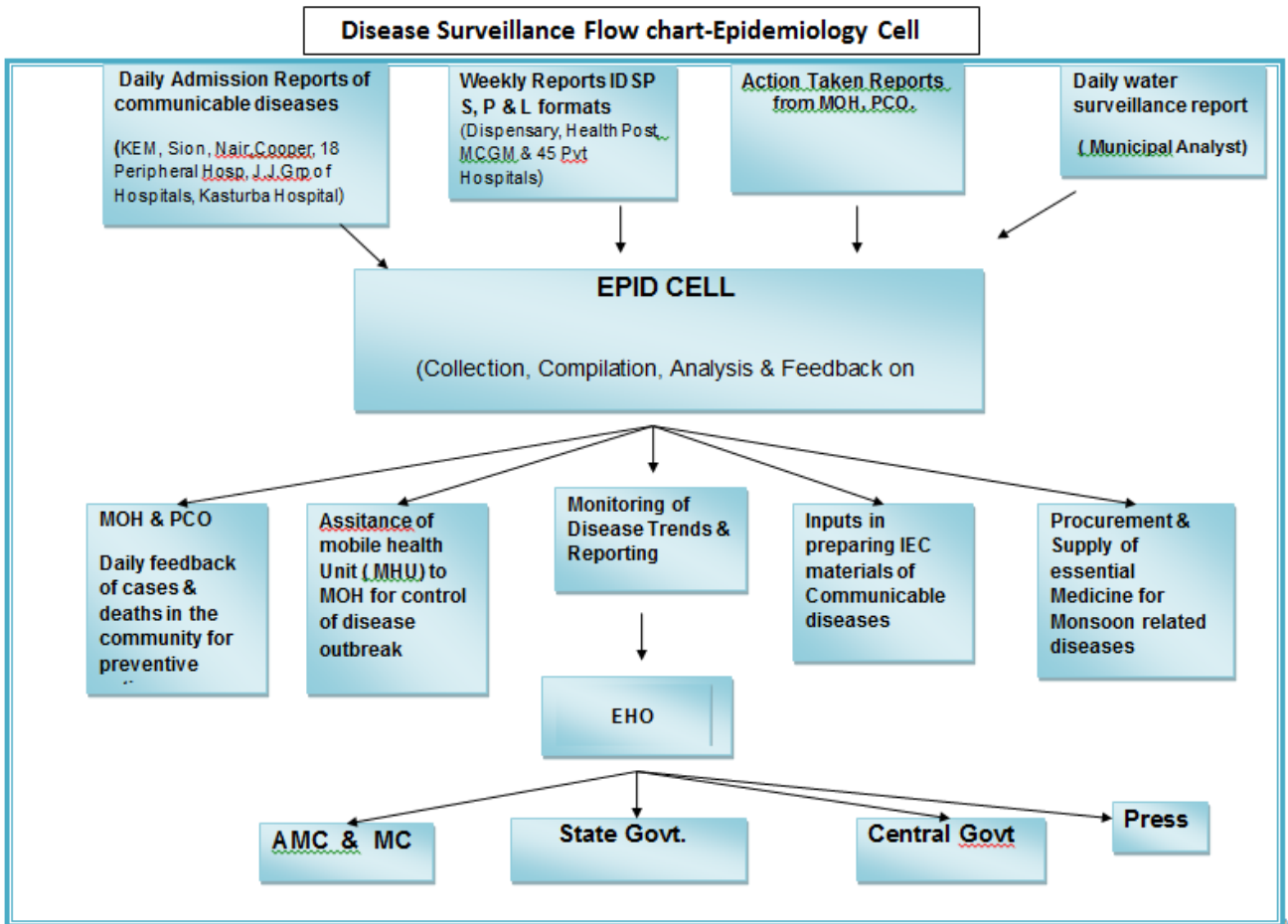
- 1) Good Observing System
- 2) Modern and reliable forecasting techniques
- 3) Rapid and dependable communication system for the forecast advisories and warnings to reach all concerned
- 4) Adequate preparedness and quick response.

Task	Activities	Responsibility
Structural Measures		
Shelter Belt	1. Ensure shelter belt plantation and mangrove regeneration	1. Forest Dept. 2. Collectors 3. Planning Authorities
Providing Cyclone Shelters	1. Construct cyclone shelters in cyclone prone areas	1. SDMA 2. Secretary, R&R 3. GMDMA 4. Planning Authorities
Forecasting and Warning	1. Strengthen and upgrade of existing cyclone and tsunami forecasting system 2. Establish infrastructure for cyclone/tsunami warning and disseminate to the on shore/off shore coastal areas 3. Develop specific warning dissemination system for ports, beach, salt workers and fishermen	1. IMD 2. SDMA 3. GMDMA
Evacuation Routes Identification	4. Evacuation routes should be identified	1. GMDMA 2. Traffic Police
Non-Structural Measures		
CRZ Act	1. Costal Regulations Zone Act – Strict implementation 2. No development within 500 m of the high tide line with elevation of less than 10 m above MSL 3. Land use zoning in accordance with CRZ	1. SDMA 2. GMDMA 3. Planning Authorities
Capacity Building	4. Prepare departmental cyclone / tsunami contingency plan 5. Develop cyclone/tsunami related departmental action plan and SOP 6. Impart training to the stakeholders involved in cyclone/ tsunami mitigation and management.	1. SDMA 2. GMDMA 3. IMD 4. INCOIS 5. Maritime Boards 6. Navy 7. Coast Guard
Awareness	7. Disseminate cyclone/tsunami risk to general public residing in coastal areas 8. Campaign for cyclone/tsunami safety tips	1. GMDMA 2. IMD 3. Maritime Board 4. Planning Authorities
Safety Audit	9. Carry out structural safety audit of all critical lifeline structures	1. Planning Authorities

3.3.4 Epidemics

An epidemic is the rapid spread of infectious disease to a large number of people in a given population within a short period of time, usually two weeks or less.

Municipal Corporation of Greater Mumbai’s Public Health Department is the Lead Agency for monitoring and control of epidemics.



Mitigation efforts for control of epidemics would include

- Surveillance and warning
- Preventive and promotive measures
- Strengthening institutional infrastructure

Task	Activities	Responsibility
Structural Measures		
Surveillance and warning	<ol style="list-style-type: none"> 1. Identify the epidemic prone areas 2. Establish mechanism for regular monitoring of such locations 3. Set up testing laboratories with trained man power if required 4. Collect data and disseminate to concerned authorities 	<ol style="list-style-type: none"> 1. Ex. Health Officer 2. Ward MOH 3. Insecticide Officer 4. Planning Authorities
Preventive and Promotive Measures	<ol style="list-style-type: none"> 1. Ensure clean drinking water, personal toilets and proper sanitation facilities in epidemic prone areas. 2. Ensure safe drainage and proper waste management system 	<ol style="list-style-type: none"> 1. Ch.Eng. SWM 2. Ex Health Officer 3. Planning Authorities
Strengthening Institutional Infrastructure	<ol style="list-style-type: none"> 1. Organize capacity building trainings for health staff 2. Establish testing labs with modern equipment and trained manpower 	<ol style="list-style-type: none"> 1. Ex. Health Officer 2. Ward MOH 3. Planning Authorities
Non Structural Measures		
Capacity Building Activities	<ol style="list-style-type: none"> 1. Identify the primary stakeholders of current epidemic 2. Organize epidemic management trainings for all stakeholders 3. Provide necessary safety devices to health staff who manage and work in epidemic area 	<ol style="list-style-type: none"> 1. Direction, ME&MH 2. Ex Health Office 3. Planning Authorities
Awareness Program	<ol style="list-style-type: none"> 1. Organize public campaigns to aware them on what to do and what not do to control the epidemic. 2. Use both electronic and print media to disseminate the safety measures and the actions government taken to check the epidemic 	<ol style="list-style-type: none"> 1. Direction, ME&MH 2. Ex Health Office 3. Planning Authorities

The following measures for preventing the health risk arising out of a disaster:

- Research and epidemiological studies
- Immunization and vaccination
- Proper food and nutrition
- Maintenance of hygiene and sanitation
- Adequate system of garbage disposal
- Vector Control
- Well laid down system of education, training and simulation exercises
- Mitigation Plans

District Disaster Management Plan

- Media Campaigns
- Sustainable development
- People's involvement

Mitigation plans should integrate the following points:

- Creating awareness of health risk at community level
- Promote local actions through community participation to reduce such risk
- Assist decision makers (Politicians and administrators) to understand the nature and extent of various risks faced by the communities in their area of responsibility, and to assess the economic conditions through proper decision making and planning.
- Introduce effective measures to implement disaster mitigation plans at different levels of public administration based on risk assessment and vulnerability analysis.

With such a mitigation strategy, it becomes possible to reduce the adverse health consequences. The local community, the governmental bodies, and other agencies working in the area of disaster management can assess the causes, severity and elements of risks pertaining in their areas. This will enable them to take appropriate health preparedness measures.

NGOs and disaster management agencies should conduct training programmes of the public health workers and volunteers in the community. As far as possible, population should be trained for multi-purpose activities. Formal training can be given through modular courses by NGOs or other agencies. Training can be informal through visit to schools and public offices. Street plays and entertainment shown can also be used for the purpose.

Exercises are conducted after the training. There are two major advantages of conducting an exercise. One, the organization and community will be able to assess its preparedness, and two media glare on the exercise will help spread the message across the community, making the populace more aware of the disaster scenario, and the actions to be taken by them. This may result in more volunteers from the community.

4.3.5 Road, Rail Accidents

Roads and Railways are the principal mode of transport for both passengers and goods in the city. The safety of railway operations is becoming all the more imperative in view of railway endeavor to lift more passengers and freight traffic. Accordingly, high priority is being given to various safety measures to ensure greater safety in rail travel. Factors contributing to occurrence of Rail Disasters are:

- Heavy Rain
- Cyclone / Flash Floods
- Human Failures
- Equipment Failures

District Disaster Management Plan

- Non-observance of section of 131 of Motor Vehicle Act, 1988 by road users leading to unmanned railway level crossing accidents
- Sabotage
- Tampering with Track

In areas prone to natural disasters, like cyclone and floods, Railways adopt measures to tackle problems. Weather warning is received through the meteorological department and is relayed. The track is patrolled on foot and the condition of track, bridges are observed, and special watch is kept at vulnerable locations.

Bomb blasts or anonymous calls are dealt with the help of the concerned government, railway police / State police who rush to the spot and conduct checks. The Accident Relief Train and Medical Relief Train are moved to the site.

The road fatalities involving pedestrians and bicyclists are on the increase due to the spiraling increase in number of vehicles clogging the roads. Road accidents are caused by the negligence of the drivers, lack of proper road sense in the public and also by use of vehicles which are fully road worthy.

The mitigation strategy therefore assumes that enforcement of Motor vehicle Act will precede the measures suggested:

Task	Activities	Responsibility
Structural Measures		
Strengthening Institutional Capability	<ol style="list-style-type: none"> 1. Make provision for special enforcement wing 2. Set up traffic posts and trauma care centers 3. Set up hotlines and speed monitoring technology 4. Keep equipments for removal of accident vehicles 5. Fix a lead agency for monitoring 6. Make provision of special route for hazardous vehicles 	<ol style="list-style-type: none"> 1. Transport Commissioner 2. Planning Authorities
Strengthening Road Infrastructure	<ol style="list-style-type: none"> 1. Avoid parking on no parking zones. 2. Show excavation locations with barricades 3. Put road dividers, speed breakers, information sign boards 4. Keep machines for removal of debris in emergency 	<ol style="list-style-type: none"> 1. Mumbai Traffic Police 2. Planning Authorities in Mumbai 3. Planning Authorities

<p>Improving Regulations</p>	<ol style="list-style-type: none"> 1. Insurance regulation 2. Strictly use protective materials by two wheeler drivers 3. Training for drivers carrying hazardous materials 4. Use blinking lights for stationary vehicles 	<ol style="list-style-type: none"> 1. Transport Commissioner 2. Mumbai Traffic Police 3. Planning Authorities
<p>Non-Structural Measures</p>		
<p>Capacity Building</p>	<ol style="list-style-type: none"> 1. Organise training for all stakeholders involved in road transport and traffic management. 2. Organize first responder training for Traffic Personals 3. Build up management skill of traffic police and Regional Transport Office staff organizing mock drills in a regular interval 	<ol style="list-style-type: none"> 1. Traffic Police 2. Transport Commissioner 3. GMDMA 4. Planning Authorities
<p>Awareness Generation</p>	<ol style="list-style-type: none"> 1. Create public awareness on road safety, traffic rule and noise pollution control 2. Disseminate fire safety tips, traffic rules and regulation among public through electronic display boards 3. Develop IEC materials on dos and don'ts for public distribution 	<ol style="list-style-type: none"> 1. Traffic Police 2. Transport Commissioner 3. Planning Authorities 4. GMDMA

Strengthening Institutional Capability & Road Infrastructure:

1. Assess the problem, policies and institutional settings relating to road traffic injury and the capacity for road traffic injury prevention
2. Improve the deteriorated stretches of roads in Asphalt or Concrete
3. Maintain the roads in motorable condition
4. Prescribe Regular lines for the existing roads & road lines for new proposed roads.
5. Maintain existing roads
6. Provide & maintain Road Dividers, Signals, delineation etc. (Road safety devices) in consultation with Traffic Police & Wards Offices.
7. Provide & maintain streetlights on roads through the B.E.S.T., Reliance Energy & M.S.E.B. in consultation with Traffic Police & Ward Offices.
8. Prescribe Road widening based on traffic studies & new road lines for proposed new roads.
9. Parking of vehicles in “No Parking Zone” strictly prohibited
10. Formulate & implement pay & park schemes in consultation with Traffic Police & Ward Offices.
11. Construct flyovers, FOB & subways.

12. The speed breakers and tipplers must have standard designs.

Improving Regulations:

1. Insurance claims should be linked with compliance of all regulations related to vehicles and transport restrictions.
2. Prepare a road safety strategy and plan of action.
3. Allocate financial and human resources to address the problem.
4. Implement specific actions to prevent road traffic crashes, minimize injuries and their consequences and evaluate the impact of these actions.

4.3.6 Fires

Fire loss is national loss because what burns never returns. Fire is a good servant, but a bad master. Amongst all hazards, fire and fire related accidents carry a high degree of fire risk and pose a greater problem.

There are many cause of fire in the district such as accidents, electrical short-circuit, carelessness, gas leaks, mishandling of flammable chemicals and products, etc. Further, Mumbai being highly industrialized district there is increased threat of fire incidents. Fire causes huge losses of life and property every year.

Task	Activities	Responsibility
Structural Measures		
Develop Fire Infrastructure and other fire facilities	<ol style="list-style-type: none"> 1. Strengthen coordination between Fire agencies and other stakeholders 2. Equip fire stations with modern fire engines and other equipment 3. Provide fire proof devices to fire fighters 4. Insurance coverage for fire staff 5. Make provision for special fire burn ward in the hospitals 6. Robust communication system for Fire Brigade and it's Regional Command Centers and fire stations 	<ol style="list-style-type: none"> 1. Maharashtra Fire Services 2. Mumbai Fire Brigade 3. Information Technology dept. 4. Director, ME&MH
Non-Structural Measures		
Capacity Building	<ol style="list-style-type: none"> 1. Provide regular training to the fire staff in using and maintaining the equipment 2. Organize regular demo for fire brigade to familiar them with fire equipments 3. Conduct mock drills to check up the departmental preparedness 	<ol style="list-style-type: none"> 1. Maharashtra Fire Services 2. Mumbai Fire Brigade
Awareness Generation	<ol style="list-style-type: none"> 1. Organize awareness programmes on fire safety in schools, colleges and offices 	<ol style="list-style-type: none"> 1. DMU 2. Maharashtra Fire Services

	2. Disseminate fire safety tips among public through print and electronic media 3. Develop IEC materials on dos and don'ts for public distribution 4. Organize training program for NGOs, NSS, NCC students	3. Mumbai Fire Brigade
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From history it is found that fire is a frequently occurring hazard in Mumbai, and many fires occur because of the lack of awareness on the part of occupants such as using temporary and low quality electric gas fixtures / lines, faulty electrical equipment etc. To avoid fire accidents as a part of mitigation strategy, efforts should be made to

1. Strict regulations on the quality of electric and gas lines and fixtures especially for commercial and institutional buildings.
2. Shopkeepers may not be allowed individual generators in case of multi-story commercial buildings, instead, owners may be asked to arrange central generator, preferably placed outside the building in a generator room.
3. Building approving authorities should have a mechanism to inspect the adequacy of active fire safety measures before approving it to be fit for use.
4. There should be no relaxation on the provisions of standard fire safety measures for commercial and institutional buildings as these are highly vulnerable to fires and generally house many people at on time.
5. There is an urgent need to develop fire safety guidelines and educate public, building owners, designer and government agencies regarding the damaging effects of fire and importance of including fire safety in the design of important buildings.
6. Computerized data management system should be introduced to keep the record of all fires including frequency, extent, fatality, economic losses etc.
7. Special burns wards should be established in every civil hospital and in the hospitals near the industrial estates.
8. Equipping fire services with robust communication facilities
9. The roles and responsibilities of administration, police, fire services and medical services should be clearly laid down.

4.3.7 Industrial and Chemical Accidents

Major Chemical (Industrial) disasters are low in frequency but are very significant in the terms of loss of lives, injuries, environmental impact and property damage. Frequency and severity of

chemical disasters has increased in last few years due to rapid development of chemical and petrochemical industries and increase in size of plants, storage and carriers, specifically in densely populated areas.

Task	Activities	Responsibility
Structural Measures		
Industrial Safety Measures	<ol style="list-style-type: none"> 1. Strengthen Mutual Aid Response Group (MARG) 2. Form and strengthen the Crisis Groups at local levels 3. Develop on-site and Off-site Plans 4. Set up toxic water treatment facility 5. Set up leakage checkup devices 6. Purchase, store and keep functional all necessary Industrial safety equipment 7. Make provision for poison ward in MCGM & Govt Hospitals 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. DISH 4. Planning Authorities
Techno-Legal Regime	<ol style="list-style-type: none"> 1. Implement the Acts and Rules related to industrial safety firmly 2. Ensure structural safety inspection / audit by competent authority 	<ol style="list-style-type: none"> 1. GMDMA 2. DISH 3. Planning Authorities
Strengthening Warning Systems	<ol style="list-style-type: none"> 1. Set up on site and off site warning dissemination system 	<ol style="list-style-type: none"> 1. DISH 2. Ward Asst MCs 3. Collectors 4. Planning Authorities
Non-Structural Measures		
Emergency Planning	<ol style="list-style-type: none"> 1. Prepare / update emergency onsite and offsite plan 2. Regular monitoring of safety activities in all the factories / industries 	<ol style="list-style-type: none"> 1. DISH 2. Ward Asst MCs 3. Collectors 4. Planning Authorities
Capacity Building	<ol style="list-style-type: none"> 1. Organize industrial safety trainings for officers and staff working in factories 2. Set up an on site and off site monitoring team to check up all safety measures 3. Conduct mock drills in a regular interval 4. Encourage disaster insurance 	<ol style="list-style-type: none"> 1. DISH 2. GMDMA 3. Collectors 4. Planning Authorities
Awareness Activities	<ol style="list-style-type: none"> 1. Organize community awareness programmes for the communities residing near the factories and let people know dos and don'ts in case of industrial disaster 2. Develop IEC material in local language and distribute them in schools and local communities 3. Organize school level awareness activities and ensure students participation in large number 	<ol style="list-style-type: none"> 1. SDMA 2. DISH 3. GMDMA 4. Collectors

1. Accurate information of location, type and quantities of hazardous material being store, used or produced should be known at district level.
2. The hazardous material should be stored and handled as per laid down norms. These are usually divided into different categories with each having identification mark for packaging and transportation.
3. A regular and systematic inspection of chemical plants and storage facilities of hazardous material is important. Most of the chemical disaster can be avoided if laid down norms are followed strictly by all. A common understanding on requirements of safety by government officials and those running industries with hazardous material is essential.
4. Disposal of toxic waste by industrial units must be monitored. There have been cases where toxic wastes dumped underground have resulted in pollution of sub-soil water. Disposal of toxic waste in rivers and drains, especially passing through populated areas, needs to be stopped in totality.
5. Monitoring of pollution levels gives warning of toxicity in land, water or atmosphere. It can also forewarn the authorities of any unusual and hazardous substance in the environment.
6. Emergency management plans needs to be prepared for on-site and off-site contingencies. On-site contingencies are those where the impact of the accident is localized and it is like to cause dame or destruction of plant and equipment or injure or loss of life to workers. In off-site emergencies, the impact of the accident is widespread i.e. beyond the premises of a hazardous industrial unit.

Following aspects should be include in DM Plan

- Awareness among workers and the people likely to be affected
- Procedure for warning
- Immediate action to be taken
- Specific responsibilities of officials and their training
- Plan for casualty evacuation and medical aid
- Fire fighting arrangements
- Command, Control and Communication System
- List of specialists, personnel, and organisations who could provide assistance.
- Practice drills

4.4 Community efforts in Mitigation Measures

Any mitigation policy and activity need to be accompanied by community participation. The communities are the first to respond when disaster strikes. Since they are familiar with the local area vulnerabilities, available resources, facilities, demography, the community need to be assisted with disaster mitigation plans.

Public Administration and citizens have to work in unison, as existence of one without the other is not possible in a civilsed society. The harmonious relationship depends upon the sincerity, earnestness and cooperation between the two. There is need to

- Encourage people's participation for development and modernization
- Kindle the potential energy of the citizens in to kinetic energy to accelerate development

District Disaster Management Plan

- Supplement the efforts of the government in the conduct of its affairs
- Strengthen the values of democracy in the minds and spirit of the people
- Enlist respect in the Constitution, which is rooted in people's sovereignty

Empowerment of community: The community needs to be empowered for coping with disasters. Disasters are situations that need mobilization of capabilities and capacities of local population. It is also known that the local communities have an active part to play before and after disaster because:

- A good state of preparedness before a disaster strikes may reduce its impact.
- More number of lives can be saved during the first few hours after a disaster has occurred, before help arrives from elsewhere.
- The numerous problems of survival and health resulting from a disaster are dealt with more efficiently, if the community is active and well organized.

Session – 5

Preparedness Measures

Preparedness Measures

5.1 Concept & Significance

Disaster involve in two key elements namely, the event and people vulnerable to it. Hence, preparedness assumes significance, to strengthen the abilities, capacities to predict and wherever feasible, prevent disaster, lessen the impact, facilitate response, and handle the consequence of disaster at various levels. Disaster preparedness is a multifaceted activity. It has to pay attention to economic, social, political, technological and psychological variable.

Preparedness strategy has to aim:

- Developing awareness amongst the people to be alert and responsive to impending disasters.
- Reducing the vulnerability of community in disaster-prone areas and enhancing their ability to cope with them.
- Strengthening the institutional mechanism and capacities of government at several levels, non-governmental organizations (NGOs), Communities in disaster preparedness, relief, response and rehabilitation activities.
- Building networks between several organizations including government, NGOs, private organizations, community, and other key stakeholders to foster preparedness efforts.

Principles:

- Perceptions should be studied and opportunities created for people to modify their perceptions where necessary
- Create strategies to rouse the curiosity of the individual and encourage a general desire for change.
- Individuals and communities should be helped to compare the existing ways with proposed innovations, relate innovations to the basic needs and overcome barriers to acceptance
- Adopt educations methods that have a heavy emphasis on community involvement and participation.
- Group approval influences adoption of new behavior pattern.
- Behavior is motivated. Motivation is the inner drive the propels human beings towards attaining a desired goal.

Activities:

- Developing and institutionalizing disaster preparedness plan which comprehensive, indicating the roles and responsibilities of several stakeholder before, during and after occurrence of disasters.
- Strengthening warning systems and meteorological studies
- Evolving appropriate Information Education and Communication (IEC) activities for community
- Keeping ready Rapid Response Teams, Search and Rescue personnel along with Emergency Medical Teams
- Setting up safe havens
- Putting in place emergency evacuation procedures
- Making available relief activities including emergency shelters, medical, food aid services, and security arrangements.
- Assessing the damage after the occurrence and restoring transport, power and communication systems.

Measures

- **Disaster Mapping:**
 - Disaster mapping is done to assess the impact of disaster on population, property and natural resources.
 - With the help of mapping, it's possible to provide pre and post disaster related information which further help in risk assessment, systematic rescue and relief operations
- **Disaster Preparedness Plan:**
 - The plans can either be short term or long term encompassing the aims and objectives,
 - the organizational structure for tackling disasters
 - preparedness measures
 - the communication system
 - warning arrangements
 - community disaster operations
 - the operational aspects of implementation of plans
 - post disaster review, training and public awareness.
- **Land-use Zoning for Disaster Management**
 - Proper land-use planning and zoning important for disaster management
 - Reduce the extent of damage both to the lives and property
- **Preparing community through Information Education and Communication**
 - Information, education and communication are important aspects to DM
 - It emphasizes to increase the awareness of the community about hazards, risks and coping mechanisms.
 - It deals with effective channels and strategies of communicating and educating the community about disasters
- **Predictability, Forecasting and Warning**

- **HPC (2001) has recommended the following to be implemented in a phased manner, in evolving and sustain a culture of preparedness. These are**
 - Preparing precision Geographical Information System / Digital Maps and also hazard specific zonation maps for all identified hazards
 - Utilizing remote sensing for forecasting, monitoring and evaluation, predicting disaster damage scenarios
 - Creating information database giving the land use, demographic, socio-economic data, infrastructure, and resources inventories of governmental and non-governmental systems and historical documentation of previous disasters
 - Planning for all contingencies, which are linked to different support departments and establish interlinkages between district plans
 - Strengthening forecasting, warning and alert systems to initiate preparations for response and trigger the decision making process.
 - Capacity building of various role players in disaster management such as police, civil defence, para military forces, home guards etc.

- **SDMA suggested following disaster management activities under preparedness measures**
 - Update resources inventory
 - Review and update the DM Plans
 - Develop DM policy, guideline and plan
 - Establishment of EOC and early warning system
 - Formation of DM Committees and task forces
 - Organise capacity building trainings
 - Purchase / repair the search and rescue materials and critical supplies
 - Identify disaster prone areas and complete the HRVA study
 - Prepare the hazard maps
 - Organize community based DM trainings, orientations and awareness activities
 - Make fund provision for disaster response, mitigation and relief works
 - Implement all preventive and mitigation activities in disaster prone areas
 - Conduct mock drills
 - Mainstreaming of DM in development programmes / projects / scheme
 - Develop coordination and net working with various stakeholders

5.2 Availability of Disaster Management Resources

Resources available with State have been uploaded in the IDRN web site.

India Disaster Resource Network (IDRN)

IDRN is a nation-wide electronic inventory of resources that enlists equipment and human resources, collated from districts, states and national level line departments and agencies.

IDRN is a web-based platform, for managing the inventory of equipment, skilled human resources and critical supplies for emergency response. Primary focus of IDRN portal is to enable the decision makers to find answers on availability of equipment and human resources required to combat any emergency. This database will also enable them to assess the level of preparedness for specific disasters.

The online inventory of resources is hosted in the National Informatics Centre (NIC), New Delhi. Only the authorized Government officers have the access to uploaded data in the portal and the district authorities are the officials for facilitating data collection and updation. Data is monitored and maintained at the central level by National Institute of Disaster Management (NIDM). Besides NIDM is responsible for the overall administration of the portal.

District Collectors/Magistrate are the authorized officials to get the latest information about disaster management resources available with various line departments/agencies and uploaded in the portal, using services of District Informatics Officers.

5.3 Community –Based Disaster Management

The Community has an important role, their coping mechanisms are undervalued. But in case of any disaster, the responsibility of community and local authority is much more in setting goals, devising rehabilitation programmes, managing recovery and developing priorities. Its need to recognize the community as a key resource in disaster management, Communities and victims are a resource because:

- They are knowledgeable about disasters happening in their own environment and are sometimes able to forecast them
- They are rich in experience of coping, both in preparedness and in emergencies. Their coping methods – practiced over time and derived from their own experience suit the local government best.

CBDP has to incorporate certain important components such as:

- Hazard Mapping and Zoning
- Involving local institutions
- Formulating Community Preparedness and Contingency Plans
- Forming Disaster Task Forces at local level
- Capacity building of the members of task force
- Networking with NGOs and CBOs

1.3.1 CBDM in Pre-disaster Phase

- Orienting the community towards the nature and effects of the disasters to which they are vulnerable
- Taking stock of the resources of the community such as schools, primary health centers, cyclone shelters, communication facilities, road and other infrastructure and skilled individuals
- Assessing the risks and vulnerabilities of the community. The various elements at risk that include the physical structures, as well as the vulnerable section of the community such as women, children, physically challenges, old etc. need to be examined so that the preparedness measures are appropriately planned.
- Formulating preparedness plan at the community level, that takes into cognizance the community needs, measures to be taken by the community before, during and after the disaster strikes, resources available at various places, clear allocation of responsibilities amongst all concerned officials, departments, NGOs, CBOs.
- Specifying the role of community in handling the disaster

1.3.2 CBDM During Disaster

- Organising Search, Rescue and Evacuation activities. This includes identifying the disaster victims, bringing them to safer places, provision of first aid, distribution of relief, adhering to evacuation plan etc.
- Shelter for people as well as livestock. This includes arrangements for water supply, sanitation, kitchens, fodder for animals, medical services and first aid etc.
- Clearing of debris from collapsed buildings, bridges, trees other structures, re-establishing of transport and communication facilities.
- Moving of injured to the nearby health centers and hospitals
- Disposing of dead humans in order to contain the spread of disease in another important task. Identification of dead bodies, compliance with police formalities, mobilizing resources for disposal of bodies in accordance with religious and cultural practices, are activities which involve the community. Disposal of dead animals is important as it has effect on health and environment
- Assessing damages immediately on the occurrence of disaster facilitates quick emergency relief. This is to be done with reference to the number of households population, livestock, area affected etc.

1.3.3 CBDM in Post-Disaster Phase

- Undertaking a detailed damage assessment covering verified number of human lives, identification of live victims as well as the dead, livestock, infrastructure and the estimated value.
- Drawing up a comprehensive economic rehabilitation plan that includes restoration activity through necessary inputs.
- Building an appropriate monitoring and evaluation mechanism in community based disaster preparedness programme.

A CBDM broadly is to indicate the following aspects:

Pre-disaster phase:

- Risk assessment and vulnerability analysis
- Resource analysis and mobilization
- Warning system and its dissemination
- Organizing community response mechanisms
- Construction and maintenance of cyclone / flood shelters
- Mock exercise and drills

During disaster phase:

- Search, Rescue and Evacuation
- Shelter for disaster affected
- First aid and other medical support
- Clearance of debris
- Restoration of communication system or use of alternative communication system
- Disposal of Dead
- Property security and public safety
- Immediate damage assessment
- Information, Education and Communication (IEC) and training
- Role of various functionaries and agencies

Post Disaster Phase:

- Damage and needs assessment
- Psychological support to the victim
- Restoration of lifeline support
- Agriculture, economic and social rehabilitation
- Information, Education and Communication and training
- Role of various functionaries and agencies.

5.4 Capacity Building Trainings and Other Proactive Measures

5.4.1 Capacity Building Trainings

The following capacity building trainings are planned under disaster management program in the District for various departments / stakeholders:

Target Group: Engineers & Masons

Target Group	COURSE CONTENT	Agency
Engineering	Course Content	MCGM & Private
Civil Engineers/ Structural Engineers/ Architect/ Town Planner	Introduction of Disaster, and Disaster Management Plan for Mumbai and CRI	GOVT., MCGM, PRIVATE, MHADA, PWD, BEST, MMRDA
	Challenges in Earthquake Engineering	
	Seismic Retrofitting of Buildings, Problems and Practices	
	Earthquake Risk Management	
	Ductile Detailing of RC Buildings	
	Earthquake Resistant Design of RCC Buildings	
	Seismic Microzonation : Experience Sharing	
	Seismic Analysis of Building for Earthquake Ground Motions	
	On Site & Off Site Mock Drills	
	Preparation of Disaster Management Plan	
Table Top Exercise		
Masons	Introduction of Disaster, and Disaster Management Plan for Mumbai and CRI	GOVT., MCGM, PRIVATE, MHADA, PWD, BEST, MMRDA
	Earthquake Risk Management	
	Seismic Retrofitting of Buildings, Problems and Practices	
	Seismic Analysis of Building for Earthquake Ground Motions	
	Seismic Microzonation : Experience Sharing	
	Construction of Earthquake Resistance Building	

Target Group: Hospital Staff

Target Group	COURSE CONTENT	Agency
Hospitals		All Hospital
Director /Deans / Medical Superintendents	Basics of Disaster, Disaster Management Plan for MCGM, CRI	GOM, MCGM & PRIVATE
	Introduction of Emergency Medical Services and wellbeing of Emergency Medical Technician (EMT)	
	Introduction of Climate Change	
	Handling Mass Casualty & Triage	
	CBRN	
	Preparation of Hospital Disaster Management Plan	
	Evacuation Drills / Mock Drills / Table top Exercise	

District Disaster Management Plan

	including CRI	
Doctors	Basics of Disaster, Disaster Management Plan for MCGM, CRI & Mock Drills	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Assessment and Management of Trauma Patient, Psychological impact	
	Airways	
	Practical of Patient Assessment and Management + Airway Practical	
	Introduction of Emergency Medical Services and wellbeing of Emergency Medical Technician (EMT)	
	Cardio Pulmonary Resuscitation (CPR)	
	Cardio Pulmonary Resuscitation (CPR) Hands on	
	Handling Mass Casualty & Triage	
	Medico legal	
	Table top Exercise including CRI	
Metron / Nurses / para-Medical	Basics of Disaster, and Disaster Management Plan for MCGM, CRI & Mock Drills	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Assessment and Management of Trauma Patient, Psychological impact ,	
	Airways	
	Practical of Patient Assessment and Management + Airway Practical	
	Introduction of Emergency Medical Services and wellbeing of Emergency Medical Technician (EMT)	
	Cardio Pulmonary Resuscitation (CPR)	
	Cardio Pulmonary Resuscitation (CPR) Hands on	
	Stretcher Drill & Stretcher Improvisation and Bandages, Emergency Methods, Lifting carry methods	
	Stages of Search & Rescue, Rope rescue	
	Visit at Ashwini INS Navy Hospital	
Handling Mass Casualty & Triage		
Medico legal		
Table top Exercise including CRI		
Ward Boy	Basics of Disaster, and Disaster Management Plan for MCGM, CRI & Mock Drills	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Cardio Pulmonary Resuscitation (CPR)	
	Cardio Pulmonary Resuscitation (CPR) Hands on	
	Stretcher Drill & Stretcher Improvisation and Bandages, Emergency Methods, Lifting carry methods	

District Disaster Management Plan

	Stages of Search & Rescue, Rope rescue	
	Table top Exercise including CRI	

Target Group: School

Target Group	COURSE CONTENT	Agency
School		
Principal / Teachers / Non-Teaching Staff	Introduction of Disaster, and Disaster Management Plan for MCGM and CRI	GoM, MCGM & Private
	Do's and Don't's before, During and After Disaster, Mock Drill	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Dos and Don'ts on CBRN	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	
	Preparation of School Disaster Management Plan	
	Table top Exercise including CRI	
Students 8 to 10 std	Introduction of Disaster and CRI	GoM, MCGM & Private
	Do's and Don't's before, During and After Disaster, Mock Drill	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Dos and Don'ts on CBRN	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	
	Question Answer	

District Disaster Management Plan

Student Below 8 std	Basics of Disaster and CRI	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Do's and Don't's before, During and After Disaster, Mock Drill	
	Question Answer	

Target Group: Colleges

Target Group	COURSE CONTENT	Agency
Colleges		
Principal / Teachers / Non Teaching Staff	Introduction of Disaster, and Disaster Management Plan for MCGM and CRI	GoM, MCGM & Private
	Do's and Don't's before, During and After Disaster, Mock Drill	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Dos and Don'ts on CBRN	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	
	Preparation of College Disaster Management Plan	
	Table top Exercise including CRI	
NSS / NCC	Introduction of Disaster and CRI	GoM, MCGM & Private
	Do's and Don't's before, During and After Disaster, Mock Drill	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Dos and Don'ts on CBRN	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	
	Crowd Control	
	Table top Exercise including CRI	
Students	Introduction of Disaster and CRI	GoM, MCGM & Private
	Do's and Don't's before, During and After Disaster, Mock Drill	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	

	Dos and Don'ts on CBRN	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	
	Question Answer	

Target Group: Community

Target Group	COURSE CONTENT	Agency
Community		
Slums / NGOs / Religious Places	Introduction of Disaster, and Disaster Management Plan for MCGM and CRI	NGOs, Slums, Temples, Durgah, Church etc.
	Do's and Don't's before, During and After Disaster, Mock Drill	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	
High Rise Buildings	Introduction of Disaster, and Disaster Management Plan for MCGM and CRI	Co Op Societies, Associations etc.
	Do's and Don't's before, During and After Disaster, Mock Drill	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Preventive measures for High Rise Buildings	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	
Fisherman	Introduction of Disaster, and Disaster Management Plan for MCGM and CRI	Fisherman Colonies, Association etc.
	Do's and Don't's before, During and After Disaster, Mock Drill	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Demonstration of Fire	
	Introduction of Climate Change	
	Coastal Disaster / Early Warning / Cyclone Prevention - Dos & Don'ts	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	

	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	

Target Group: Security Personals

Target Group	COURSE CONTENT	Agency
Security		MCGM & Private
Director / Manager / Officers	Introduction of Disaster, and Disaster Management Plan for MCGM and CRI	GOVT., MCGM, PRIVATE, CORPORATE
	Do's and Don't's before, During and After Disaster	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Dos and Don'ts on CBRN	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Preparation of Disaster Management Plan	
	On Site & Off Site Mock Drills	
Table Top Exercise		
Security Guards	Introduction of Disaster, and Disaster Management Plan for MCGM and CRI	GOVT., MCGM, PRIVATE, CORPORATE
	Do's and Don't's before, During and After Disaster, Mock Drill & Crowd Control	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Preventive measures for High Rise Buildings	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	

Target Group: Corporate

Target Group	COURSE CONTENT	Agency
Corporate		MCGM & Private
General Managers / Manager / Officers	Introduction of Disaster, and Disaster Management Plan for MCGM and CRI	Banks / Malls/ Theaters / Auditoriums / Hotels
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers, Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Dos and Don'ts on CBRN	
	Preparation of Disaster Management Plan	
	On Site & Off Site Mock Drills	
	Table Top Exercise	
Staff	Introduction of Disaster, and Disaster Management Plan for MCGM and CRI	Banks / Malls/ Theaters / Auditoriums / Hotels
	Do's and Don't's before, During and After Disaster, Mock Drill	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Preventive measures for High Rise Buildings	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
Bandages, Emergency Methods, Lifting carry methods		

Target Group: Government Staff

Target Group	COURSE CONTENT	Agency
Govt., /MCGM Staff		MCGM & Private
Officers / ACPs /	Introduction of Disaster, and Disaster Management Plan for Mumbai and CRI	Police, Fire Brigade, MCGM, GoM Staff
	Fire Fighting - Principles of Combustion and Methods of Extinction - Preventive measures for High Rise Buildings, Types of Fire Extinguishers, Demonstration of Fire	
	Dos and Don'ts on CBRN	
	Introduction of Climate Change	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	

District Disaster Management Plan

	Preparation of Disaster Management Plan	
	On Site & Off Site Mock Drills , Table Top Exercise	
PSI / Constables / Fireman / Office Staff	Introduction of Disaster, and Disaster Management Plan for Mumbai and CRI	
	Do's and Don't's before, During and After Disaster, Mock Drill & Crowd Control	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Preventive measures for High Rise Buildings	
	Demonstration of Fire	
	Dos and Don'ts on CBRN	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Principles of First aid, Contents, Types of injuries - Signs, Symptoms & Treatment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	
	Mock Drill / Table Top Exercise	

Target Group: Control Rooms

Target Group	COURSE CONTENT	Agency
Control Room		MCGM & Private
Duty Officer / In charge/ Nodal Officers	Introduction of Disaster, and Disaster Management Plan for Mumbai and CRI	GOVT., MCGM, PRIVATE, CORPORATE
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Dos and Don'ts on CBRN	
	Importance of Effective Communication and Coordination Skills in Control Room and Barriers	
	Functions of Emergency Control Room	
	Command and Control System	
	Function of Police, alert system etc	
	Introduction of Climate Change	
	Weather Forecasting and Early Warning System	
	Role of ESF	
	Function of Fire Brigade, alert system etc.	
	Role and Responsibilities of Emergency Control Room	
	Hands-on experience on use of various equipment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
Preparation of SOP and Disaster Management Plan		
On Site & Off Site Mock Drills		
Table Top Exercise		

District Disaster Management Plan

Staff	Introduction of Disaster, and Disaster Management Plan for Mumbai and CRI	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Types of Fire Extinguishers	
	Demonstration of Fire	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	
	Dos and Don'ts on CBRN	
	Importance of Effective Communication and Coordination Skills in Control Room and Barriers	
	Functions of Emergency Control Room	
	Command and Control System	
	Function of Police, alert system etc.	
	Reporting Procedure and Formats	
	Weather Forecasting and Early Warning System	
	Role of ESF	
	Function of Fire Brigade, alert system etc.	
	Role and Responsibilities of Emergency Control Room	
	Hands-on experience on use of various equipment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Visit to Various Control Room	
Table Top Exercise		

Target Group: Media

Target Group	COURSE CONTENT	Agency
Media		MCGM & Private
Journalist	Introduction of Disaster, and Disaster Management Plan for Mumbai and CRI	Police, Fire Brigade, MCGM, GoM Staff
	Fire Fighting - Principles of Combustion and Methods of Extinction - Preventive measures for High Rise Buildings, Types of Fire Extinguishers, Demonstration of Fire	
	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment and CPR	
	Role of Media during Emergency	
	Preparation of Disaster Management Plan	
	On Site & Off Site Mock Drills , Table Top Exercise	
Reporters	Introduction of Disaster, and Disaster Management Plan for Mumbai and CRI	
	Do's and Don't's before, During and After Disaster, Mock Drill & Crowd Control	
	Fire Fighting - Principles of Combustion and Methods of Extinction - Preventive measures for High Rise Buildings	
	Demonstration of Fire	
	Role of Media during Emergency	
	Bomb Prevention, Dos and Don'ts on Bomb Threat	

	Principles of First aid, Contents, Types of injuries – Signs, Symptoms & Treatment	
	Cardio Pulmonary Resuscitation (CPR) and Hands on	
	Stages of Search & Rescue, Rope rescue	
	Stretcher Drill & Stretcher Improvisation	
	Bandages, Emergency Methods, Lifting carry methods	
	Mock Drill / Table Top Exercise	

5.3.2 Techno-legal Regime

Task	Activity	Responsibility
Institutional Arrangement	<ul style="list-style-type: none"> ▪ Constitution of Greater Mumbai Disaster Management Department 	1. R&R Dept
	Formation of DM policy, guidelines and Act <ul style="list-style-type: none"> ▪ Development of DM Plans at district and ward level including HRVA ▪ Prepare Hazard wise Action Plans 	1. GMDMA 2. All line Depts
	District Contingency Plans <ul style="list-style-type: none"> ▪ Prepare SOPs and ESF ▪ Departmental Disaster Management Plans 	1. GMDMA 2. All line Depts
	<ul style="list-style-type: none"> ▪ Revision of Development Control Regulations ▪ Emergency Medical Service Act <ul style="list-style-type: none"> ○ Formation of EMS ○ Set up paramedic cadre through training programmes and accredit / license them ○ Provide trainings to emergency service staff ○ Make provisions for reorganization and setting up trauma centers in District ○ Standardize and license ambulance services 	1. DP Dept. 2. Legal Dept 1. Director, ME&MH 2. EHO
	<ul style="list-style-type: none"> ▪ Development of relief norms and packages 	1. R&R dept 2. SDMA 3. GMDMA 4. Collectors
	<ul style="list-style-type: none"> ▪ Development and promotion of incentives, insurance, disaster bonds, tax rebate, etc. against the disaster 	1. Finance dept 2. Revenue Dept.
	<ul style="list-style-type: none"> ▪ Strengthening of Early Warning System <ul style="list-style-type: none"> ○ Need assessment and feasibility study ○ Implement the EWS ▪ Arrangement with service provider companies for multiple warning message 	1. R&R dept. 2. SDMA 3. GMDMA 4. IMD
	<ul style="list-style-type: none"> ▪ HRVA for different natural and man-made disasters prone to district. Conduct microzonation study in seismic zone and prepare hazard maps 	1. R&R dept 2. SDMA 3. GMDMA 4. GSI 5. IIT
	<ul style="list-style-type: none"> ▪ Ensure all Safety Measures at District level <ul style="list-style-type: none"> ○ Identification of locations 	1. SDMA 2. GMDMA

	<ul style="list-style-type: none"> ○ Put reliable alarm system in place ○ Arrangement of personnel protective equipment ○ Promotion of life saving methods and techniques 	3. All line dept.
	<ul style="list-style-type: none"> ▪ Strengthening of relief distribution and accounting system at district level ▪ Identification of centralized system for receipt, storage and distribution of relief ▪ Rate contract, procurement and stockpile of relief material 	<ol style="list-style-type: none"> 1. R& R dept 2. SDMA 3. Collectors
	<ul style="list-style-type: none"> ▪ Strengthening of EOC at district level ▪ Retrofitting of existing buildings in hazard prone zones ▪ Strengthening the DM Committees, Task Forces, training Centre ▪ Organize mock drills on different themes and check the preparedness of line agencies ▪ Ensure the emergency logistic arrangement is in place 	<ol style="list-style-type: none"> 1. GMDMA 2. All line Dept.

5.3.3 Awareness

Task	Activity	Responsibility
Information Education and Communication	<ul style="list-style-type: none"> ▪ Design and develop public awareness messages in local language ▪ Disseminate the messages through electronic and print media ▪ Do wall paintings, hoarding, posters, booklets, leaflets, local cable, advertisement, hording, booklets, school programmes et. as core awareness activities 	<ol style="list-style-type: none"> 1. DMU 2. All line dept.

5.4 Community Resiliency Indicator

History and Background

It is reported that disasters in the world are occurring with increasing frequency. That may perhaps be so, but the intensity of disasters is surely increasing in recent times. As it is understood, of the two types of disasters - natural and man-made, the former have been occurring over the ages as “acts of God”, and these were considered as such. In recent times however, natural disasters are said to be more catastrophic, particularly in terms of loss of property and life.

Any incident is turned into a disaster depending on the following criteria:

- the intensity of the incident
- area covered by the incident
- number of human lives affected by the incident

- extent of loss of life and property due to the incident
- loss of production etc due to the incident

Hence, when an incident has a major negative influence on society, it is called a “disaster”. There are different categories of disaster and their intensity also varies.

5.4.1 Vision

To build a safe and disaster-resilient community by developing a holistic, proactive, multi-hazard and technology driven strategy through a culture of prevention, mitigation and preparedness to generate a prompt and efficient response of community at the time of disasters. The entire process will centre-stage the community and will be provided momentum and sustenance through the collective efforts of Government agencies and Non-Governmental Organizations (NGOs). (Reference NDMA Vision)

5.4.2 Mission

1. To assess vulnerability and ability of community to respond to disasters.
2. To spread awareness, promote education & training at community level, to build capacity and support the ongoing ability of a community, to help each other, to identify strengths and challenges, to mobilize resources, and to work collectively during disasters of any level & nature.
3. To ensure that the community involving all social groups in the process of Disaster Risk Management, maintains resilience before, during and after disasters.
4. To build a proactive and technology driven strategy for effective response to disasters.
5. Raise awareness and understanding of risks and local emergency response capability in order to motivate and sustain self resilience.
6. Support and enable existing community resiliency, expand and grow these successful models of community resiliency in other areas (Kumbharwada Potters’ Initiative).

5.4.3 Community Resiliency Indicators

What is community resiliency?

Resiliency is the capacity of human and natural/physical systems to adapt to and recover from sudden change. It is the capacity of a system, community or society potentially exposed to hazards, to adapt by resisting or changing in order to reach and maintain an acceptable level of functioning and structure.

Communities are provided a broad array of services, from water and waste disposal to civil defence, education, street cleaning, open space, land use planning, and environmental quality. Along the coast, communities may also be provided for flood protection, beach access and near shore water quality. These services are affected during the disaster but resilient people motivate others and assist in the restoration of amenities without causing disturbance and agitation.

Resilient communities are people who enhance the capacities to respond to the impact of crises and step up to restore normalcy. Resiliency is not a single trait, but is rather a combination of traits or characteristics that can reduce community vulnerability. Neither

is it a single step, but is rather an on-going effort. With every calamity the community comes across, they reveal the capacities of mental and behavioral agility.

Resiliency includes an awareness of vulnerabilities and planning for ways to protect important services, when protective measures do not work as anticipated. This, however, does not mean that people work in a parallel stream for recovery, but that they will join together with the efforts of the administration.

A major goal of a resilient community is to minimize the occurrence of disaster. Hazardous events will happen and some damage is inevitable from major events; but major events need not result in a disaster. The hazardous events such as storms, earthquake and tsunamis are not avoidable, but the consequences of the events, the loss of human life, property and essential services, can be avoided when a community is resilient. Even impacts of hazardous events with human sources, like massive railway accident, fuel depot fire and terrorist attack can be monitored with proper planning.

5.4.4 Elements for Community Resiliency

Resilient community comprises the following four major components:

- People- their caliber, education, human capital etc.
- Organization- of the people which include value system
- Resources- human as well as material to tackle the situation; and
- Community processes- including economic, social , and spiritual

5.4.5 The need for Community Resiliency

In the Indian context, CR is not a new concept. With every incident, may it be rural like Bhuj, Killari or Uttarkashi quake or coastal tsunami in Tamil Nadu to bomb blasts in metro cities like Mumbai and Delhi, people have reverted to near normalcy on the second or third day of the disaster. This is specifically because of our value system; strong faith in kindness, positive attitude towards rigorous work, cooperating and helping attitude to others. However, mental shocks, bad memories, economic losses have taken a long time for recovery. Human and natural systems undergo constant change, hence, we need to help communities in minimizing risks and losses. This will be critical to the region's long-term viability and success. When a disaster occurs, quick recovery is the only solution.

Time required for recovery depends on a variety of factors, viz:

- Building resiliency in children and families
- Preparedness
- Stress and coping
- Managing a crisis
- Coping with post-traumatic stress disorder (PTSD)
- Pediatric bereavement
- Overcoming depression & anxiety
- Anger management
- Behavior management
- Self-care
- Mental health concerns

5.4.6 Recovery has different dimensions, viz:

- It is time oriented - short, medium and long
- It requires an understanding of the community- the symptoms, the networks and the dependencies
- It occurs when all aspects of community well-being (both mental physical) are addressed after an emergency
- It needs to be led and coordinated from the time of the disaster
- It needs adaptive leadership and management
- It will take a long time - particularly after a disaster
- It will create new opportunities for the community

Hence, if an Indian community (either rural or urban) requires to be empowered with inner strength to bounce back from a disaster, we need to inculcate:

- Courage to find out their own solutions
- Leadership; individual as well as team leadership
- Realistic awareness about different types of disasters
- Regular practice for preparedness
- Multi-level and structured training
- Sense of pride towards the community
- Feeling optimistic about the future of the community
- Spirit of mutual assistance and cooperation
- Sense of attachment for their community
- Self reliance and search for own resources
- Support for education at all levels
- Organization and development of partnership and cooperative working in the community
- Diversified employment in the community
- Locally owned employment opportunities
- Formation for strategy for increasing independent local ownership
- Openness to alternative ways of earning and economic activity
- Competitive position of community
- Creation and implementation of community vision and goals
- Pursuing trait for achieving goals
- Formation and development of plan which will encompass all segments of the community

Thus can we build a strong and resilient community in Mumbai.

5.4.7

‘The Calm’	
Level	Indicator
5	People calm and composed, offering wholehearted help to agency personnel involved in recovery operations
4	People making the effort to remain calm, refraining from complaining or agitating, offering proper help to agency personnel doing recovery work
3	People appear to be disturbed, but moderately responding to orders and cooperating with agency personnel doing recovery work
2	People visibly upset and irritable, creating obstructions in recovery operations by offering inappropriate help
1	People unable to reconcile with the situation, widespread desolation and despair, obstructing recovery work
0	Extreme agitation, widespread scenes of chest beating and exaggerated expressions of sorrow, total lack of effective efforts at recovery

‘The Dignity’	
Level	Indicator
5	Near return to pre-crisis levels in social behaviour, giving respect to others. Unstinted cooperation for recovery processes
4	Comprehensive demonstration of civil behaviour towards others, and purposeful actions towards recovery
3	Presence of quiet and serious atmosphere. People conducting themselves in a restrained manner
2	Grudging accepting discipline and observing some aspects of civil behaviour
1	Signs of some consideration for the injured and weak, but yet self centered due to high insecurity
0	Complete lack civil behaviour, no respect for the aged and vulnerable, and a pronounced level of insecurity

‘The Ability’	
Level	Indicator
5	Comprehensive laws with compliance mechanism in place, strong political will and community participation in disaster resilient technology for development
4	Greater awareness of the necessity for strong infrastructure and willingness to pursue proper implementation
3	People gaining confidence in the administration and better understanding of the rules and regulations and technology
2	Existing laws are not adhered to, due to lack of awareness and understanding
1	Absence of suitable monitoring standards related to infrastructure and technology, ineffective political and administrative procedure
0	Total lack of proper planning system, implementation of rules and regulation are not comprehensive, lack of technology resulting in weak infrastructure

'The Grace'	
Level	Indicator
5	People exhibiting consideration for others and displaying kindness, placing common good over and above personal concerns
4	People demonstrating courteous conduct, and displaying genuine concern for others
3	People losing endurance as they are struggling to cope with the situation, perceived signs of insensitivity
2	People are inconsiderate, showing indifference to others
1	Extremely selfish and insensitive attitude of people and unconcern for others
0	Community attitude showing total lack of decency or concern for common good

'The Order'	
Level	Indicator
5	Calm and quiet situation prevails, people conducting themselves in an orderly manner
4	Visible signs of a well organized community, there is restraint and people obey directions and organize themselves
3	Community leaders take charge and able to serve the community by getting encouraging response from the people
2	People unorganized but showing signs of individual orderly behaviour but lack of understanding of orders due to language barrier
1	Confusion, authorities finding it difficult to control the people and the situation
0	Situation appearing to be totally out of control with criminal behaviour, chaos everywhere major law and order problem

'The Sacrifice'	
Level	Indicator
5	Keeping own interest aside and dedicating efforts to the welfare of the community. Administration and Emergency Services working nonstop
4	Concern for others prominently dominating self-interest, leading by example
3	Signs of responsible behaviour apparent when dealing with others
2	Shifting responsibility, egotism takes centre stage
1	Selfishness dominating all actions
0	Sense of excessive selfishness everywhere, aggressive grabbing, missing sense of urgency on behalf of administration

'The Tenderness'	
Level	Indicator
5	Widespread scenes of people demonstrating empathy, sharing and caring
4	People highly considerate of the condition of others and offer small comforts
3	People by and large offering help and displaying acts of kindness
2	Occasional indications of concern and consoling others
1	People displaying outright self-centeredness
0	People exhibiting aggressive, unethical behaviour and indifference towards the injured and weak

'The Training'	
Level	Indicator
5	Community fully trained in disaster preparedness; and everyone is aware of what to do and how to cope and tide over the disaster
4	Community provided with preparedness and basic training, able to cope with the situation, however still requires guidance
3	Basic training visible but there is lack of coordination
2	Community trying to cope, those providing guidance are somewhat able to convey instructions.
1	Community unprepared and incapable of handling emergencies
0	Lack of basic knowledge of how to cope in a disaster, behaviour extremely erratic and confused

'The Media'	
Level	Indicator
5	Responsible and restrained reporting of the situation by media, providing judicious guidance for public safety and advisories for public health, People find the media communications informative and helpful
4	Media demonstrating moral ethics, reporting the factual news and moderating the tone and contents of the reports
3	Over emphasized narration of serious cases, criticizing the authorities, minimal attention on providing guidance to the community
2	Unwarranted competition amongst media to provide gory details, no value addition to the cause
1	Spreading rumours, misinforming the public, people frustrated with the media
0	Media persistently sensationalizing news and capitalizing on the loss and grief of the people thereby creating total insecurity and panic

'The Conscience'	
Level	Indicator
5	No one taking undue advantage of any situation and conducting themselves in an exemplary manner
4	People coming together to form groups and behaving in an honest and conscientious manner
3	People realizing that honesty and ethical behaviour is expected of them and avoid taking advantage of difficult times
2	Frequent scenes of unruly and dishonest behaviour
1	Individuals taking undue advantage of the situation at every stage
0	Immoral condition, fraudulent, criminal and corrupt behaviour rampant

5.4.8 Challenges

- The concept of Community Resiliency has rarely been acknowledged
- It is not incorporated in academics, research, and policy programs
- There is a very limited theoretical understanding of the concept of disaster resilience
- It is not clear how this concept should be assessed, measured, and/or mapped
- It seems that making it operational for disaster risk reduction strategies and policies is a critical challenge
- The recent literatures on hazard and disaster seldom refer to resilience concept as a guiding principle behind an effective hazard risk management
- Making it operational for policy decisions poses critical challenges in terms of its assessment
- The main challenge is how to define and develop indicators that can entirely measure this concept or, how this concept should be mapped and what unit of analysis should be used
- It seems that without a guiding framework in which indicators can both be defined and measured, this concept will not be useful for disaster risk reduction strategies
- It is a fact that individuals, groups, and communities may each possess different degrees of resilience which vary significantly over time and with occupation
- Assessing community resilience is a complex process because of the diverse interactions of people, communities, and societies
- Lot of manpower and technical support is required for the process with suitable infrastructure facilities
- The resiliency indicators have to be considered in the context of the behavioural approach of the floating population of Mumbai
- Response of the community in different types of emergencies may be variable
- Political will, cutting across ideologies of parties is crucial
- Honest social commitment required toward the community and country irrespective of caste, creed and region
- Lack of trust from the community towards the government of the day

5.4.9 Implementation Process

- Who can use this process
- Every individual member of the society shall use this process for self-assessment of resiliency as well as of their neighbourhoods. However, following agencies / organizations shall take the lead in implementing this process, with the view to assess the level of resiliency and enhance the competency while responding to the disasters:
- Disaster Management Unit, MCGM
- Public Health Department, MCGM
- National Disaster Response Force
- Mumbai Police
- Fire Brigade
- Home Guards
- Civil Defence
- NCC, MCC, NSS, Scout & Guide
- All Service Sector Organizations
- All other Government & Semi-Government Organizations
- All Non-Governmental Organizations (working with disaster prone communities for disaster preparedness/ management/ relief/ rehabilitation etc.)
- All charitable organizations
- All Civil Society Organizations
- All Social, Voluntary, Recreational and Sports Clubs
- Lions, Rotary and Giants Organizations
- Community Based Organizations
- Organizations implementing Slum Adoption Scheme
- Citizens' Groups/ Associations/ Forums
- Advance Locality Management Groups (ALMs)
- Corporate houses
- Trade Organizations/ Associations/ Unions
- Chambers of Commerce and Trade
- Financial Institutions
- All Educational Institutes
- Research Organizations/ Agencies
- Individuals Researchers
- All Health Care Institutes
- Industrial/ Commercial Complexes
- Slum Communities
- Residential societies
- Disaster prone communities
- Media Houses
- All political organizations
- All other agencies/ institutions/ organizations

Assumptions

- Whilst using the CRI process, one needs to keep in mind the following assumptions:
- This process has 10 indicators i.e. parameters that measure and assess the resiliency level of the community.

The Process design is -

- Relevant - for the purpose for which it is being used
- Discrete –does not overlap with definitions with other competencies
- Simple – it is not ambiguous
- Flexible – enough to change if required
- Fair – to everyone who will use the assessment process
- Communities shall be assessed during normal time, during disasters and in the aftermath of an attack/ calamity/ disaster.
- The disaster response agencies should make the assessment for the community while conducting awareness programs, while responding to any disasters and also assessing themselves as responders while responding to the disasters.
- It is imperative that, the assessment shall be done for all indicators at every appraisal.
- It has been observed that the resiliency levels vary amongst different sections at different levels of the socio-economic ladders of society. Thus, the assessor should take sufficient care to ensure that the community should be homogenous, self-contained, etc.
- Resiliency level assessments should not be conducted very frequently with a community. Frequent assessments may lead to influenced / unnatural responses from the respondents in the community.
- The assessor organization must read and understand the complete handbook before going for the implementation process with a community.
- This process is intended at facilitating self-evaluation, self-learning and enhancing resiliency of the communities.
- This handbook is meant for voluntary initiatives for assessment of community resiliency. No certification of any sort will be issued - neither to the assessor organization nor to the assessed community/ organization.
- While care has been taken in making these indicators comprehensive and applicable to most communities, yet changes, insertions, deletions or modifications may be necessary to make the process more relevant to the specific context of the target community.
- Specific references should be drawn in the form of examples from the past experiences of disaster situations faced by the community chosen. This is necessary in order to understand each of the indicators in the process and make the implementation process more relevant to the target community. Though, the indicators defined in the CRI process are self-explanatory, yet, they need to be demonstrated and explained by trained individuals.
- If the process is used during normal times (in absence of a disaster situation) the assessor shall draw references from the past disasters faced by the community. If used during normal times i.e. in absence of any disaster, the responses received will be largely hypothetical or based on past experiences.
- Whilst undertaking this process, vulnerability and potential risk factors shall be considered.
- The process once initiated, must be completed in single stretch / sitting

Process Steps:

- **Understanding the CRI Assessment Process:** Assessment is an occasion where a number of participants take part in a series of exercises and or tests by trained assessors. The participant's performance/reactions are then measured against the levels of the indicators. The organizations and individuals chosen to be involved in carrying out the Community Resiliency assessment by using this process, shall undergo a preparatory session which could be conducted in the form of brain storming session, training, self-learning workshop, etc. This session should enable the assessor participants in getting thorough understanding of each of the indicators (refer to the chapter: "Indicators") and its relevance to the community chosen.
- **Roles & Responsibilities:** The Roles and Responsibilities are broadly mentioned below, however if the situation requires certain flexibility is permitted.

1. Assessor:

Role: The assessor plays a vital role in the success of the appraisal of the individual / community. The assessor should ideally interact with representatives of the stakeholder groups / agencies in the community at least once during the process of the assessment.

Responsibility: The assessor should act like a human video camera; i.e. they should record words and actions without passing any comments / judgments. They should have good listening and observation skills. They should be able to sustain high level of concentration and should have good interactive skills. The assessor should be objective and be able to focus on real evidence rather than being subjective. The assessor should efficiently classify the behaviour of the assessee as per the indicator level. The assessor should see to it that the assessee is assured of the benefit of being involved in the process, for themselves, their children and the entire community.

On completion of response collection, the assessor should compile all the responses and the findings of the CRI process. The process of compilation should be free from any type of influence of any past knowledge / experiences associated with the community assessed. The assessor should share the final assessment report with the assessee.

A summary sheet of the final assessment and all the documents created during the CRI process should be submitted to the MCGM and EOC for creating a data base and for storing in the archives.

2. Assessee:

Role: Assessee is an individual or a group of individuals or a community who is being surveyed and interacted with. The assessee provides the key information in form of responses in accordance with the resiliency indicators.

Responsibility: The assessee should be open, realistic and co-operative while participating in the assessment process. The responses should be objective in nature and should be drawn either from the past experiences or their normal individual lifestyle. Community Resiliency Indicator: An MCGM Initiative.

3. Observer:

Role: They are individuals who are neutral, and who do not have any direct stake with the assessee. However, they should have full understanding of the complete CRI process and of the community being assessed. They will make their own observations, which shall also be helpful for evaluation of the complete CRI process that has been carried out.

Responsibility: The observer is responsible to passively yet thoroughly observe the complete process of CRI from the beginning till the stage of drawing conclusions / results of the assessment process. Their observations are not only of the assessee but also of the assessor and all other stakeholders involved in the CRI process. All of these observations should be documented and presented to the EOC (MCGM).

Knowing the community:

Before going into the community to test the Community's Resiliency, it is imperative to collect relevant information about the target community. The information to be collected should include past instances of disasters faced by the community, potential disaster threats to the community, demographical information, socio-economic characteristics of the population etc. The individuals carrying out the assessment must be well acquainted with the community chosen.

Sample selection:

A sample is a finite part of a statistical population whose properties are studied to gain information about the whole (Webster, 1985). When dealing with people, it can be defined as a set of respondents (people) selected from a larger population for the purpose of a survey.

A population is a group of individuals, objects, or items from which samples are taken for measurement.

Sampling is the act, process, or technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population.

For the CRI process, appropriate representation of all key stakeholder groups from the concerned community should be involved in the process. Sizable sample in proportion with the population of the community should be selected. Methods of sample selection used in scientific research may be useful.

The scientific research methods for sample selection include the following;

1. Simple Random Sample:

Here, each subject or unit in the population has an equal chance of being selected. If a subject or unit is drawn from the population and removed from subsequent selections, the procedure is known as random sampling without replacement — the most widely used random sampling method. Random sampling with replacement involves returning the subject or unit into the population so that it has a chance of being chosen another time. Sampling with replacement is often used in more complicated research studies such as nationwide surveys.

(**Advantages:** Detailed knowledge of the population is not required, external validity may be statistically inferred, a representative group is easily obtainable, and the possibility of classification error is eliminated. **Disadvantages:** A list of the population must be compiled, a representative sample may not result in all cases, and the procedure can be more expensive than other methods.)

2. Systematic Sample:

Systematic samples are frequently used in social research. They often save time, resources, and effort when compared to simple random samples. The method is widely used in selecting subjects from lists such as telephone directories, Broadcasting / Cable casting Yearbook, Editor & Publisher.

(**Advantages:** Selection is easy and the selection can be more accurate than in a simple random sample. This procedure is generally inexpensive.

Disadvantages: A complete list of the population must be obtained and periodicity may bias the process.)

3. Stratified Sample:

A stratified sample is the approach used when adequate representation from a sub sample is desired. The characteristics of the sub sample (strata or segment) may include almost any variable: age, sex, religion, income level, or even individuals who listen to specific radio stations or read certain magazines. The strata may be defined by an almost unlimited number of characteristics. However, each additional variable or characteristic makes the sub sample more difficult to find.

4. Cluster Sample:

The usual sampling procedure is to select one unit or subject at a time. But this requires the researcher to have a complete list of the population. In some cases there is no way to obtain such a list. One way to avoid this problem is to select the sample in groups or categories; this procedure is known as cluster sampling. For example, analyzing magazine readership habits of people in Maharashtra would be time-consuming and complicated if individual subjects were randomly selected. With cluster sampling, one can divide the state into districts, towns or zip code areas and select groups of people from these areas.

(**Advantages:** Only part of the population need to be enumerated, costs are reduced if clusters are well defined; estimates of cluster parameters are made and compared to the population.

Disadvantages: Sampling errors are likely, clusters may not be representative of the population, each subject or unit must be assigned to a specific cluster.)

Recommended methods for data collection:

Focused group interviews, one to one interviews, observations, and any other suitable method may be used for data collection. One of the suggestions could be -- pictorial presentation of various levels of each of the resiliency indicators should be shown to the respondents collectively. This may help the respondents in relating with the various levels of their resiliency. This will also facilitate in communicating with the respondents in a simple manner about what responses are expected of them during the assessment activity. (Hence,

we need to compile a set of pictures representing each of the 6 levels of resiliency under each of the indicators.) This presentation should be made in an objective manner so as to prevent any influence on the mindsets of the respondents. This methodology may work better in case the community chosen hasn't experienced any major disasters in the past.

Compilation of responses:

The responses received from all the respondents should be compiled and presented to key representatives of the community, for group discussions and verifications. This may include leaders / representatives of all the key stakeholder agencies / groups in the community chosen.

Measuring the community resiliency level:

On the basis of responses received and subsequently corroborated by community representatives as mentioned above, average level resiliency of the community can be assessed using the different levels projected under each of the 10 resiliency indicators. The quantifiable criteria to be used while assessing the level of resiliency should be referred to ensure objectivity.

Preparing a Plan of Action for raising the existing level of Community Resiliency:

It is advised that, on completion of the assessment activity, the assessor should work towards developing an appropriate plan of action for raising the resiliency level of the community assessed, in close consultation with the key stakeholder groups / agencies, which were part of the assessment activity.

On the basis of the findings of the CRI process, the assessor will arrive at a hypothetical statement about the overall present state of resiliency of the community assessed as following;

The community presently blindly faces or responds to disaster situations

OR

The community presently panics & tries to escape or run away from disaster situations

OR

The community presently follows scientific approach while responding to disaster situations

While arriving at a plan of action for improvement, the following aspects should be taken into consideration:

- Consider the average responses under each of the ten indicators
- This will further help in setting the milestones / targets for improving the state of community's resiliency in terms of each of the specific indicators of resiliency.
- A graph showing the present level of resiliency and the targeted level of resiliency should be drawn, so as to clearly demarcate the expected areas of improvement, as well as the expected extent of improvement under each area.
- While setting the milestones for achieving progress, concurrence should be taken from the stakeholder groups and their commitment towards the proposed

improvements. For this, specific roles need to be identified for each of the stakeholder groups, so as to have clearly laid down roles and responsibilities and specific expectations from each of them.

- Feasible and commonly agreeable actions with timelines to be drawn.

Plan of action should incorporate the following aspects:

Create a roadmap for increasing the resiliency levels under each of the indicators. This should include the following:

- The plan of action should translate into community based & local actions focused at raising the level of resiliency under each of the indicators.
- On the basis of the findings, the assessment areas of concern and scope for improvement to be drawn in definite words.
- Identify actual (on ground & practical) reasons for the certain level of resiliency shown by the community under each of the indicators. This will enable the assessor and stakeholder groups in identifying the true problem areas and root causes of the same.
- Once the assessor and the stakeholder groups are convinced that the targeted improvements have been achieved to a great extent, the assessor should do a re-assessment of the same community so as to validate the successes / achievements claimed.
- Conscious efforts should be made to document and record the complete process followed and the periodical progress attained throughout the processes.
- Set target for achieving a higher level of resiliency (for example; If the average resiliency level of the community under indicator- “The Calm” is at “Level 3”, then the set target could be to raise the level up to “Level 4 or 5”).
- Mapping of the community for identifying the resources, skills etc.
 - Human (Trained volunteers, youth, etc.)
 - Infrastructure (safe places, temporary shelters)
 - Monetary and other financial resources
 - Plans and strategy for linking these resources, skills and expertise for addressing the lacunas identified
 - Plans and strategy for raising the awareness level of local community with emphasis on vulnerable sections
 - Information and knowledge (such as - emergency information, important contact details, etc.)
 - Communication channels for information dissemination
 - Mock Drills

The plan of action shall also make provisions for imbibing certain features / characteristics in the concerned community and its members for improving the resiliency levels:

- **Sense of solidarity and cooperation:** Not only towards the closed ones or the family members but also towards the community at large.
- **Creativity and adaptability:** The ability to creatively meet changing situations and to discover new / alternative better systems that are less brittle and vulnerable.
- **Pro-activity:** positive action in support of safety and security at individual, family and community level.
- **Carefulness, preparation and planning:** cultivating the virtue of prudence and the habit of 'watching out' in order to avoid trouble or manage it when it is inevitable.
- **Responsibility:** personal and social responsibility for making efforts to ensure that the families and the community at large are prepared for the circumstances.
- **Awareness of environment:** To cope with rapidly changing circumstances, it is imperative to practice our ability to observe, understand and generally be aware of our environment; its opportunities and risks.
- **Holistic methodology:** We can't cope with particular local issues in isolation from the other global issues. Thus, we must bring all that we have and are- values, reasoning ability, knowledge, spirituality, faith, prayers, relationships and cultures on common forum for shared and collective action in order to achieve common good.
- **Mindset Change Training:**
- For an effective implementation and to obtain objective analysis from this process, the assessor and the observer shall undergo the acquaintance / training which consists of the following:
 - a. Understanding of the community's social characteristics
 - b. Understanding the broader political and governance conditions and changes that are occurring, and their impact on the community's ability to manage change
 - c. Identification of the different groups within a community, including those who are most
 - d. Likely to be affected by a change, and understand the relationships between those groups
 - e. Identification of the vulnerabilities within a community which may reduce its resilience to adapt to change
 - f. Identification of a community's resources and adaptive capacities which increase its resilience to transformation
 - g. Development of scenarios to understand how a change might impact on the community and how that community might utilize its resources and adaptive capacities to respond in an adaptive way
 - h. Identification of practical strategies to strengthen the community's resources and capacities
 - i. Monitoring and evaluation of changes as they occur to identify expected and unexpected social impacts

- j. Explore a community's set of values, attitudes and beliefs, how these are influenced by the process of change, and how they may influence a community's response
- k. Understanding what impact external (social, political, governance) conditions have on a community's response to change.

5.5 Medical Preparedness

Medical preparedness plans for disasters are significant and constitute one of the most important elements in disaster response. Medical preparedness plans focus on conserving resources for optimal utilization, lay down priorities for augmentation, and provide an appropriate response in dealing with casualties.

Phases:

1. **Warning and threat phase:** Preparedness after issue of warning require a quick assessment of logistical support that is available assembling and dispatch of first and triage teams to the anticipated disaster zones.
2. **Rescue and Relief Phase:** In this phase, a quick analysis of the problem is undertaken. Medical relief teams fan out and reach out to the victims and provide first aid, triage, stabilization, loading and transport to definitive care facility.
3. **Immediate action phase:** As these point patients are received in definite care, information transfer is achieved, a re-assessment of training is done treatment is instituted, emergency room / intensive care is provided and definitive diagnosis and treatment is given.
4. **Initial recover phase:** This is the phase where recuperation of the victims takes place. The stage is important also for the reason that after the initial shock has waned off, patients need to be addressed for their mental problems, besides the physical ones.
5. **Long-term rehabilitation phase:** This involves discharge, extended care at home, and return to normal functions. Some victims may require social support to get over the mental barriers in returning to normal life.

Pre-Hospital Plan

Pre-hospital stage primarily involves the organization of medical care at the site of disasters. The importance of this stage is reflected in the fact that organized medical care should be available to the victims as early as possible.

The following actions are taken up on information of an impending disaster:

- a. **Setting up of emergency control centers:**
 - Organization, command and control structures are important in the management of disasters.
 - Immediately after issue of warning, a command centre is integrated in the disaster relief coordination cell.
 - Orders are to be issue of dispatch of team to the area, and field command posts are to be set up in the vicinity.
 - Some disasters like cyclone may give time for preparedness, disasters like earthquakes may occur suddenly without warning. Hence, disaster teams have to

be prepared for such eventualities on the basis of the vulnerability analysis of the geographical area.

- Supply stocks are to be reviewed and redressed.
- Communication is to be sent from the field teams to the central control.

b. Setting up of command post

- A command post is set up in the disaster area to coordinate relief work.
- The post helps to assess the magnitude of disaster.
- Medical relief teams are required to go into areas in disaster zones to provide prompt medical attention to the victims.
- Teams are required to provide first aid, conduct triage, and evacuate casualties and transport them to hospitals

c. Site Medical Teams for First Aid and Resuscitation

- The SAR teams / first aid and resuscitation teams move immediately to the disaster area
- The aim of the teams is to render first aid to the victims as soon as possible and transport them to the definitive care facility.
- The teams also do triaging of victims.
- Organizational capability is built in these teams so that they move to disaster zones as early as possible.

d. Triage

- In mass casualty, to overcome difficulties in attending to casualties, a system of prioritization needs to be evolved, which will identify patients requiring priority care
- Triage is sorting out of those wounded, whose prognosis is most favorable, with an aim to dispatch them to a hospital as quickly as possible.
 - a) Class I – Severely injured casualties who can be saved with stabilization, transportation and treatment
 - b) Class II – Urgent, but those who can be transported after sometime.
 - c) Class III – Walking wounded
 - d) Class IV – Dead or very severely injured
- Triage must be performed by the most experienced member of the team.
- If doctor not available for triage, the para medics who are part of the search and rescue teams.
- Triage is done at two places – i) at the site of disasters and ii) in the hospital after a patient is wheeled in for definitive care.
- Triage helps to identify cases for quick evacuation and treatment.
- Ambulances are provided to the victims based on the priority with Class I cases sent first to the hospitals.
- Dead and severely injured cases with adverse prognosis are kept last on the priority list for evacuation.

e. Tagging

Tagging of the victims is undertaken based on the triaging of victims. Standard formats / colour codes are most often used for tagging. Common tags used for the victims for disaster are:

- **Red:** Priority one / Class one
- **Yellow:** Priority two / Class two
- **Green** – Priority three / class three
- **Black** – Dead / moribund cases / class four

The tags contain the names, age, sex, triaging priority , basic medical findings and initial treatment given. Tagging helps to identify patients for priority evacuation to hospitals, and at the same time is a record of treatment offered in disaster zones by medical teams. The tags tied to the patients hands and feet where they are easily seen and accessible.

f. Evacuation / casualty clearing teams:

The roles of the evacuation / casualty clearing teams are primarily two:

- Establish staging sections where the injured from the disaster area will be received, examined and stabilized if required.
- Transportation to hospitals.

g. Mobile Hospitals:

- Mobile hospitals are important in areas where medical care facilities are lacking and in places where the number of victims exceed the capacity of the state.
- Mobile hospitals are especially advantageous in earthquakes. The main disadvantage of mobile hospitals are that it costs time and money to procure and maintain them in optimal running condition.
- Communication between various field teams, command posts and hospital is one of the most important issues to be addressed in the medical relief plan. Such a communication network helps in better decision making and efficient utilization of resources.

Hospital Alerting and Response:

Clinical Casualty Management :

- 1. Alert:** All medical and paramedical staff of the hospital is alerted to assemble in the hospital casualty
- 2. Expansion of casualty area:**
 - If it is expected that hospital casualty space will not be enough, then the main O.P.D. hall should be opened upon to receive the casualties.
 - Adequate accommodation should be arranged in various wards / side rooms / seminar rooms / halls or any other space, and later on by discharging certain categories of patients.
 - All existing operations theatres should be opened up
 - Every district hospital should gear itself to commission a 'disaster ward' at a short notice.
 - If space within hospital is inadequate, nearby community hall, school etc can be converted into a disaster ward.
- 3. Security arrangement by hospital security staff with the help of police personnel:**
 - Police should also act as traffic controllers and direct patients and relatives to respective reception centers.

- If required hospital entry / exist should be controlled by security / police personnel.
- 4. Management of casualties:** Principle of triage is to be applied so that casualties can be classified on the basis of need and treatment.
- 5. Brought in dead:** Or those who die while receiving resuscitation should be segregated, and shifted to the place identified for temporary morgue. This should be done on priority to keep the morale of victims and working staff.
- 6. Diagnostic services:** Laboratory, Radiology and Imaging Services should be made fully operational and utilized as and when required.
- 7. Emergency light arrangements:** Additional generators are to be provided in casualty, blood bank and x-ray department. A spare transformer of 500 KW should available as a standby.
- 8. Communication:** Both “extra-mural and intra-mural” communication system need to be strengthened.
- 9. Support and utility service:** Should be alerted. Engineering department should ensure that water and electricity is made available without interruption
- 10. Medical Supplies:** Both drug and non-drug items need to be augmented and hospital buffer stock should be utilized. Spot purchases should be made as per rules.
- 11. Blood bank Services to be put on alert:** Officer In-charge or the Medical Officer should approach voluntary organizations and volunteers and arrange for bold all groups.
- 12. Public relations and information system:** Hospital should identify and notify an officer who will give information to public, press, radio and other organizations. He alone will give the requisite and relevant information. Hospital staff should not reveal information in an unqualified manner and cause confusion and controversies. Panic is a dangerous element in disaster and therefore, hospital should start functioning immediately.

Role of Information and Communication Technology in Health Response:

Disaster preparedness, emergency relief, and recovery are the three main lines of action that provide for an effective public health management of disasters. ICT addresses these issues by facilitating access to, and dissemination of timely information and knowledge. It has operational utility, both at the micro and macro level. At the micro level, ICT can be used in spreading awareness about disaster preparedness and mitigation in the community through internet based community information centers. At the macro level, it can be utilized to facilitate health network connectivity within the nation, and also among countries.

Following are the application of four tools of ICT:

- 1.** Geographical Information System:
- 2.** Remote Sensing
- 3.** Satellite Imagery
- 4.** Internet

ICT has made significant contribution to the field of disaster medicine. It has made tele-medicine and tele-consultation possible in remote areas that were not connected or accessible during disasters. It has established electronic connectivity between hospitals and disaster site, which

has enabled immediate diagnosis and treatment of the disaster victims. It has further facilitated effective and quick communication and transportation and has rendered coordination effective with its ability to transfer and exchange information at a high speed.

5.6 Knowledge Management

Task	Activity	Responsibility
Knowledge Management	<ul style="list-style-type: none"> ▪ Disaster related activities carried out at district level to be documented and disseminated to various line departments, training agencies, private organizations, and community people through website, local electronic and print media so that disaster management will be main streamed 	<ol style="list-style-type: none"> 1. GMDMA 2. Line departments
	<ul style="list-style-type: none"> ▪ Advanced research works with regard to community based disaster management to be taken up and the research outputs should be applied in practical field. ▪ Develop and maintain data base of disaster resources available with various government and private agencies and help in disaster response and recovery efforts. ▪ Adopt the advanced information and communication technologies in early warning dissemination and emergency management situations ▪ Record properly the best practices, lessons learnt, field reports, work experiences of disaster and share all these among different stakeholders in meetings, workshops and seminars. 	

5.7 Communication System

Task	Activity	Responsibility
Set up safe communication and last mile connectivity	<ul style="list-style-type: none"> ▪ Set up reliable communication system between state, district, taluka and village ▪ Undertake research on latest emergency communication and information system ▪ Enhance the local communication mechanism and give priority on local language to disseminate the alert message. ▪ Ensure the teams are ready with communication equipments round the clock ▪ Ensure the most reliable and alternative EWS in disaster prone localities. 	<ol style="list-style-type: none"> 1. SDMA 2. GMDMA 3. Information & Technology Dept. 4. Line departments
Mock Drills	<ul style="list-style-type: none"> ▪ Organize mock drills as per DM plan guideline on Communication Practice ▪ Document the procedures of mock drills, record the weaknesses, identify the gaps and take the feedbacks. ▪ Update the communication plan 	

Section – 6

Response Mechanism

Response Mechanism

The Basic Plan for How Greater Mumbai Responds to a Disaster explains the Municipal Corporation of Greater Mumbai approach to emergency response and operations. The Basic Plan explains the laws, hazards, risks, organization, assumptions, policies, and operating procedures for response to an emergency in Greater Mumbai. Every Department Director and all Department Staff should read this part and become familiar with how the Greater Mumbai emergency management system will respond to a large disaster.

6.1. Legal Authorities: Statutes on Emergency Management

This section references and briefly describes legal authorities for MCGM emergency response operations. The best Emergency Management organizations do not operate as a single entity. Only a response organization that is legally-based and that is well nested between National and State response authorities and District and ward responses will be successful. Collaboration with non- governmental organizations, utilities and private organizations is essential to successful disaster response. In light of these requirements for successful response operations, the MCGM Emergency Operations Plan is an extension of regulatory guidance from higher levels of government, coupled with collaboration and cooperation with all other response partners.

6.1.1. Disaster Management Act, 2005 (DMA)

The Disaster Management Act (DMA), 2005, dated December 23, 2005, was enacted on 9th January 2006. The Act stipulates the establishment of requisite institutional mechanisms for drawing up and monitoring the implementation of disaster management plans, ensuring measures by various wings of the government for prevention and mitigating the effects of disasters, and for undertaking a holistic, coordinated, and prompt response to any disaster situation.

6.1.2. State Responsibilities under Disaster Management Act, 2005

The DMA sets out the framework for institutional mechanisms at the State and District levels expressing that the task of disaster management should jointly be undertaken by different government levels. The Act assigns the State Governments and State Disaster Management Authority (SDMA) primary responsibility to monitor and assess disasters and any developing situations as well as to keep the national agencies, National Disaster Management Authority and National Executive Committee, apprised of the same. The State has to evaluate its own capabilities to handle disasters and to project resources to be mobilized as necessary.

- Every State Government shall establish a State Disaster Management Authority headed by the Chief Minister with such other members, not exceeding eight, to be nominated by the Chief Minister.
- The State Disaster Management Authority shall have the responsibility for laying down policies and plans for disaster management in the State.

- Each State Government shall establish a District Disaster Management Authority (DDMA) for every district in the State. The Authority shall be headed by the Collector or District Magistrate or Deputy Commissioner, as the case may be, and will have an elected representative of the local authority as co-chairperson.

6.1.3. Maharashtra State Disaster Management Authority under Disaster Management Act, 2005

The Maharashtra State Disaster Management Authority (SDMA) was constituted on May 24, 2006 with the Chief Minister as its chairperson. Most important aspects of disaster risk management under the present legal regime are vested in State officials. The laws with respect to relief works for the victims of natural calamities are likewise within the purview of State responsibilities.

The State Executive Committee (SEC) was formed, with the Chief Secretary as chairperson, as the policy-making body at the state level. The Committee is empowered to give directions to any department of the State or any authority or body of the State to take actions in response to any disaster situations or disasters. The State can take action as it deems necessary in order to effectively implement the provisions of the DMA. The Municipal Commissioner of MCGM has been appointed by the Chief Minister as a member of the SDMA.

6.1.4. Emergency Procurement of Resources under Disaster Management Act, 2005

The Act makes special provision for emergency procurement of resources by MCGM in a disaster situation.

6.1.5. Protections under Disaster Management Act, 2005

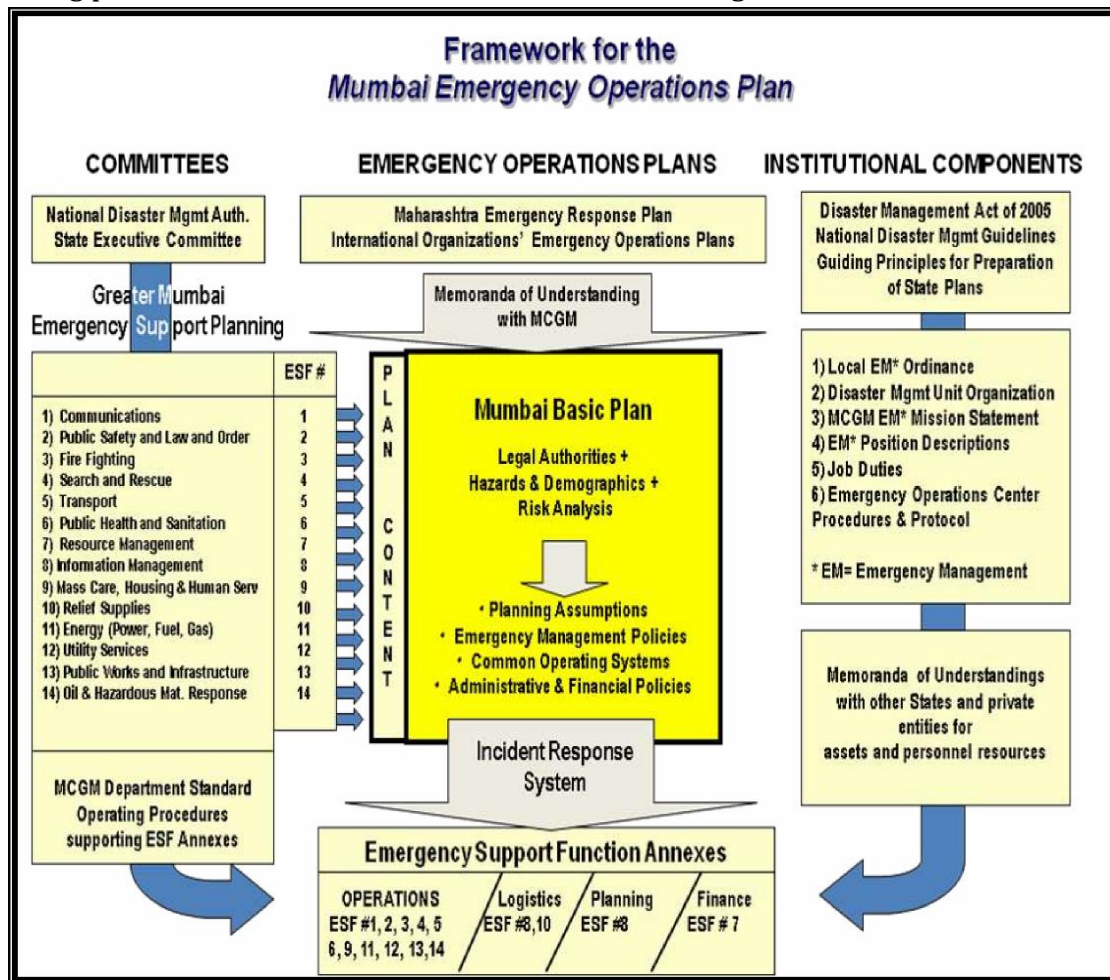
The Act provides for punishment for obstruction, false claims, misappropriation of money and materials, issue of false warnings etc. However, it also gives protection to officers for actions taken in good faith in the discharge of their duties.

6.1.6 District and Local Responsibilities under Disaster Management Act, 2005

- The District Authority shall act as the district planning; coordinating and implementing body for disaster management and take all measures for the purpose of disaster management in the district in accordance with the guidelines laid down by the National Authority and State Authority.
- The local authorities have been assigned functions which include ensuring training of its officers and employees, maintenance of resources relating to disaster management as to be readily available for use in the event of any disaster; ensure all construction projects under it conform to the standards and specifications laid down for prevention and mitigation of disasters and carry out relief, rehabilitation and reconstruction activities in the affected areas. The local authority may take such other measures as may be necessary for disaster management.

6.1.7. MCGM Authorities under the Disaster Management Act, 2005

The Disaster Management Act, 2005 has attempted to cover the entire country, and in the process, has not taken care of Corporations in megacities like Mumbai. Normally, the local authority falls within the jurisdiction of a district authority. However, this position is not valid in the case of municipal corporations in cities like Mumbai. For instance, there are two districts in Mumbai all of which fall within the geographical coverage of MCGM. The Act can be said to implicitly enjoin certain functions to MCGM. The actual status of MCGM is that while it is subordinate to State Authority, it is actually above the district authority and has essentially subsumed the functions entrusted to the district authority as well as the local authority within the areas falling under its jurisdiction. The basis or rationale for this conclusion can be found in the following provisions of the Act as well as actions of state governments, as indicated below:



- The Statement of Objects and Reasons of the Act states that “the government has decided to enact a law on disaster management to provide for requisite institutional mechanisms for drawing up and monitoring the implementation of the disaster management plans, ensuring measures for various wings of government for prevention and mitigating effects of disasters and for undertaking a holistic, coordinated and prompt response to any disaster situation.” MCGM is a wing of the state government and is therefore responsible for the above functions as enshrined in the Statement of Objects and Reasons of the Act itself.
- One of the functions assigned to the State Executive Committee is to “give directions to any Department of the Government of the State or any other authority or body of the State

regarding actions to be taken in response to any threatening disaster situation or disaster.” MCGM would fall in the category of “any other authority or body of the State” and shall be responsible to take such actions as may be directed by the State Executive Committee.

- Section 32 of the Act states that every office of the Government of India and of the State Government at the district level and the local authority shall prepare a disaster management plan. MCGM is an office of the State Government and is therefore required to comply with this provision.
- If there is still any doubt, it has been set at rest by the State Government, or to be precise, Chief Minister, by appointing the Municipal Commissioner of Mumbai as a member of the State Disaster Management Authority.

6.1.8. Other Laws that have Impact on the Conduct of the EM Program Mumbai Municipal Corporation Act of 1888.

This Act provides the framework of the Corporation and the Commissioner functions.

- Section 119 gives powers to execute works urgently required for public service.
- Section 354 gives powers for removal of structures which are in ruins or likely to fall.
- Section 520 A, gives powers of State Government to issue directions to MCGM in emergency arising out of water scarcity.

6.2. Hazards, Geography, Population and Land-use Management

6.2.1. Five Major Hazards Types in Mumbai

Mumbai faces high risk to natural disasters. Natural hazards such as floods, earthquakes, cyclones and droughts put additional pressure on Mumbai’s socio-economic systems and urban environment, which are already strained as a result of surging population growth. Climate change intensifies the uneven distribution of risk, skewing disaster impacts even further towards poor communities and other vulnerable groups. The hazards which have impacted or may potentially impact Mumbai are as follows:

1) Earthquakes: and its secondary effects like fires, chemical spills, landslides etc. An earthquake is a phenomenon that occurs without warning and involves violent shaking of the ground and everything over it. Earthquakes are tectonic in origin; that is the moving plates are responsible of the occurrence of the violent shaking. The occurrence of an earthquake in a populated area may cause numerous casualties and injuries and extensive property damage.

2) Floods: Flooding is a chronic and recurrent problem in the metropolis. Almost 60 per cent of the annual rainfall occurs during two months in a year. Occasionally 35-40 per cent of this rainfall is received in just 2-3 events.

3) Cyclones: Cyclones are caused by atmospheric disturbances around a lowpressure area distinguished by swift and often destructive air circulation. They are usually accompanied by violent storms and bad weather. The World Meteorological Organisation (WMO, 1976) uses the

term 'tropical cyclone' to cover weather systems in which winds exceed 'gale force' (minimum of 34 knots or 63 Kph). Tropical cyclones are the progeny of ocean and atmosphere, powered by the heat from the sea, driven by the easterly trades and temperate westerlies, the high planetary winds and their own fierce energy.

4) Chemical, biological and radiological disasters. Major Chemical (Industrial) disasters are low in frequency but are very significant in the terms of loss of lives, injuries, environmental impact and property damage. Frequency and severity of chemical disasters has increased in last few years due to rapid development of chemical and petrochemical industries and increase in size of plants, storage and carriers, specifically in densely populated areas. Biological disasters are scenarios involving disease, disability or death on a large scale among humans, animals and plants due to toxins or disease caused by live organisms or their products. Such disasters may be natural in the form of epidemics or pandemics of existing, emerging or re-emerging diseases and pestilences or man-made by the intentional use of disease causing agents in Biological Warfare (BW) operations or incidents of Bioterrorism (BT). In view of large programme on nuclear power generation and applications of radioisotopes and radiation technology, its possibility of radiation emergency in India cannot be ruled out, particularly because of the possibility of nuclear materials falling in the hands of the terrorists that can be used in the form of Radiological Dispersal Device (RDD), definite likelihood of popularly known as "dirty bomb".

5) Epidemics. The introduction of a pathogen capable of establishing a transmission chain into a susceptible population will result in an epidemic. In nature, the initial primary infection(s) are followed by rounds of secondary and tertiary infections and so on.

6.3. Emergency Management Planning Assumptions for Response Operations

1. A large disaster striking Mumbai will also affect the adjacent districts to Mumbai, such as Thane and Raigad.
2. For a large, regional disaster, Mumbai will receive limited resources from outside of Greater Mumbai, at least during the initial days following the disaster. In addition, movement of resources within Greater Mumbai will be restricted or delayed. As a result, not all priority response operations will be met with required resources. This situation requires response operations to be driven by defined Operational Priorities, determined by Emergency Support Function leaders (14) and the Responsible Officer at the Emergency Operations Center.
3. Response operational priorities will include a) safety and security of people and property, b) managing a large floating population with food, water, shelter, and medicine, c) re-establishing ground transportation routes to the hospitals and to other critical facilities, c) maintaining and supplementing fuel supplies and d) reestablishing electricity supply and communications to these wards.
4. Safety & security of people and property will be the primary consideration in emergency management planning & strategy formulations.
5. Additional Operational Priorities will be determined by Emergency Support Function Leaders at the EOC, based on the Situation Report.

District Disaster Management Plan

6. All emergency planning will include contingencies for the failure of electrical power and most significantly, communications failures.
7. Response operations can continue for a short time period, a few days, for several weeks, or longer.
8. Initially, response operations will be required around the clock, 24 hours a day, 7 days a week depending upon the severity of the incidence.
9. Response personnel have prepared their families so that they can focus on disaster response operations with sound knowledge their families are safe.
10. An assumption is that some key response personnel will not be available to assist in response operations for a variety of reasons.
11. Response personnel include all government employees.
12. A Preliminary Damage Assessment will be conducted as part of the response operations in order to understand the situation and to provide the information to decision makers to order to create Operational Priorities for allocating limited response resources.
13. MCGM authorities will communicate directly with the State Disaster Management Authority for required additional resource requests.
14. A formal Emergency Operations Center currently exists for MCGM which is operated around the clock with trained manpower having designated duties.
15. Operations of the EOC will be supplemented with additional manpower in case of disaster.
16. MCGM will establish satellite/alternate/standby EOC locations, as needed and also Incident Command Posts.
17. Other key support organizations will establish Control Rooms.
18. MCGM will focus on addressing the media as often as possible in order to communicate with the public. The MCGM will address the media with “one voice”, communicating a common message to the public. Most media briefings will be conducted at an established Joint Information Center.
19. As a stated policy of the Government of India, no appeals shall be made seeking foreign aid for disaster response. However, if the foreign national governments voluntarily offer assistance as a goodwill gesture in solidarity of the disaster victims, the Ministry of Home Affairs will coordinate with the Ministry of External Affairs for obtaining and channelizing such assistance.
20. Dispatchers will be informed of the disaster and send emergency response units to the scene.
21. Outbreaks of epidemic or medical emergencies may occur with time as secondary disaster.
22. Spontaneous volunteers will require coordination.
23. Access to damage area will be limited. Some sites will be accessible only through air and

water.

24. Access to the disaster area will depend on reestablishment of ground/water routes as soon as possible.

6.4. Concept of Operations for Greater Mumbai Emergency Operations

This section explains common operating procedures for all response personnel assisting the MCGM and Greater Mumbai response. The MCGM Emergency Operations Plan is nested within State and National Disaster Management Authorities and plans. The MCGM EOP is written with the express understanding that disasters are responded to and managed at the lowest political level possible, and is elevated only when the capabilities and resources of the responding level are exceeded.

6.4.1. Emergency Operational Structure for Greater Mumbai

The *National Disaster Management Guidelines; Incident Response System (IRS), July 2010*, provides the Nationally-mandated organizational structure for disaster response at all levels. It provides clear regulatory guidance on the required organizational structure for the MCGM Emergency Operations Center. The IRS also directs the creation and use of the Emergency Support Function System. The Emergency Support Function System provides for managing fourteen (14) different identified functions required during disasters. The Emergency Support Functions each operate under one MCGM Department Lead with various support organizations. Each Emergency Support Function operates under the legal authorities, understanding of hazards, risks, demographics, planning assumptions and emergency management policies, common operating systems, and administrative and financial rules, as described in this section of the Plan.

6.4.2. Appointment of Municipal Commissioner of Greater Mumbai as the District Disaster Officer for Greater Mumbai

The National Government, on the recommendation of the State Executive Committee, designated MCGM as the nodal agency for all aspects related to disaster management and assigned the Municipal Commissioner of Greater Mumbai as the District Disaster Officer¹ for Greater Mumbai in 1994. Thereafter the Commissioner assumed the function of managing disasters in Greater Mumbai and mobilized his own resources. Under the Municipal Commissioner is the Chief, Emergency Operations Centre or Responsible Officer, Disaster Management Unit who takes care of all aspects of disaster management including coordination of all measures related to disaster prevention, mitigation, preparedness, response and relief.

6.4.3. Private Company Response Plans Exist

Many vital installations in the city like Hindustan Petroleum Corporation Limited, Reliance Energy Ltd, Bhabha Atomic Research Center, Tata Power Corporation Ltd, Maharashtra Telephone Nigam Ltd, and Mumbai Port Trust have their own Emergency Response systems that cater to their needs and are available to MCGM on request. The informal arrangement is functional despite the absence of a Memorandum of Understanding between these organizations

and MCGM.

6.4.4. Non-governmental Organization Response System

Some non-government organizations provide complementary relief and rehabilitation activities in Greater Mumbai. These include the Agriculture Produce Market Committee, Bharat Sevashram, CARE, CARITAS, CASA, Indian Red Cross, Mahalaxmi Trust, Ramkrishna Mission, Salvation Army, Somaiya Trust, Swami Narayan Trust, Service Clubs of Rotary, Lions and Giants, Tata Relief Committee. NGOs also assist MCGM at the local level during any disaster, especially in shelter activity.

6.4.5. Other MCGM Partnerships for Emergency Response System

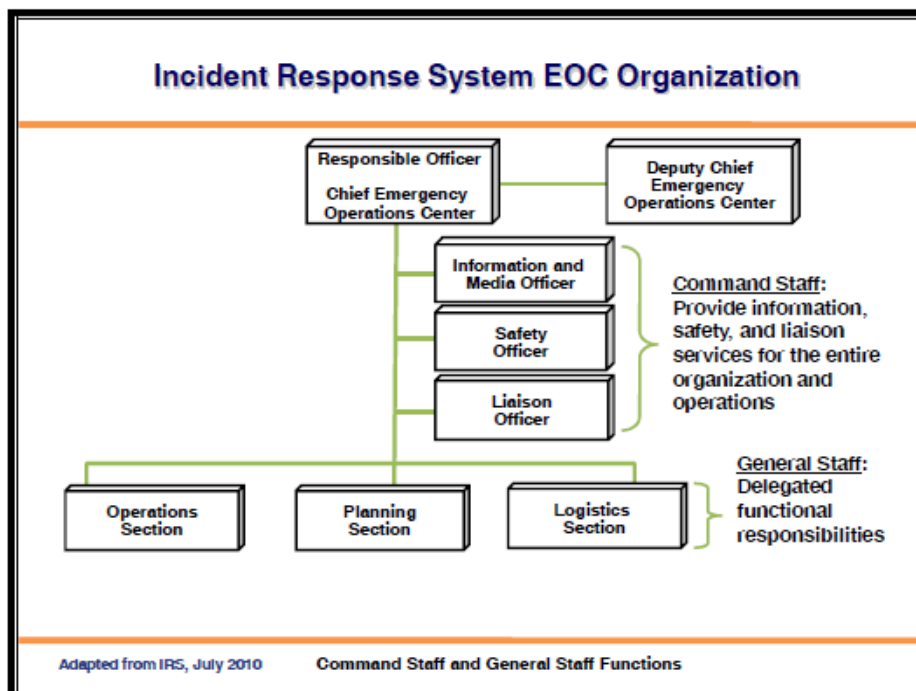
MCGM has also established links with other organizations and stakeholders, such as academic institutions and professional organizations working in the city in order to increase participation and mobilize additional technical and financial support for DRM activities in Greater Mumbai. This resource list includes the following organizations and stakeholders:

6.4.6. Emergency Operations Center

Location of MCGM Emergency Operations Center (EOC) for Greater Mumbai Response Operations:

1) **MCGM has designated the MCGM Emergency Operations Center** at the existing Disaster Management Unit located in the basement of Annex Building MCGM Head Office Mumbai. The MCGM EOC will function to support the area of Greater Mumbai.

2) **Alternate Sites for MCGM Emergency Operations Center.** The Primary alternate site for the emergency operation Centre is under construction at Kalpataru Lalbaug in Central Mumbai.



3) The purpose of the Emergency Operations Center is to:

- Provide a central location, with communications capabilities, for key MCGM Department Heads and Emergency Support Function Liaisons to gather as a central coordinated body. These liaisons, officials, and decision makers present will be able to make decisions on the spot under the guidance of Responsible Officer (RO) and will be able to assist the RO in achieving the **incident objectives**. The RO will also ensure that the line departments do not issue parallel and contradictory instructions to their field level officers.
- Demonstrate that the MCGM Government is in charge, and ensure a coordinated decision-making process;
- Provide for information exchange and documentation about the ongoing disaster;
- Set incident objectives (operational priorities) for response at the MCGM level and Ward level;
- Collect damage information and needs assessment for the District Disaster Relief Committee and State Emergency Operations Center;
- Provide for a media location and media briefings with the MCGM “speaking with one voice”; and
- Manage logistics and resources for required response operations, and to track disaster finances.

The EOC will take stock of the emerging situation and assist the Responsible Officer in mobilizing the respective line department's resources, manpower and expertise along with appropriate delegated authorities for the on-scene response teams. EOC will keep the Responsible Officer informed of the changing situation and support extended.

6.4.7. Activation of the MCGM Emergency Operations Center (EOC)

The Municipal Commissioner or Chief Officer, Disaster Management, CCRS & Liaison, MCGM may activate the EOC if the following conditions exist:

- If there exists an imminent threat to public safety or health on a large scale;
- If an extensive State government, District government, or National government response and coordination will be required to resolve or recover from the emergency or disaster event;
- If the disaster affects multiple Wards within MCGM that rely on the same resources to resolve major emergency incidents; or
- If the Local Emergency Declaration Ordinance is implemented to control the major emergency or disaster event. (Note: this mechanism is not currently in place)

6.4.8. Communication and Alert Regarding Opening of the MCGM Emergency Operations Center

Announcements that the MCGM Emergency Operations Center has been opened for incident monitoring and response will be provided to the public through all available systems.

6.4.9. Communication, Alert and Warning

Communication, Alert and Warning will be provided to the public through all available systems. Warning information will only be used from the following official Warning Nodal Agencies. Nodal Agencies for Early Warning are as follows:

Disaster Agencies

Earthquake	IMD, MERI, NGRI, GIS
Floods	IMD, MCGM
Cyclones	IMD
Epidemics	Public Health Dept, MCGM & GOM
Road Accidents	Police
Industrial & Chemical	Accidents Industry, MARG, Police, BARC, DISH
Fires	Fire Brigade, Police

6.4.10 EOC Organization under the Incident Response System

- The Emergency Operations Center Organization will operate under the following India Incident Response System organizational structure, as presented below in Figure
- The Indian Incident Response System Structure is very closely aligned to internationally used systems so that international aid can be delivered to India and Greater Mumbai in an organized and efficient manner.

6.4.11. Responsibilities of the Chief of the Emergency Operations Center & Command Staff Positions at the EOC

- The Chief of the EOC, or Responsible Officer, is overall in charge of disaster response and the operations of the Emergency Operations Center. In addition, the Chief of the EOC will manage the Information & Media, Safety, and Liaison Functions. They report directly to the Chief of the Emergency Operations Center or Responsible Officer and may have assistants. The main function of the Command Staff is to assist the Chief of the Emergency Operations Center or RO in the discharge of his functions. These Command Staff positions are shown in the EOC Organization Chart, as shaded or green color, in Figure below.
- The Information and Media Officer (IMO) is responsible for: Advising Chief of Emergency Operations on information dissemination and media relations. The IMO Obtains information from and provides information to community and media.

3) The Safety Officer is responsible for advising the Chief of Emergency Operations on issues regarding incident safety. Ensuring safety of all incident personnel.

4) The Liaison Officer(s) is/are responsible for: Assists the Chief of Emergency Operations by serving as point of contact for representatives from other response organizations.

5) The MCGM Chief of the Emergency Operations Center will designate additional responsibilities and assignments, depending on the situation.

6.4.12. Responsibilities of the Operations Section at the EOC

Responsibilities for the Operations Section include (Note that the Operations Section is the largest commitment of personnel and resources on every disaster): The Operations Section is responsible for directing the required tactical actions to meet incident objectives. Management of disaster may not immediately require activation of Branch, Division and Group. Expansion of the Operations Section depends on the enormity of the situation and number of different types and kinds of functional Groups [Emergency Support Functions] required in the response management.

6.4.13. Responsibilities of the Planning Section at the EOC

The Planning Section is responsible for all matters relating to the planning of the incident response. The Planning Section Chief (PSC) heads it. This section helps the Incident Commander in determining the objectives and strategies for the response. The Planning Section works out the requirements for resources, their allocation and subsequent utilization. The Planning Section maintains up-to-date information about the ongoing response and prepares the Incident Action Plan. For the closing phase of the Operations, this Section also prepares the Incident Demobilization Plan.

6.4.14. Responsibilities of the Logistics Section at the EOC

The Logistics Section is responsible for providing facilities, services, materials, equipment and other resources in support of the incident response. The Section Chief participates in development and implementation of the Incident Action Plan, activates and supervises Branches and Units of his section. In order to ensure prompt and smooth procurement and supply of resources as per financial rules, the Finance Branch has been included in the LS

Section – 7

Partnership with other Stakeholders

Partnership with other Stakeholders

The worldwide increasing in population and infrastructural growth has resulted in worsening the affects of disasters events, such as natural and man-made. The development of Information and Communication Technology as upgraded the awareness and sensitivity worldwide irrespective of the location where the disaster occurred.

In the present scenario the concept of disaster management is seen as multi-agency which is to be managed by various international organisations, United Nation Agencies, community based organisations and public and private partnership. In this unit we will be discussing such organisations in disaster response, their functions and responsibilities. We will be also understand the role of media in disaster response and common aspects of their coordination.

The concept of disaster management is seen as multi-agency undertaking and it is jointly managed by various United Nations agencies, international organisations and NGOs. The need for cross-fertilization and filling the gaps between these efforts is greater than ever. In the unit, we will be discussing the various international agencies, NGOs and Community Based Organizations along with role of Media and Public-Private Partnerships.

Disaster Management Unit of MCGM has adopted concept of Emergency Support Function for efficient coordination with & among the various stakeholders identified. The Emergency Support Function concept of operations is the internationally recognized standard for modern, state-of-the-rt emergency operations plans and recognized the National Disaster Management Authority.

The ESF concept provides a systematic and efficient system to organize the several stakeholders that are engaged in disaster risk management, to provide them with a methodology for sharing knowledge and resources, and for working efficiently to address the challenges of preparing, responding and recovering from any emergency situation. Through this process, it provides for effective inter-institutional and inter-sectoral coordination, thereby resolving one key impediment to disaster risk management. With time and regular practice, the stakeholders will develop close working relationships that yields benefits well beyond managing emergencies.

Emergency Support Functions (ESF) are the essentials of Emergency Management that provide the coordination mechanisms among the various agencies; they provide the organization and process to plan, manage and coordinate specific response and preparedness activities common to - any hazardous event that can result in an emergency from the most frequent one to the most extreme one. Each ESF is headed by a lead agency and is supported by identified support agencies. These ESFs form an integral part of the Emergency Operation Centers and each ESF would coordinate its activities from the Municipal Corporation of Greater Mumbai Emergency Operations Center (EOC). The ESFs identified for Mumbai are as follows:

Sr. No.	ESF	Lead Agency
1	Communication	Disaster Management Unit, MCGM
2	Public Safety and Law and Order	Mumbai Police
3	Fire Fighting	Mumbai Fire Brigade, MCGM
4	Search and Rescue	Mumbai Fire Brigade, MCGM5
5	Transport	Transport Commissioner
6	Public Health and Sanitation	Executive Health Office, MCGM
7	Resource Management	Disaster Management Unit, MCGM
8	Information Management	Public Relations Officer, MCGM
9	Mass Care, Housing and Human Services	Education Officer, MCGM
10	Relief Supplies	Collector (City)
11	Energy (Power, Fuel & Gas)	Brihan Mumbai Electricity Supply & Transport Undertaking
12	Utility Services	Deputy Municipal Commissioner (Special Engineering), MCGM
13	Public Works and Infrastructure	Director (Engineering Services & Projects), MCGM
14	Oil & Hazardous Material	Director, Industrial Safety and Health

7.1 Disaster Management Unit, MCGM (ESF 1 & ESF 7)

7.1. a Scope

- To establish communication with, other EOCs and ESFs.
- To coordinate the establishment of required temporary communications and the restoration of permanent communications system.
- To review and update precautionary measures to protect the equipment functionality and to provide appropriate instructions to all concerned agencies handling various communication equipment.
- To activate other ESFs as per requirement.
- To communicate relevant information to other ESFs as required for the management of emergency in the most effective and accurate manner.
- To coordinate establishment of required temporary communications.
- To coordinate restoration of permanent communications as early as possible.
- To develop plans and coordinate and manage communications support.
- To provide resource management support.
- To develop and update resource inventory.

- To keep a stock of material and equipment.
- To provide necessary manpower, equipment, material and logistic support to other ESF's.
- To provide support for requirements not specifically identified in other ESFs. It addresses the effort and activity necessary to evaluate, locate, procure, and provide essential material resources, including excess and surplus.
- To continue support until the disposition of excess and surplus.
- Implement financial management, procurement and tracking system.

7.1.b Responsibilities and Actions

- Identify operational communication facilities in affected areas.
- Identify damaged communication facilities.
- Identify communication facilities that need to be transported to affected sites to establish emergency operational services.
- Identify actual and planned action of private communication operators towards operationalizing their own facilities in affected areas.
- Establish temporary communication facility through mobile exchanges on priority, for use by EOC and responding agencies of all ESFs.
- Establish temporary communication facilities for public use.
- Coordinate actions with other ESFs for restoration of communication.
- Coordinate communication requirements of responding agencies.
- Extend support to private communication providers and vice versa.
- Restore communication facilities after disaster.
- Provide emergency communication for response to all agencies and link EOCs and other control rooms.
- Provide communication facility to communities.
- Coordinate the requirements of temporary communication in affected areas.
- To maintain updated resource inventory.
- Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety.
- Locate and coordinate the use of available space for disaster management activities.
- Coordinate and determine the availability of and provide consumable non edible supplies stocked in distribution facilities and customer supply centers when available.
- Procure required stocks from vendors or suppliers when items are not readily available.
- Coordinate motor equipment and transportation services in coordination with the ESF Transport, and in conformance with its responsibilities for the implementation of emergency-related functions, including the prioritization and/or allocation of all or part of the civil transportation resource and related ESF Transport responsibilities.
- Coordinate the procurement of communications equipment in coordination with ESF Communication.

7.2 Mumbai Police (ESF 2)

7.1.a Scope

- Provide a mechanism for coordinating and providing support to authorities; and/or support to other ESFs, consisting of law enforcement, public safety, and security capabilities and resources during potential or actual incidents requiring a coordinated response.
- Support incident management requirements including, but not limited to, force and critical infrastructure protection, security planning and technical assistance, technology support, and general law enforcement assistance in both pre incident and post-incident situations.

7.1.b Responsibilities and Actions

- Maintaining law and order that includes crowd and riot control. Carrying out preventive arrests where required.
- Facilitating orderly conduct of relief operations and management of relief facilities.
- Supports other ESFs for preparedness activities and conducts evaluation of operational readiness, including a roster and description of public safety and security activities.
- Maintains close coordination during operations between the affected areas, other ESFs, as required.
- Obtains initial situation assessment from field units and determines appropriate management response to anticipated or current requests for assistance.
- Obtains and distributes incident contact information to supporting agency coordinators for emergency responders.
- Assesses requests before committing resources, and ensures responding agencies are provided with information on known hazards, mission requirements, appropriate vaccinations, credentials, and personal protective equipment to operate in the environment to which they are assigned.
- Provide Experts on explosives, fire investigators, explosives detection and accelerant detection, canine handler, medicos, crisis negotiators, intelligence officers, explosives enforcement officers, industry operations investigators, fire research engineers, forensic chemists, forensic auditors, and support personnel in many specialty areas.
- Other specialized capabilities include National Disaster Response Force (NDRF) that conduct high-risk enforcement operations; investigators at the scene of significant explosives and fire incidents; a fleet of trucks that allow the NDRF to be fully equipped for the forensic examination of explosives and fire scenes; and Mobile Laboratories and Command & Control vehicles. EOC will deploy the necessary and available resources to provide the appropriate response.
- Each support agency maintains its authority and is responsible, when appropriate and

according to resource availability, for providing personnel, equipment, facilities, technical assistance, and other support as required.

- Provide periodic reports, as requested, regarding agency assets and response capabilities.
- Provide technical subject-matter expertise, data, and staff support for operations, as may be requested by the lead agency.
- Ensures that capabilities are in place to provide an appropriate response facility emergency and to nuclear or radiological emergencies.
- Coordinates with public and private-sector entities in protecting critical infrastructure and telecommunications systems.
- Ensure the security in all modes of transportation, transportation infrastructure, and the people and goods in transit provides transportation security screening, inspection, vulnerability assessments, and law enforcement services throughout the transportation system.

7.3 Mumbai Fire Brigade (ESF 3 & ESF 4)

7.3.a Scope

- To manage firefighting activities like fire detection, fire suppression, rescue, evacuation and hazardous materials incidents.
- To coordinate firefighting activities with other ESFs.
- To provide personnel, equipment and supplies during firefighting operations.
- To assess damage due to fire.
- To manage search and rescue activities like search, rescue, extrication, stabilization, evacuation and transportation.
- To coordinate search and rescue activities with other ESF's.
- To provide personnel, equipment and supplies during search and rescue operations.

7.3.b Responsibilities and Actions

- Liaisoning, coordinating and reporting with EOC and support agencies.
- Assessment and reassessment of the situation and deployment of resources as per requirement.
- Carry out firefighting and rescue operations.
- To assess damage due to fire.
- Liaisoning, coordinating and reporting with EOC and support agencies.
- Assessment and reassessment of the situation and deployment of resources as per requirement.
- Carryout search and rescue operations.

7.4 Transport Commissioner (ESF 5)

7.4.a Scope

- Management and coordination of transportation activities to support the emergency response and relief efforts.
- Establishing priorities and/or allocating of transportation resources, processing of all transportation requests, managing air and marine traffic, determining the priority of highway repair, conducting damage assessment, and coordinating emergency management activities with local jurisdictions, State agencies, neighbouring cities and provinces.
- Processing and overall coordination of requests for transportation support.
- Obtaining transportation services and provides visibility of transportation assets into and out of affected areas.
- Assessing the damage to transportation infrastructure, analyzing the effects of the disaster on the transportation system, monitoring the accessibility of transportation capacity and congestion in the transportation system, and implementing management controls, as required.
- Assisting in the design and implementation of alternate transportation services, such as mass transit systems, to temporarily replace system capacity lost to disaster damage.
- Coordinating the clearing and restoration of the transportation resources. Responsibility for transportation needs assessment and documentation rests with emergency managers.

7.4.b Responsibilities and Actions

- Will identify and coordinate all relevant public and private agencies to repair and restore access into the disaster area(s), with priority for repairs/restoration given to those more heavily traveled roads and to proceed as rapidly as possible.
- Operational control remains the same during emergencies as during normal activities; however, operations may require 24-hour coverage, and a central point of overall coordination. Prepare to assist in lengthy operations that start in response and continue through recovery and involve cleanup activities and return of resources.
- Has primary responsibility for providing and assigning emergency transportation resources to requesting organizations and coordinating their operations as directed through the MCGM EOC and for the maintenance and repair of primary transportation infrastructure throughout Mumbai.
- Schools, colleges & other education institutes assume responsibility for protection of students, staff, equipment and facilities, as well as the safe transportation of students.
- The Board of Education will develop and maintain a database of available transportation resources owned and maintained by them in Mumbai and in surrounding areas.
- In the event that these assets are required, they will assist in accessing and utilizing these resources for emergency transportation needs.
- Responsible for establishing and maintaining public transportation and resources.
- In the event that these assets are required, the Transit Service will assist in accessing and utilizing these resources for emergency transportation needs.
- Responsible for transportation of sick or injured persons in need of medical attention.
- In the event that these resources are required, the Ambulance Service will assist in utilizing these resources for emergency transportation for persons with special needs.

7.5 Executive Health Office, MCGM (ESF 6)

7.5.a Scope

- Assessment of public health/medical needs.
- Health surveillance.
- Medical care personnel.
- Health/medical/veterinary equipment and supplies.
- Medicine and food supplies.
- Patient evacuation.
- Patient Care.

District Disaster Management Plan

- Safety and security of drugs, biologics, and medical devices.
- Blood and blood products.
- Food safety and security.
- All-hazard public health and medical consultation, technical assistance, and support.
- Behavioral Health Care.
- Public health and medical information.
- Vector control.
- Potable water/waste-water and solid waste disposal.
- Disposal of dead bodies.
- Biomedical waste disposal.
- Mass fatality management, victim identification, and decontaminating the remains.
- To establish portable, modular hospital units.

7.5.a Responsibilities and Actions

- Internal assets to provide immediate medical response capabilities.
- Assess potable water, wastewater, solid waste disposal issues, and other environmental health issues.
- Conduct field investigations, including collection and laboratory analysis of relevant samples.
- Provide technical assistance and consultation on potable water and waste-water/solid waste disposal issues.
- Assessing the threat of vector-borne diseases.
- Conducting field investigations, including the collection and laboratory analysis of relevant samples.
- Providing vector control equipment and supplies.
- Providing technical assistance and consultation on protective actions regarding vector borne diseases.
- Providing technical assistance and consultation on medical treatment of victims of vector borne diseases.
- Providing victim identification and mortuary services.
- Establishing temporary morgue facilities.
- Performing victim identification by fingerprint, forensic dental, and/or forensic pathology/anthropology methods.

District Disaster Management Plan

- Processing, preparation, and disposition of remains.
- Tracking personal effects.
- Arranging for body release

7.6 Public Relations Officer, MCGM (ESF 8)

7.6.a Scope

- Develop plans to coordinate with news media for emergency operations, before, during and after emergencies.
- Develop plans to conduct a multi-agency/jurisdiction coordinated public information programme during emergencies and disasters; this includes the establishment of a **Joint Information Center (JIC)**.
- Develop plans and programs to educate news media about disaster management.
- Develop procedures to organize and operate a media briefing area and/or a JIC during emergency.
- Develop and maintain pre-scripted SMS, news releases, and public service announcements for all hazards.
- Provide evacuation information to the affected public.
- Develop and maintain a roster with contact information of media personnel.
- Supplement emergency management public information operations, as necessary
- Provide timely and accurate SMS and news releases in common language and terminology to inform the media and citizen.
- Provide emergency public information relating to population of special needs.
- Coordinate with news media regarding emergency operations.
- Organise and operate a press briefing area and a JIC, as appropriate.
- Continue public information activities for the purpose of updating the media and public on response, relief and recovery efforts.
- Develop plans and procedures for rumor control.
- Develop plans to coordinate with news media for emergency operations, before, during and after emergency situations.
- Develop plans and programs to educate news media that this ESF will be the primary information center during emergency situations, unless otherwise directed by the Emergency Services Director.
- Develop and maintain pre-scripted messages, news releases, and public service announcements for all hazards to include hurricanes, earthquakes, nuclear incidents and

dam failures.

- Appeal to public to cooperate to emergency response.

7.6.a Responsibilities and Actions

- Disseminate information about evacuation information to the affected people through media.
- Update public information media (print, radio and TV) listings as necessary.
- Provide mass notifications to the populace and provide periodic media updates.
- Organize and operate a press briefing area and a joint information center, as appropriate.
- Supplement emergency management public information operations as necessary and as resources are available.
- Continue public information activities to include updating the people on recovery efforts.

7.7 Education Officer, MCGM (ESF 9)

7.7.a Scope

- The Lead Agency will work with support agencies to facilitate delivery of mass care services.
- Initial response activities will focus on meeting urgent needs of disaster victims on a mass care basis. Initial Recovery efforts may commence as response activities are taking place. As recovery operations are introduced close coordination will be required between support agencies responsible for recovery operations.
- As response activities are introduced, close coordination will be required between those responsible for response activities, and supporting agencies.
- Emergency shelter for disaster victims includes the use of pre-identified shelter sites in existing structures; creation of temporary facilities or the temporary construction of shelters; and use of similar facilities outside the disaster-affected area, should evacuation be necessary.
- Feeding will be provided to disaster victims and emergency workers through a combination of fixed sites, mobile feeding units, and bulk distribution of food. Such operations will be based on sound nutritional standards and will include meeting requirements of disaster victims with special dietary needs.
- Disaster Welfare Information (DWI) regarding individuals residing within the affected area will be collected and provided to immediate family members outside the affected area through a DWI system. DWI will also be provided to aid in reunification of family members separated at the time of the disaster.
- Emergency first aid will be provided to disaster victims and workers at mass care facilities and at designated sites within the disaster area. This service will be supplemental to emergency health and medical services established to meet the needs of disaster victims.
- Sites will be established within the affected area for bulk distribution of emergency relief items to meet urgent needs of disaster victims.

7.7.b Responsibilities and Actions

- Locate adequate relief camps based on damage assessment.
- Quick assessment of functional and stable structures for use as shelters.
- Identify clear open spaces for setting up of relief camps.
- Coordinate shifting of population from affected buildings to safe sites.
- Set up relief camps in temporary shelters by innovative methods, closer to open traffic links.
- Provide shelters in accordance with risk.
- Enter into a pre-contract system with the Civil Suppliers for immediate arrangement of food and relief materials during the crisis.
- Ensure coordination of activities related to Emergency provisions of temporary shelters, Emergency mass feeding and Bulk distribution of relief supplies to the disaster victims as also the disaster managers and relief workers.
- Control quality and quantity of food for relief.
- Ensure timely distribution of food to affected people.
- Make emergency food supplies available to the affected population.
- Provide adequate and appropriate shelter to the affected population.
- Locate relief camps close to open traffic and transport links.
- Develop alternate arrangements of shelter for population living in structures that might be affected even after the disaster.

7.8 Collector (City) (ESF 10)

7.8.a Scope

- Is responsible for providing direct and active support to emergency response and recovery efforts during all the phases following a disaster.
- Locating, procuring, and issuing resources such as food, water, medicines, clothing, financial assistance, contracting services, fuel, and personnel.
- To receive donations in kind the relief supply from local and international donors, stock and disburse.
- Is responsible for coordinating the activity of relief supply from all agencies and ESFs.

7.8.b Responsibilities and Actions

- Collector (City & Suburbs) is responsible for planning, coordinating, and managing relief supply.
- To coordinate procurement and allocation of relief supply.
- To oversee distribution of relief supply of food and other essential supplies.

District Disaster Management Plan

- The Lead Agencies for this ESF is the Collectorates of Mumbai which are vested with the overall responsibility for allocating and coordinating resources and support activities. This will be responsible for the review and revision of this plan on an annual basis or as needed.
- Responsible for coordinating the response in any major emergency or disaster. This includes supporting EOC to ensure an effective response to the situation.
- Coordinate with the support agencies. Such coordination includes liaison with agencies.

7.9 Brihan Mumbai Electricity Supply & Transport Undertaking (ESF 11)

7.9.a Scope

- To gathers, assesses, and shares information on energy system damage and estimations on the impact of energy system outages in affected areas.
- To work closely with other ESFs and aids in meeting requests for assistance to affected population.
- Has a variety of assets and resources that will be used in response to any event involving disruption in energy delivery, caused by multiple hazards. Energy Delivery includes producing, refining, transporting, generating, transmitting, conserving, building, and maintaining energy systems and system components.

7.9.b Responsibilities and Actions

- Serve as the focal point for issues and policy decisions relating to energy in all response and restoration efforts;
- Monitor energy system damage and repair work.
- Collect, assess, and provide information on energy supply, demand, and prices; contribute to situation and after-action reports.
- Identify supporting resources needed to restore energy systems.
- Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts.
- EOC will activate lead agency, which will subsequently activate support agencies.
- May also self-activate in coordination with EOC.
- This activation will require deployment of ESF representative to the EOC.

7.10 Deputy Municipal Commissioner (Special Engineering), MCGM (ESF 12)

7.10.a Scope

- Assessment and repairs of current utility capabilities, capacities, and reserves within Mumbai.

District Disaster Management Plan

- Collect, evaluate, and share information on utility service damages and repairs, and estimates on the impact of service outages within the affected areas.
- Provide information concerning the utility services restoration process such as projected schedules, percent of completion of restoration, geographic information on the restoration and other information as appropriate.
- Restoration of normal operations of all utility services.

7.10.b Responsibilities and Actions

- Maintain liaison with local utilities and provide 24-hour emergency contact information to include critical personnel, emergency chain of command, and notification procedures.
- Provide accurate and timely emergency public information coordinated through the EOC.
- Document all emergency-related expenditures and situation reports.
- Representative provided in the EOC will coordinate the evaluation, allocation and restoration of Utility Service.
- Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency.

7.11 Director (Engineering Services & Projects), MCGM (ESF 13)

7.11.a Scope

- Undertake pre disaster activities such as prepositioning assessment teams, contractors and other advanced elements.
- Undertake needs/damage assessments immediately following a disaster.
- Emergency clearance of debris to enable reconnaissance of the damaged areas and passage of emergency personnel and equipment for life-saving, property protection, and health and safety.
- Removal and disposal of debris from public and private properties.
- Provision of expedient emergency access routes, which includes repairs to damaged streets, bridges, ports, waterways, airfields, and other facilities necessary for emergency access to disaster site.
- Emergency restoration of critical public facilities, including the temporary restoration of water supplies and wastewater treatment systems.
- Emergency demolition or stabilization of damaged structures and facilities as immediate hazards to public health and safety, or as necessary to facilitate life-saving operations.
- Temporary protective measures to abate immediate hazards to the public for health and safety reasons until demolition are accomplished.
- Emergency contracting to support public health and safety, such as providing for potable

water, ice, power or temporary housing.

- Technical assistance, including inspection of public and private structures.
- Provision of emergency power to public facilities.

7.11.b Responsibilities and Actions

- The Lead Agency representative will establish operations at the EOC as soon as possible after the notification and activation.
- As soon as the lead agency representative reaches EOC he will take briefings and updates about the incidence from the EOC and vice versa.
- Assess the disaster situation and forecast public works and infrastructure response needs.
- Provide technical assistance to EOC and validate requests for public works and infrastructure resources.
- Establish communication with the other ESFs.
- Assess the disaster situation and determine the adequacy of public works and infrastructure response activities.
- Provide technical assistance to the other agencies providing public works and infrastructure.
- Validate requests from affected areas for public works and infrastructure resources.
- Manage the process for requests for assistance through EOC.
- Provide reports to the EOC response structure and anticipate future public works and infrastructure requirements.

7.12 Director, Industrial Safety and Health (DISH) (ESF 14)

7.12.a Scope

- To provide coordinated response to actual or potential discharges and/or releases of hazardous materials by placing the response mechanisms of the supporting agency within the coordination structure that ensures the most efficient and effective use of resources.
- To prevent, minimize, or mitigate a threat to public health, welfare, or the environment caused by actual or potential hazardous materials incidents.
- To establish the lead coordination roles, the division and specification of responsibilities among agencies, and on-site response organization that may be brought to bear in response actions, including description of the organizations, response personnel, and resources that are available.
- This ESF is applicable to all departments and agencies with responsibilities and assets to

support response to actual or potential discharges and/or releases of hazardous materials.

- To detect, identify, contain, clean up, or disposal of released hazardous materials. The actions can include stabilization of berms, dikes, or impoundments; capping of contaminated soils or sludge; use of chemicals and other materials to contain or retard the spread of the release or to mitigate its effects; drainage controls; fences, warning signs, or other security or site control precautions; removal of highly contaminated soils from drainage areas; removal of drums, barrels, tanks, or other bulk containers that contain hazardous substances; and other measures as deemed necessary.
- Respond to actual or threatened releases of hazardous materials not typically responded but that, as a result of the disaster or emergency, pose a threat to public health or welfare or to the environment.
- Response activities to hazardous materials incidents include, but are not limited to, household hazardous waste collection, permitting and monitoring of debris disposal, water quality monitoring and protection, air quality sampling and monitoring, and protection of natural resources.

7.12.b Responsibilities and Actions

- Maintain close coordination among all agencies.
- Provide damage reports and assessments.
- Facilitate resolution of any conflicting demands for hazardous materials response resources. Coordinate the programme of backup support from other regions to the affected area.
- Provide technical, coordination, and administrative support and personnel, facilities, and communications.
- Coordinate, integrate, and manage the overall effort to detect, identify, contain, clean up, or dispose of or minimize releases of oil or hazardous substances, or prevent, mitigate, or minimize the threat of potential releases.
- Provide expertise on environmental effects of oil discharges or releases of hazardous substances, pollutants, or contaminants and environmental pollution control techniques.
- Assess the effects of pollutants on environment.
- Acquire and disseminate weather data, forecasts, and emergency information.
- Provide expertise on natural resources and coastal habitat, the environmental effects of oil and hazardous substances, and appropriate clean-up and restoration alternatives.
- Coordinate scientific support for responses in coastal and marine areas, including assessments of the hazards that may be involved.
- Predict pollutant movement, dispersion, and characteristics (atmospheric or marine) over time.

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- Provide information on meteorological, hydrological, oceanographic conditions for marine, coastal, and inland waters; and Provide charts and maps for coastal and territorial waters.
- Direct response actions for releases of hazardous substances from vessels, facilities, and vehicles.
- Provide advice in identifying the source and extent of radioactive releases, and in the removal and disposal of radioactive contamination.
- Provide assistance on all matters relating to the assessment of health hazards at a response and protection of both response workers and the public health.
- Determine whether illnesses, diseases, or complaints may be attributable to exposure to a hazardous substance.
- Establish disease/exposure registries and conduct appropriate testing; and develop, maintain, and provide information on the health effects of toxic substances.
- Provide assistance and expertise in fish and wildlife resources, geology and hydrology, earthquakes and other natural hazards, minerals, soils, vegetation, mining activities, identification of hazardous substances, biological and general natural resources, cultural matters affecting Indian lands and resources, National parks, wildlife refuges, and fish hatcheries.
- Provide expert advice on complicated legal questions arising from the response.
- Provide advice and assistance in coordinating an international response when a discharge or release crosses international boundaries or involves foreign flag vessels.
- Provide expertise on all modes of transporting oil and hazardous substances, including information on the requirements for packaging, handling, and transporting regulated hazardous materials.

Section – 8

Reconstruction and Rehabilitation

Rehabilitation and Reconstruction

Activities relating to rehabilitation and reconstruction are primarily carried out by MCGM and various State Government departments and boards.

However, their activities in this phase shall be in accordance with the reconstruction and rehabilitation plans framed by GMDMA, in conjunction with implementing authorities. On the expiry of a disaster declaration, the Authority shall, where necessary, act as an agency for facilitating and coordinating rehabilitation and reconstruction activities by departments of the MCGM / State Government.

The reconstruction and rehabilitation plan is designed specifically for worst-case scenario. The key activities in this phase are discussed below:

8.1 Detailed Damage and Need Assessment

While a preliminary damage assessment is carried out during disaster phase, a detailed assessment must be conducted before commencing reconstruction and rehabilitation activities. The primary objective of any post-disaster damage assessment and need analysis is to provide a clear, concise picture of post disaster situation, to identify damage caused to different sector and to develop strategies for rehabilitation, reconstruction and recovery. The relevant MCGM / State Government departments and other authorities shall initiate detailed assessment at their respective level for damages sustained in their respective departments and jurisdiction in the affected regions. For assessing the damage and need of the affected community, the damage and need assessment team should be a composite representation of all the different communities and groups in the affected area. An ideal team would include expert in the related field, government official and representatives from majority and minority communities, females, Scheduled Caste and Tribes, panchayat member or nagarpalika member, etc.

8.2 Reconstruction Strategy

Depending on the type of damage and population affected, following measures can be initiated as comprehensive recovery strategy. While the short term reconstruction strategy includes repair, restoration and strengthening of affected structures, long term strategy includes reconstruction and relocation.

8.2.1 Repair and Restoration

MCGM / GoM, if needed, will formulate a policy of assistance to help the affected to repair and restore damaged houses and dwellings. This should neither be treated as compensation for damage nor as an automatic entitlement. Respective departments should carry out timely repair and restoration of the related infrastructure, facilities, services, etc. This shall aid in quickly resuming the essential services they provide. MCGM shall coordinate with national and international NGOs, donor agencies and other government bodies to prioritise restoration of critical infrastructure like health institutions, temporary housing, lifesaving facilities, critical government infrastructure, etc.

8.2.2 Reconstruction

GMDMA shall oversee reconstruction and rehabilitation work and ensure that it takes into account the overall development plans for the MCGM. GMDMA shall approve reconstruction and rehabilitation projects based on:

- Identification of suitable projects by relevant departments
- Project detailing and approval by the relevant technical authority

Two essential aspects of reconstruction are:

a. Owner Driven Reconstruction

Reconstruction should be done on the principle of Owner Driven Reconstruction. Here the MCGM administration aids in provision of funds and technical expertise for construction activity. The principle allows active participation of the affected family/ owner in rebuilding their houses and ensures that their houses suit their cultural, occupational and other personal needs and context. It also gives them a sense of ownership and change their mindset from 'being a beneficiary' to 'being an owner' which also aids in psychological rehabilitation.

The active participation of the owner also ensures regular monitoring of the process, quality of material used, etc. which helps in speeding up the reconstruction process.

b. Build Back Better

Reconstruction post disaster also gives an opportunity to build back better. The new construction post disaster should comply of all safety norms, guidelines and building codes. The design of these buildings should be disaster resilient as per the hazard profile of the area into consideration. MCGM shall monitor the reconstruction process and ensure that the principle of build back better is followed through disaster resilient reconstruction.

8.2.3 Relocation

The GoG believes that need-based considerations and not extraneous factors drive relocation of people. The local authorities, in consultation with the people affected and under the guidance of GSDMA, shall determine relocation needs taking into account criteria relevant to the nature of the calamity and the extent of damage. Relocation efforts will include activities like:

- Gaining consent of the affected population
- Land acquisition
- Urban/ rural land use planning
- Customizing relocation packages
- Obtaining due legal clearances for relocation
- Getting the necessary authorization for rehabilitation
- Livelihood rehabilitation measures for relocated communities, wherever necessary

While planning on site reconstruction or relocation, care should be taken to provide the community with all basic amenities in close vicinity of the reconstruction site. This leads to holistic reconstruction process. Some of the basic amenities are as follows:

- Health
- Education
- Proper drainage system.
- Provision to drinking water
- Provision for proper sanitation
- Provision for waste collection and management
- Market place
- Connectivity to road and railway

8.3 Rehabilitation

Holistic rehabilitation post disaster includes many inter linked aspects. It is critical to address all need of affected population in order to achieve early recovery and to bring back normalcy to their lives.

8.3.1 Socio-economic Rehabilitation

Socio-economic rehabilitation is aimed at revamping the social and economic fabric to the pre-disaster or a better situation. It also addresses issues like that of livelihood restoration and generation. This is done by providing required training, skill, tools and equipment to restart the previous or new livelihood options. Care should also be taken to address the needs of various socially and economically vulnerable groups like that of women, adolescent girls, old age persons, differently able persons, children, destitute, below poverty line population, scheduled castes, scheduled tribes, particularly vulnerable tribal groups, etc.

8.3.2 Psychological Rehabilitation

Disasters often lead to long time stress and trauma due to loss of near and dear ones, injuries, loss of limbs, loss of housing and related property, trauma generated by facing the disaster and fearful sites, fear of repetition of the disaster, etc. If not addressed appropriately, it may lead to lifelong psychological fear and disorders, thus it is necessary to provide psycho-social first and psychological care to the affected population.

8.3.3 Environmental Rehabilitation

Environmental impacts of natural disasters can result in serious risk to life and livelihoods if not addressed. Environmental emergencies like uncontrolled, unplanned or accidental release of a substance into the environment not only impact human life in many ways but also damage environment to great extent which may be impossible or may take years to restore to original. Without proper consideration of the environment, pre-existing vulnerabilities may be re-created

or exacerbated. Thus MCGM along with other stakeholders should ensure measures to decontaminate the affected elements like air, river, water bodies, forests, etc.

8.4 Information, Education and Communication

Communication activities are necessary to convey to the larger community the scope and nature of the proposed reconstruction and rehabilitation effort so as to increase the stakeholder awareness and buy-in for the ongoing activities. Hence, GMDMA and relevant MCGM / State Government departments shall undertake:

- Ongoing media management/Public Relations: To ensure accurate communication of the reconstruction and rehabilitation measures being taken to various stakeholders;
- Community management: This includes communicating to the affected communities with a view to appraising them of efforts being made for their relocation/ rehabilitation/ reconstruction;
- Feedback mechanisms: Using the communication network to get feedback on reconstruction and rehabilitation measures.

8.5 Dispute Resolution Mechanisms

GMDMA, in conjunction with GoM & relevant agencies, shall institutionalize mechanisms to address beneficiary grievances at various levels, as well as explore innovative ways of dispute minimisation like involving the community in reconstruction initiatives. Appropriate mechanism with penalties for dealing with false claims will be evolved to prevent misuse of assistance.

Section – 9

Mainstreaming of Disaster Management in Development Plans

Mainstreaming of Disaster Management in Development Plans

9.1 Mainstreaming DRR in Development Programs / Projects / Schemes

Mainstreaming Disaster Risk Reduction (DRR) means that risk reduction becomes a part of all partners involved in development work by institutionalizing the process in planning and implementation and in policies.

Disaster risk reduction (DRR) is a systematic approach to identifying, assessing and reducing the risks of disaster. It aims to reduce socio-economic vulnerabilities to disaster as well as dealing with the environmental and other hazards that trigger them: it has been strongly influenced by the mass of research on vulnerability that has appeared in print since the mid-1970s. It is the responsibility of development and relief agencies alike. It should be an integral part of the way such organizations do their work, not an add-on or one-off action. DRR is very wide-ranging: Its scope is much broader and deeper than conventional emergency management. There is potential for DRR initiatives in just about every sector of development and humanitarian work.

The basis of the MCGM Disaster Management Plan is a collaborative planning process that incorporated a synergistic, holistic approach to disaster risk reduction and response for Mumbai. This approach allowed the development of the MCGM Disaster Management Plan, or the operating environment in which Mumbai responds to disaster.

'Win-win' solutions for securing sustainable development, reducing poverty and strengthening hazard resilience, need to be explicitly and actively sought, particularly as climate change looks set to increase the incidence of droughts and floods and the intensity of windstorms. Solutions are best derived by integrating disaster risk reduction strategies and measures within the overall development framework, viewing disaster risk reduction as an integral component of the development process rather than as an end in its own right.

Hazard-related issues need to be considered in national and sectoral development planning, country programming and in the design of all development projects in hazard-prone countries, seeking both to protect the development investments themselves against natural hazards and to strengthen the hazard resilience of the communities they serve. Hazard-proofing individual structures may not even cost much. . As such, due consideration of disaster risks may represent an important aspect of international efforts to enhance aid effectiveness.

9.2 Mainstreaming Issues with MCGM Departments

The issues of disaster mainstreaming which to be taken into consideration by concerned department are given below:

Activities	Responsibility
To ensure whether project involves any creation / modification of structural / engineering assets	BP, DP, HE, Health Dept, Concerned ACs
To ensure the possible risks, likelihood and impact from disasters due to the location of project sites	Irrigation - Power - Water supply - Health - Roads & Buildings - Education - Health - Others Dept. approving the project Administratively Financially Technically Urban Development Authorities PWD Dept Irrigation Dept. GMDMA, DMU Local Bodies
To ensure whether probable risks have been prioritise and the mitigation measures being contemplated, both structural & non-structural measures	
To ensure the design and engineering of the structure has taken into consideration the National Building Code 200, The appropriate BIS, other applicable sources such as NDMA	
Impact assessment of project (Damage that can be caused to the project by natural disasters, design of the project that could accentuate the vulnerability of the area to disasters and or lead to rise in damage / loss of lives, property, livelihood, and surrounding environment	
Risk assessment of project Vulnerability assessment of project (Evaluation of site with regards to parameters such as probable maximum seismicity, probable maximum storm surge, probable maximum wind speed, probable maximum precipitation, probable maximum flood discharge and level, soil liquefaction prone- ness under probable earthquake intensities) Review of land use management, Building Code / Building use regulation, Directives and Legislation	
Impact of the project on the environment and the surrounding population with respect to the type of the project and adoption of mitigation measures to reduce the impact of the same	

Section – 10

Cross Cutting Issues

Cross Cutting Issues

10.1 Gender and Disaster Management

Gender equality:

Refers to both men and women having the freedom to develop their personal abilities and make choices without the limitations set by stereotypes, rigid gender roles, or prejudices. It does not mean that men and women have to become the same, but that their rights, responsibilities and opportunities should not depend on whether they are born male or female. Gender inequality predominantly impacts negatively on women and girls, as men tend to have more decision-making power and control over resources than women. Because of this, efforts to advance gender equality need to focus primarily on improving the situation and status of women and girls in their societies. Specific actions may be taken to ensure that women's views and priorities are adequately and directly heard in disaster management committees.

Gender equity:

Refers to fairness of treatment for women and men according to their respective needs. This may include equal treatment, or treatment that is different but considered equivalent. For example, specific outreach strategies may be developed to ensure that relief assistance reaches female-headed households in societies where the mobility of women is restricted. Likewise, general distribution centres may be created or certain livelihood recovery activities may be designed and implemented specifically by and for women.

Gender issues in Disaster Management

The relationships between men and women are powerful forces in every culture. The way these relationships are defined creates differences in the roles and responsibilities of men and women. It also leads to inequalities in their access to, and control over, resources and decision-making powers. Women and girls generally tend to be the main victims of natural disasters. A few commonly recorded reasons for higher death tolls among women and girls include:

- 1) Cultural constraints on female mobility which hinder self-rescue, for example, women may not leave the home without male permission, they may be reluctant to seek shelter because shared communal facilities do not have separate, private spaces for women or clothing may have been damaged lack of skills such as swimming or tree climbing, which are traditionally taught to males less physical strength than males, in part due to biological differences but, in some cases, also due to the effects of prolonged nutritional deficiencies caused by less access to food than men and boys.
- 2) At the same time, gender-based behaviours and stereotypes can also have negative effects on men and boys. Poverty is known to be a key factor in the vulnerability of both men and women during hazard events, but there can be gender differences among poor people that further compound the risks. For instance, poor women may have heightened vulnerability to hazard events that occur during the daytime, as many live in unsafe areas and houses and tend to spend more time indoors and near the house than their male relations. As men usually form the majority of poor migrant labourers, their wives and children, as well as older people remaining in the family home, may be more exposed to the impacts of local disasters.
 - a. In addition to gender-based stereotyping and discrimination, women and men may face further discrimination based on race, ethnicity, age, language, disability, sexuality, class or religion, further increasing their vulnerability

Disaster Response

The following are some key gender considerations that should be taken into account when planning and implementing emergency response assistance.

Emergency needs assessment: In the case of quick-onset disasters, rapid assessments normally take place within the first 24 to 72 hours of the emergency. At the minimum, data should be collected at this time on the age, gender, and diversity of the affected population. Whenever possible, this data should be supplemented with any available information on the pre-existing gender and socio-economic context and on the impact previous disasters may have had on different groups.

Emergency response teams: Assessment and response teams should include equal numbers of male and female members in order to facilitate accessing women and men separately during needs assessments. The proportional representation of, and consultation with, male and female representatives of different groups in the affected communities (the elderly, youth and minorities), is also very important for the same reason.

Beneficiary registration and relief distribution systems: Procedures for relief registration and distribution should recognize the need for, and ensure access to, assistance by all types of vulnerable and needy households, as well as individuals within households. Relief materials should not be distributed in the name of only male heads or on the basis of physical damage and losses. Food aid is far more likely to reach children if it is distributed directly through women. However, the system for doing so must be carefully developed with the participation of community and other local leaders to avoid misunderstandings and backlashes against the targeted groups.

Female heads of household or female family members with limited physical mobility may need help accessing distribution locations or may need relief aid transported to them. This may also be the case for the elderly and for those with disabilities. This situation can be compounded when women face multiple mobility constraints. This may require door- to-door visits to those with mobility constraints, as well as consulting men and women separately and scheduling community meetings at times that are convenient for both.

Appropriateness of relief items: Gender and culture-specific needs should be taken into consideration when designing relief packages. Women and men should be consulted on the contents of relief supplies to ensure they are suitable and to avoid costly waste, preferably as part of disaster preparedness planning for the pre-stocking of relief items. Women and older girls also have particular sanitary needs that should be taken into account. Relief packages need to contain supplies for menstrual blood absorption that are in line with what women would normally use (sanitary pads and clean strips of cloth), and should include underwear for women and girls. As women tend to be reluctant to approach men regarding their personal hygiene requirements, and can be easily embarrassed or humiliated during the distribution of sanitary and undergarment supplies, it is generally preferable that males are not involved in their distribution. Similarly, pregnant and lactating women have special needs for ensuring adequate milk production and for other crucial nutrients and vitamin supplements that can be incorporated into family or mother and baby assistance packages.

Addressing health issues: Disaster relief efforts need to pay attention to specific female health needs. Often, pregnant women have lacked access to obstetric care and have miscarried or delivered babies under

unsanitary and unsafe conditions. The availability of female and male medical personnel is particularly important after a disaster. This is especially true when cultural norms may not allow women to be examined by male physicians, and when women's mobility may be restricted.

Ensuring the safety and security of those displaced by disasters is also a key priority. Displaced women and girls face heightened risks of unwanted and high-risk pregnancies and rape. Those affected by disasters also frequently face a higher exposure to contagious diseases including HIV/AIDS. Condoms, reproductive health kits and midwifery kits, along with reproductive health information are key post-disaster needs.

Domestic violence and alcohol abuse prevention counseling should be incorporated into the provision of post-disaster psychosocial services whenever possible. Increased rates of alcoholism and alcohol-related violence are frequent in disaster affected areas. Men may also need counseling to help them cope with changes in gender roles, i.e. caring for young children after the loss of their spouse. Sports programmes for men and women may also be helpful in relieving tensions.

Ensuring appropriate safe shelter, human settlements and water and sanitation: Shelter and human settlement planning needs to take into account the socio-cultural and economic needs and preferences of both men and women, as well as safety considerations. Following natural disasters, the threat of physical and sexual violence often increases; this threat is magnified in relief camps.

The location and set-up of shelters can affect both the perceived and actual safety of those displaced by a disaster. Locating shelters close to the original home whenever feasible provides extra safety due to intimacy with the shelter's physical surroundings. Women are often in charge of collecting firewood and water, and are therefore particularly affected by the security of access routes to these resources. The spacing and design of shelters is important in ensuring adequate privacy for female members of households from neighbours or passersby. Secure doors and adequate lighting can be important factors in safety. Cooking, bathing and toilet arrangements also need to be adequate, safe and culturally appropriate. This requires participation by both male and female beneficiaries in designing such facilities.. Female and male bathing areas should be placed at some distance from each other and near areas with adequate lighting. Whenever culturally necessary, women's bathing and toilet areas should also include a separate area for washing and drying menstruation cloths. Furthermore, kitchens should be adapted to local food preparation customs.

Disaster Recovery

The following are key considerations to ensure gender sensitive recovery.

Recovery assessment: A full gender analysis should be conducted as an essential component of recovery needs assessments. Following the initial emergency assessment of a quick-onset disaster, a more in-depth assessment of community needs, vulnerabilities, and coping strategies is usually undertaken by the response and recovery operation. This includes the detailed identification of vulnerable groups with special needs within the local context (single parents, orphans and landless tenants for example). Vulnerability and Capacity Assessment (VCAs), Participatory Rapid Appraisals, and other forms of social analysis to be used to determine those that are the poorest and most vulnerable within disaster-affected communities with whom they are currently working or plan to work.

As with emergency assessments, ensuring gender balance on the team conducting the assessments is essential to achieving a reliable result.

Housing, human settlements, and water and sanitation: It is vital that women and men from all social and economic groupings in disaster-affected communities actively participate in the design and location of new housing and communal infrastructure, such as water and sanitation facilities and community halls, as well as the repair of existing structures. Many reconstruction programmes have resulted in near-empty settlements or the re-creation of unsafe living conditions, because of a lack of understanding of the livelihoods and social needs of the inhabitants. This includes cases of homes that were designed to be safer when in reality the so-called improved features were unacceptable to the beneficiaries due to cultural or practical reasons. Congested kitchen causes smoke hazards to women. Local participation in physical reconstruction should be encouraged. Women should be co-owner of the houses.

Re-establishing livelihoods: The roles women play in contributing to a household's food security or income, whether as family members or heads of the household, need to be understood, and livelihood recovery activities should be designed that meet their needs, in addition to those of the men in the household. This is especially the case when households were already poor, were particularly affected by the disaster, or had their coping mechanisms badly eroded. Women's means-producing activities can include cultivating home vegetable gardens, playing key roles in crop and fish production and marketing, raising livestock, running small businesses such as selling snacks or making cakes and day labour.

Disaster Preparedness and Mitigation Measures

Disaster preparedness and risk reduction activities: Recovery processes can include regarding the needs of these disadvantaged women and men. This diplomatic role can be adopted during DRR, relief and recovery phases. There is a window of opportunity following disasters when there is great humanitarian caring and a willingness to eliminate potential barriers so that beneficiaries can have equity in relief and recovery processes. This period of time can be well utilized to bring about positive change within legislation, community attitudes and values. Finally, identifying a group of advocates for gender inclusiveness among respected local leaders, as well as through groups representing these interests, women's groups and NGOs for example, can be highly effective. These advocates should be encouraged to educate and motivate their peers on gender issues. The establishment of an advisory committee or working group comprised of these individuals can also help. However, it should be noted that sometimes support is initially required to strengthen the capacity of the interest groups.

(Source: Practical guide to gender sensitive approaches for disaster management, Intl. federation of Red Cross and Red Crescent Societies, Asia Pacific Zone)

11.2 Livestock Care during Disaster

Natural disaster is an event that is responsible for a social, economical, cultural and political devastation and affects people and communities at large. During natural calamities attention usually goes primarily towards human welfare, however, welfare of animal is also of paramount importance considering their causalities from drought and flood prone diseases, epidemics and different feed poisoning. Livestock rearing in the State is a source of employment of many more people. Nevertheless grave implications of natural calamities on both the livestock and their owners, disaster management of livestock has yet to receive any serious attention in India.

Issue to be taken in consideration

Prevent flooding, fire or earthquake from harming livestock: Safely transport, communicate and obtain medical assistance for livestock in disasters: evacuate, feed and identify livestock in a disaster: take steps to ensure that animal-related business fully recovers from a disaster: apply the four phases of emergency management to the care of livestock in disasters.

The care of livestock

Many farms are vulnerable to natural disasters and require special consideration in the protection against disasters. Their owners depend on the farm's income for their livelihood. There are often many chemicals, such as fertilizer, herbicides and pesticides that can be spilled in a disaster. In this section, you will learn about some of the basic principles of disaster mitigation for livestock.

Farms in disasters are of concern for many reasons, some of which are listed below. :

- The safety of the human food supply depends on the health of food-producing animals. : Owners have personal and financial investments in their animals.
- Protecting property is of secondary concern. Because of this, emergency management officials are not trained to deal with animals as property or the restoration of animal-related businesses. Therefore, farm owners should work with their emergency management agency and other groups before a disaster. Though, they should remember that the care of and responsibility for all animals lies with their owner or designated care provider. (*Source: Animals in Disasters/Module A, Unit-8, The Care of Livestock and Horses in Disasters*)

1. Mitigation

- There are many things that can be done on farms to mitigate disasters. Some of these are listed below.
- Build and repair buildings to meet or exceed construction codes and consider ease of evacuation.
- Replace or cover glass windows with materials that will not shatter and injure animals or personnel.
- Make sure that drainage ditches have grass covering (maintain sod). : prevent ground-burrowing animals from damaging dams and levees.
- Avoid accumulating piles of trash that can spill onto other persons' property and injure animals and people.
- Store chemicals in storm-proof buildings and secured containers.
- Do not leave construction materials unsecured. In high winds, these may become projectiles.
- Drain or build levees around ponds that could flood.
- After evacuating the barn, always close the barn doors to prevent animals from running back inside the barn.

Flooding

Many farms are in floodplains, but some farm owners and managers have a false sense of security. The animal husbandry department can provide maps and floodrisk assessment information on every property in their State. Farm owners should gather this information, review the location of their property, and engineer access to their property that will not leave them stranded during flooding. Civil engineers can help in the design and construction of flood-protected farm accesses and make

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recommendations on suitable locations for barns, stables, paddocks and high-lying areas that may be used as pasture ground in the event of a flood.

A common aftermath of flooding is the overflow of manure pits and waste lagoons. This can contaminate the environment, rivers and the drinking water supply. If this occurs, the environmental department will be interested in the environmental impact and will be concerned with river contamination and potential fish kills. Farmers can be fined for violations against regulations of environment departments. To prevent this from happening, farmers should take the following precautions.

- Have lagoons regularly inspected.
- Diligently keep records on the impact lagoons have on the environment and water shed.
- Discuss plans to divert manure from streams and rivers.
- Another common problem on farms in disasters is hazardous materials spills. Storing hazardous materials in locked buildings with securely strapped containers should prevent these from leaking into the environment and water supply.
- After floods there may be an increase in infectious disease.
- Animals that have stood in contaminated flood water will be at increased risk and may develop infections of the hooves and skin (dermatitis).
- Cuts acquired from disaster debris make animals more susceptible to tetanus and contaminated floodwater may contain toxins, including botulinum toxin from rotting carcasses. Contact with wildlife may also increase the potential for rabies.

Fire Safety

Farm fires tend to break out in the winter and summer months when barn doors are closed and the demand for heating, cooling (fans) and lighting is at its highest. Many livestock facilities are built of flammable materials and some contain gas heaters. Safety measures to prevent the damage caused by fires include the following. Fire extinguishers, sprinkler systems, smoke detectors and enforced no smoking policies can greatly reduce the risk of fires.

Electrical wiring of barns and stables should meet appropriate safety standards and be installed by qualified electricians. Professional advice is available to help with these. The State department of building and fire safety and most local fire departments provide low-cost inspections and recommendations on fire safety for properties. The recommendations are detailed and will provide the highest standards by which to prevent fires.

Farm owners should consult with their local fire department on how to fireproof their stables. This also familiarizes farm owners and local firefighters with one another. This familiarity is helpful in the event of an emergency. Knowing where a farm is located, how to access facilities, how many animals are there, and where large volumes of water are available can make the difference when firefighters are responding.

Power Supply and Miscellaneous repairs

Priority for restoration of power following an emergency is usually based on human population density. Because many farms are in rural areas, it could be some time before power is re-established. Many livestock operations depend heavily on electrical power to milk cows, provide heat and cool air (fans), and operate feed elevators and machinery. Owners can find out about the relative priority of their farm from their local utility company. This important information can help farmers prepare for times without power. Farm owners should consider securing a generator for emergencies.

2. Preparedness

The priorities for disaster planning for farms varies to some extent with the type of animals and facility. In general terms, the greatest priorities, i.e., the most likely disasters to occur, are trailer accidents, floods, fires, power outages and contagious disease outbreaks. Some locations will have additional hazards to consider, such as high winds, landslides, and hazardous materials. Owners should consult their local livestock officers and take necessary suggestions.

Safety in Animal Transport

Transportation accidents are one of the most common disasters that livestock owners will encounter. Preventive measures include regular inspection of trailers and tow vehicles for safe operation.

Veterinary preparedness in disasters

The priorities in veterinary care vary with each disaster. In high winds, tornadoes and hurricanes, traumatic injuries will predominate. In droughts and in severe winter weather, starvation and dehydration may be problems. Following fires, smoke inhalation and burn wounds will be issues that require veterinary attention. Many disasters also have distant effects on animals, e.g., debris on pastures many miles from a tornado touchdown and moldy corn following a flood can be a problem after a disaster. If you are concerned about diseases that may result from a disaster you should consult your veterinarian. If animals die or have to be euthanized, it is recommended that a post-mortem examination be performed so that insurance and legal claims can be settled.

In disasters, farm animals may be forced to congregate. Livestock from several farms may mix resulting in contagious diseases. Be aware that changing social structure may result in aggressive behavior leading to injury. Some measures can safeguard the health of livestock in disasters — vaccinations, deworming, and Coggins tests for horses. Veterinarians can also instruct their clients on first aid for horses and livestock and advise on the contents and appropriate use of first aid kits.

Before Disaster Strikes

Recommended items for a livestock disaster box include: Tack, ropes, halters, Concentrated feed, hay, supplements, and medicines Copies of ownership papers Buckets or feed nets, Garden hose Flashlight or lantern, Blankets or tarps, Lights, portable radio and spare batteries, Livestock first aid supplies.

Additional Recommendations

Consider the following prior to floods, cyclones, fires, blizzards, and other natural disasters. Learn what disaster risks are prominent in your area and what conditions accelerate that occurrence.

- Contact local law enforcement and emergency response agencies and familiarize yourself with their response patterns, criteria and capability. Make sure you also contact the official in charge of disaster response.
- Visit with neighbors or local groups about organizing a management or evacuation system for livestock.
- Evaluate your own handling capabilities including manpower, equipment and alternatives.
- Contact friends or families and make emergency arrangements with them for temporary livestock care.
- Identify facilities and resources that may be available 15 to 40 miles from your site. This works well

with agriculture producers and stables for the same contingency.

- Make sure you have legal and adequate markings to prove ownership of your livestock. Consider having ID tags (such as luggage tags) on hand that you can attach to any animals that are halter broke. You might consider having livestock marker crayons or bright-colored paint convenient to mark your animals and your premises. For less domesticated livestock you may be dependent on brands, ear tags, and ear notches. Have individual and group photographs of all livestock in your livestock *disaster box*.
- Practice loading your animals so you and the animals are familiar with the effort.
- Monitor television and local radio broadcasts regularly if risk factors are present.
- Identify an alley, lane or pen that can easily be used to confine animals and is readily adjacent to where a trailer or truck can access them. Utilize cell phone technology to monitor neighbors, families, and livestock.

3. Response Evacuation

Farm evacuations present unique problems. Appropriate planning is essential. Evacuations are best coordinated with neighbors, friends, and neighbours. Both the destination and the method of transport need to be sorted out well in advance of any need.

Feeding

When livestock and horses are evacuated and housed in large numbers, adequate amounts of feed may be difficult to procure. Develop lists of feed and hay suppliers in your area. Avoid dietary changes. When the diets of horses or livestock change, they become predisposed to colic, laminitis and metabolic diseases. Feeding diets that have moderate energy levels and meet the minimum nutritional requirements reduces the likelihood of illness. Use the following table to judge how much water and feed your animals may need.

4. Recovery

Farms are traditionally concerned with restoring the animal industries following a disaster. The long-term recovery phase of a disaster can be protracted, with substantial adjustments occurring in the disaster-stricken community.

Relocation

Every farm owner should have alternative accommodations planned for their animals in the event of a disaster. These contacts should be confirmed at least once per year. Be sure when selecting facilities to choose those that will not likely be affected by the same disasters you are planning for. Consideration should be given to how large amounts of manure will be disposed — this will accumulate and pose a significant animal and human health problem. Plans should be made for disposal of carcasses.

Restoration of Farms as Business

Farms are often affected by local disasters, such as fires, floods, chemical spills, and cyclones. It is estimated that only few small businesses affected by a major disaster ever recover to a functional state. This is likely due to inadequate insurance coverage. Farms without sufficient records will have a difficult time making an adequate insurance claim. Major concerns for small businesses, including farms, in disasters include the following: Personnel, Cash flow, Continued income for employees, Continued provision of quality care for animals, Restoration of a functional business, Changes in community

infrastructure, and Customer, buyer and supplier loyalty.

Many of these issues can be addressed before a disaster by obtaining adequate insurance coverage and entering into agreements with neighboring farms to share facilities and resources.

In addition, farms may obtain assistance from local banks, insurance companies, animal husbandry department, agriculture department and forest department to recovery the farms affected.

11.3 Risk Reduction Measures for Disabled Persons

(Source: Incheon Strategy to "Make the Right Real" for persons with Disabilities in Asia and Pacific.)

Governments of the Economic and Social Commission for Asia and the Pacific (ESCAP) region gathered in Incheon, Republic of Korea, from 29 October to 2 November 2012 to chart the course of the new Asian and Pacific Decade of Persons with Disabilities for the period 2013 to 2022. They were joined by representatives of civil society organizations, including organizations of and for persons with disabilities. Also in attendance were representatives of intergovernmental organizations, development cooperation agencies and the United Nations system. The High-level Intergovernmental Meeting on the Final Review of the Implementation of the Asian and Pacific Decade of Disabled Persons, 2003-2012, was organized by ESCAP and hosted by the Government of the Republic of Korea. The Meeting marked the conclusion of the second Asian and Pacific Decade of Disabled Persons, 2003-2012, and launched the new Decade.

The Governments at the High-level Intergovernmental Meeting adopted the Ministerial Declaration on the Asian and Pacific Decade of Persons with Disabilities, 2013-2022, and the Incheon Strategy to "Make the Right Real" for Persons with Disabilities in Asia and the Pacific. The Incheon Strategy provides the Asian and Pacific region, and the world, with the first set of regionally agreed disability-inclusive development goals. Developed over more than two years of consultations with governments and civil society stakeholders, the Incheon Strategy comprises 10 goals, 27 targets and 62 indicators. The Incheon Strategy builds on the Convention on the Rights of Persons with Disabilities and the Biwako Millennium Framework for Action and Biwako Plus Five towards an Inclusive, Barrier-free and Rights-based Society for Persons with Disabilities in Asia and the Pacific.

The Incheon Strategy will enable the Asian and Pacific region to track progress towards improving the quality of life, and the fulfilment of the rights, of the region's 650 million persons with disabilities, most of whom live in poverty. The ESCAP secretariat is mandated to report every three years until the end of the Decade in 2022, on progress in the implementation of the Ministerial Declaration and the Incheon Strategy.

Out of 10 major goals the disaster risk reduction and management for disabled persons is one.

Goal 7: Ensure disability-inclusive disaster risk reduction and management

The Asia-Pacific region is the region that is most adversely affected by disasters, including those caused by climate change. Persons with disabilities and other vulnerable groups are at higher risk of death, injury and additional impairments, as a result of exclusion from disaster risk reduction policies, plans and programmes. Public service announcements are often issued in formats and language that are not accessible by persons with disabilities. In addition, emergency exits, shelters and facilities tend not to be barrier-free. Regular participation of persons with disabilities in emergency preparedness drills and other disaster risk reduction measures at the local and district levels could prevent or minimize risk and damage when disasters occur. Physical and information infrastructure that incorporates universal design principles would improve the chances of safety and survival.

Disaster Mitigation for Persons with Disabilities

Some key principles should guide disaster relief:

1. Accessible Disaster Facilities and Services

Communications technology is vital for people with disabilities during a disaster to help assess damage, collect information, and deploy supplies. Access to appropriate facilities -- housing, beds, toilets, and other necessities -- must be monitored and made available to individuals with disabilities before, during, and after a disaster. This access also must be ensured for those who incur a disability as a result of a disaster. Appropriate planning and management of information related to architectural accessibility improves the provision of disaster services for persons with disabilities.

2. Accessible Communications and Assistance

As communications technology and policy become more integral to disaster relief and mitigation, providing accessibility to the technology for people with disabilities becomes more essential. For example, people with hearing impairments require interpreters, Time-division duplexing (*TDD*) communications, and signaling devices. In addition, written materials must be produced on cassette tape, on CD-ROM, or in large print for people with visual impairments. People with cognitive impairments, such as those with developmental disabilities, Alzheimer's disease, or brain injury, require assistance to cope with new surroundings and to minimize confusion factors. It is crucial that people with disabilities help develop accessible communications and reliable assistance technologies.

3. Accessible and Reliable Rescue Communications

Accessible and reliable communications technology is critical to ensuring fast, effective, and competent field treatment of people with disabilities. Current satellite and cellular technology as well as personal communication networks permit communication in areas with a damaged or destroyed communication infrastructure. Communications technologies can assist field personnel in rescue coordination and tracking and can be combined with databases that house information on optimal treatment for particular disabilities or that track the allocation of post disaster resources.

4. Partnerships with the Disability Community

Disability organizations must join with relief and rescue organizations and the media to educate and inform their constituents of disaster contingency and self-help plans. A nationwide awareness effort should be devised and implemented to inform people with disabilities about necessary precautions for imminent disaster. In the event of a sudden natural disaster, such a program would minimize injury and facilitate rescue efforts. In addition, more young people with disabilities should be encouraged to study technology, medicine, science, and engineering as a way of gaining power over future technological advances in disaster relief and mitigation.

Disaster Preparation, Education, and Training

Communications technologies are crucial for educating the public about disaster preparedness and warning the people most likely to be affected. Relief and rescue operations must have the appropriate medical equipment, supplies, and training to address the immediate needs of people with disabilities. Affected individuals may require bladder bags, insulin pumps, walkers, or wheelchairs. Relief personnel must be equipped and trained in the use of such equipment. In addition, relief personnel should provide training, particularly for personnel and volunteers in the field, on how to support the independence and dignity of persons with disabilities in the aftermath of a disaster.

Partnerships with the Media

Many natural disasters can be predicted in advance. Disaster preparedness for people with disabilities is critical in minimizing the impact of a disaster. The media -- in partnership with disability and governmental organizations -- should incorporate advisories into emergency broadcasts in formats accessible to people with disabilities. Such advisories alert the public, provide a mechanism for informing rescue personnel of individual medical conditions and impairments, and identify accessible emergency shelters. The creation and repetition of accessible media messages is critical for empowering people with disabilities to protect themselves from disasters.

11.4 Use of ICT in Disaster Management

Communication plays a important role in Disaster Management in providing information to all stakeholder which would help in SAR, relief and rehabilitation activities. Natural Disasters cannot be prevented but their impact can be minimised by using appropriate science and technology tools in managing disasters in a proactive way. It has now been recognised that disaster prevention, mitigation, preparedness and relief along with environmental protection are closely interrelated with sustainable development. Therefore mainstreaming of disaster management activities in the developmental plans and their effective implementation at all the levels of administration is the key. Information and communication technology would play a major role in bringing all the stakeholders on a common platform in order to ensure a sustainable development.

As per the NDMA guidelines, the State would undertake activities to establish a all-encompassing, integrated, multilateral, reliable, responsive and dedicated state of the art Digital Information and Communication Support Infrastructure on the lines of the National Disaster Management Information and Communication System (NDMICS).Steps would be taken use ICT in HRVA, knowledge management, resource management, early warning system and last mile connectivity creation of relevant database and development of the Decision Support System and also for creating Public Awareness.

Section - 11

Disaster / Emergency Action Plan

Disaster / Emergency Response Plan

Introduction: Response is the first stage of the disaster management cycle when a disaster has occurred or is imminent. Disaster response activities include setting up control rooms; putting the contingency plan in action, issue warning, action for evacuation, taking people to safer areas, rendering medical aid to the needy etc. Responders also need to cope with response-generated demands such as the need for coordination, communications, ongoing situation assessment and resource mobilization during the emergency period.

There are three phases in responding – pre, during and post disaster. Pre-disaster response activities are launched as soon as the information about an impending disaster is received. The activities like setting up control rooms, evacuation of people, etc. are intended to reduce the impact of disaster on the life and property. Response activities during disaster are meant to ensure that the needs and provisions of victims are met to alleviate and minimize suffering. Post disaster response tires to achieve rapid, durable and sustainable recovery.

Need: The response period is of crucial importance. Early response is dependent on the state of preparedness and the existence of a suitable response plan. A timely response can reduce the magnitude of loss of life and property. All disasters, including manmade disasters require a ready response plan even if the prevention aspect has been taken care of in an adequate manner. These are useful for issue of warning, serve as guide to officials at the critical time by assisting them to take immediate action; time is not in consultation with senior officers and in getting formal approval of from the authorities.

District Level Response Plan: Municipal Corporation of Greater Mumbai as a Nodal agency for disaster management is the focal point for the preparation of Response Plan at the District level as it is the point of public service delivery and responsible for directing, supervising and monitoring relief measures for disasters. Plans are periodically reviewed and updated in the light of lessons learnt in dealing with calamities from time to time and the technological advancements.

District Emergency Operations Center: The control room gathers all the necessary information about the Air Force, Navy and the Army for quick interaction and response.

Responsibilities of the Control Room are:

1. To transmit the information about the developments because of natural disaster to Chairman, GMDMA and State EOC on a continuous basis till the situation improves.
2. To receive instructions and communicate them to the appropriate agencies for immediate action
3. To collect and submit information relating to implementation of relief measures to the Chairman, GMDMA and State EOC
4. To keep the State level authorities apprised of the developments on a continuing basis.

Earthquake

- **Definition:** When fracturing of rocks in the earth's crust takes place due to geological reasons, a series of shock waves travel outward in all directions resulting in rapid and discernible tremors or earth movements. Such an event is called an earthquake. In other words, an earthquake is a violent shaking of the earth's crust due to breaking and shifting of rocks beneath the earth's surface. Scientific study of earthquakes is called seismology.
- **Intensity** - This measures the magnitude of the event. Higher is the value, the bigger is the magnitude. The most common scale used for measuring an earthquake is Richter Scale. It should be understood that Richter scale is a logarithmic scale. What this means is an earthquake measuring 6.0 is 10 times more powerful than an earthquake measuring 5.0
- **Epicenter:** This denotes the exact location, where the earthquake originated. The deeper it is inside the earth, the lower will be the impact on the surface – where human beings reside. There are 100s of earthquakes taking place on a daily basis all around the world. However, most of these earthquakes are really low-intensity, too low to be noticed. However, sometimes some earthquakes are significantly intense.
- **Nature of Losses and Damages**
The most common kinds of loss that are caused by an earthquake (depending on the severity) are:
 - **Damage to structures:** Causing partial or total collapse, damage to road and rail network, damage to utility carriers etc.
 - **Sea activity:** Water level in the sea could rise suddenly, causing very high waves, several meters in height, which could then flood the coastal areas. These could give rise to tsunamis, causing damage to coastal areas.
 - **Landslide:** As earth shakes, in mountainous regions, huge chunks of land could fall/slide onto lower regions of the mountains. This could have several impacts, including: changed topography, blocked roadways, damage to anything that comes in the way of the landslide, massive damage to the structure which sits on the piece of sliding land – and massive damage to the houses and roads where the piece of land finally lands. The landslide could also trigger another set of minor earthquakes.
- **Recognizing an Earthquake**
The most common ways to identify the onset of an earthquake would be:
 - A feeling of shaking of the ground below you, if you are sitting/standing. The most common feeling is – as if the person is feeling giddy.
 - Swinging of overhead hanging stuff, e.g. fans, chandeliers etc. However, in this situation, you should distinguish between swaying of overhead hanging stuff – due to wind
 - A feeling as if both the rear tires of your car are flat (if you are driving)

➤ **Immediate Injuries**

During an earthquake, there are many ways by which one can get hurt (many times, fatally)

1. People inside buildings could get hurt (even critically) by fall of objects/walls/ceilings
2. People outside the buildings could get hurt by falling debris from damaged buildings, glasses etc.
3. People traveling could get hurt by their vehicles falling off the tracks, bridges, material falling from overhead bridges etc.
4. People could get electrocuted by snapped electrical wires
5. People could get washed away by floods – caused due to tsunamis, breaches in dams etc.

➤ **Intensity Number**

- I. Imperceptible
- II. Feeble
- III. Very Slight
- IV. Slight
- V. Weak
- VI. Moderate

➤ **How vulnerable is Mumbai to Earthquake?**

Mumbai falls in the seismic zone III which is Moderate Damage Risk Zone. Mumbai, formed by the amalgamation of two groups of seven islands each, is connected to the mainland across the major water bodies surrounding it via roads and railways. It is thus vulnerable to be isolated from the mainland during a disaster. Its insular character also results in an acute paucity of land in the city, resulting in high density of population and one of the highest prices of real estate in the world. Since a substantial area of the city, about half of the Island City, and one-fifth to one-fourth of the suburban area, has been reclaimed from below sea-level by infilling, there is high risk of liquefaction during an earthquake.

About 60 per cent of the population of the city lives in squatter settlements. The growth rate of slum population is greater than the general urban growth rate. Slums are vulnerable primarily because of their location, density and lack of access to infrastructure. These settlements are located in areas that invariably get flooded during high tides, in coastal locations, along water mains or open drainage, on steep slopes, within industrial zones or under high tension wires. These communities suffer from inadequate access to potable water and sanitation and are more prone to health problems.

One of the most vulnerable elements in Mumbai is its building stock, which contributes to increasing risk of its population. The building stock exhibits a rich mix of several different building technologies.

Though Mumbai is acknowledged as having one of the more extensive and efficient transport networks within India, its infrastructure is woefully inadequate by world-class standards. The problem is aggravated due to the physiography of the city and the large concentration of financial, commercial and administrative functions in the southern end of the city. Lack of east-west connectivity within the city is also a major constraint. The suburban rail system is the lifeline of the city. The fares, which are the lowest compared to any other transit system in the world, also results in super dense crush load of 14-16 standing passengers per square meter of floor space. With one of the highest population densities in the world, service providers find it difficult to supply basic amenities like health, water and sanitation.

**Standard Operating Procedure
ESF - I - Communication**

Lead Agency: Disaster Management Unit

	Before	During	After
	<ol style="list-style-type: none"> 1. To form the Incident Management Team 2. To form the Damage Assessment Team 3. To organize orientation and training of responders including community in disaster management 4. To coordinate with relevant departments regarding enforcement of Building Codes, Fire Safety Rules and Certification of Building etc. 5. To follow-up with concerned agencies about the arrangements for putting up stop gap bridges on emergency basis & formation and training of the team for the erection of temporary bridges. 6. To follow-up with MTNL about the arrangements for the restoration of communication system & act accordingly 7. To follow-up with Health Department about facilities available, both in private & public sector, for health services in emergencies in vulnerable areas and act accordingly 8. To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly 9. To follow-up with Energy Department about arrangements for the restoration of power supply and providing for supply of power through alternative sources of energy & act accordingly 10. To follow-up with Ward EOCs about the implementation of mitigation, preparedness and response measures and present status of the same & act accordingly 	<ol style="list-style-type: none"> 1. To coordinate the disaster response operation 2. Activate Emergency Support Functions as per requirement 3. To deploy SAR Teams to the incident site 4. If required dispatch NDRF to the incident site 5. Inform the military and paramilitary forces to get ready for emergency response 6. To alert higher authorities 7. Activate HAM Radio Operators 8. To organize the restoration of communication, transportation 9. Coordinate for relief distribution 10. To hold meeting with donor agencies 11. To organize disposal of dead bodies both human and livestock 	<ol style="list-style-type: none"> 1. To select the sight for resettlement of victims 2. To get the resettlement plan prepared 3. To deactivate the response operation but continue with relief and other support service operations. 4. Maintain records containing all relevant information relating to action points and contact points 5. Conduct debriefing meetings with all agencies 6. Prepare an After Action Report to identify lessons learnt and improvements needed

District Disaster Management Plan

<p>11. To organize the orientation and training undertake earthquake resistance constructions and retrofitting on a large scale</p> <p>12. To follow-up with Fire Department about the reach and capacity of their fire-extinguishers, fire safety policy and plan to increase their spread and improve their capacity and policy to train security guards, habitants of high rise building, civil defence, Home Guards personnel and volunteers in fire safety measures & act accordingly</p> <p>13. To follow-up with Armed Forces about the emergency support services available with them and keep in regular touch with them.</p>		
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ESF - 2 - Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none"> • Conduct a mock drill for the law & order situation during Aircraft emergency • Arrange First Responder Training for Police personnel • Keep rescue ropes & other lifesaving material ready • Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system • Identify alternative routes for traffic • Undertake any other activity considered necessary 	<ul style="list-style-type: none"> • On receipt of an emergency call, operationalize level activation based on nature and severity of incident • The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff. • Assess the available resources and determine the need for additional resources • Ensure law and order situation in affected area • Provide extra police personnel at traffic diversions • Protect life and property, control traffic and keep close watch on anti-social elements • Provide information about traffic flow to the public through media, public address system, sign boards and display boards • Transport / Shift stranded or affected persons through Police and other vehicles • Organise towing of stranded vehicles if any with the help of volunteers • Maintain a log of reports / action taken, needs and capabilities • Undertake any other activity as per site condition 	<ul style="list-style-type: none"> • Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters. • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 3 - Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firemen • Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner • Repair and maintain ancillary equipment • Conduct Training and Refresher Courses for Rescue Teams • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery • Keep communication devices in a state of readiness • Conduct mock drills, awareness programs etc. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident. • Determine needs and available resources • Dispense resources required based on need and augment men and machinery if necessary. • Locate the incident command post and staging areas appropriately • Direct operations from a safe distance and ensure ability to escape. • Ensure safety from electrical installations or power supply at the disaster site. • If required establish communication from the incident site with other tactical operators • Monitor activities and regularly update support agencies • Organise rescue, evacuation and salvage operations. • Transport injured persons to hospitals. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 4 - Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firefighters in basic search & rescue operations. • Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner. • Repair and maintain rescue Equipment • Conduct Training and Refresher Courses for Search & Rescue Teams. • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue. • Keep communication devices in a state of readiness. • Recce disaster prone areas along with other agencies. • Conduct mock drills, awareness programs etc. • Undertake any other activity required. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs. • Operationalize level of activation depending on the nature and severity of the incident • Determine needs and available resources. • Locate incident command post and staging areas appropriately • Direct operations from a safe distance, with capability of escape. • Augment men and machinery if necessary • Establish communications from the incident site with other tactical operations, and EOC • Monitor activities and update support agency staff. • Transport injured persons to hospitals. • Shift victims to temporary shelters as per requirement. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none"> • If required prepare alternate transport arrangement plan in consultation with Supporting Agencies. • Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai. • Provide and assign emergency transportation resources to the requesting organizations. • Update information of available transportation and resources owned in and around Mumbai. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff. • Monitor activities and update support agency staff. • Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas. • Determine transportation needs and available resources. • Establish and maintain public transportation and resources. • Disseminate updated information to passengers through Public Address System. • Organize transportation of sick or injured persons in need of medical attention. • Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities. 	<ul style="list-style-type: none"> • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • To follow-up with Road & Building Construction Department about the availability of heavy duty cutting, debris clearing machines, their specifications, placement, storage and their operators & upkeep of the same for ready use. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

ESF - 8 - Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none"> • Update list of public information media (print, radio and TV). • Participate in Mock Drills, Table Top exercises 	<ul style="list-style-type: none"> • The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation. • The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff. • Disseminate information about earthquake affected areas and actions taken by government through media • Disseminate evacuation information to the affected people through media. • Provide mass notifications to the populace and provide periodic media updates. • Issue messages for public safety and mutual cooperation. • Organize a press briefing in EOC as appropriate. • Maintain a log of actions taken, reports of resources needs and capabilities. 	<ul style="list-style-type: none"> • Continue public information activities and update citizen on recovery efforts. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 9 - Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 11 - Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none"> • Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts. • Monitor energy system likely to be damaged during a disaster and in need of repair work. • Provide separate lines and separate sources of power for critical substations. • Collect, assess, and provide information on energy supply and demand. • Identify resources needed to restore energy systems. • Train staff to attend to emergencies. • Ensure sufficient stocks of essential spares such as cables. • Conduct awareness programmes for consumers. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff. • Update Support Agency staff and monitor activities. • Determine needs and available communication means. • Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts. • Collect current information on damage and area affected. • Switch off power supply if necessary. • Officers at site to coordinate with fault engineers and mains engineers. • Maintain a log of actions taken, reports of communication resource needs and capabilities 	<ul style="list-style-type: none"> • Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system • Assess the requirements of restoration • Coordinate with supporting agencies for temporary arrangement of fuel, gas and power • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 12 - Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none"> • Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures. • Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency. • Appoint additional contractual labour as per requirement. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The Lead Agency representative will receive and give briefings and updates to the EOC staff • Update support agency staff and monitor activities • Determine needs and available resources. • Start responding to utilities shortages and disruptions and take care of public safety and health 	<ul style="list-style-type: none"> • Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 13 - Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritize equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination and decontamination activities; • Seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Provide area security and prohibit unauthorized personnel from area with assistance from ESF Public Safety and Law & Order. • Determine with the help of appropriate agencies guidelines for re-entry of emergency personnel & residents. • Make emergency plan to control and clean up hazardous materials. • Conclude clean-up operations when the area is declared safe by responsible personnel. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Disseminate safety information through media • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos & Don'ts

What to Do Before an Earthquake

- Repair deep plaster cracks in ceilings and foundations. Get expert advice if there are signs of structural defects.
- Anchor overhead lighting fixtures to the ceiling.
- Follow BIS codes relevant to your area for building standards
- Fasten shelves securely to walls.
- Place large or heavy objects on lower shelves.
- Store breakable items such as bottled foods, glass, and china in low, closed cabinets with latches.
- Hang heavy items such as pictures and mirrors away from beds, settees, and anywhere people sit.
- Brace overhead light and fan fixtures.
- Repair defective electrical wiring and leaky gas connections. These are potential fire risks.
- Secure a water heater, LPG cylinder etc., by strapping it to the wall studs and bolting it to the floor.
- Store weed killers, pesticides, and flammable products securely in closed cabinets with latches and on bottom shelves.
- Identify safe places indoors and outdoors.
 - 1) Under strong dining table, bed
 - 2) Against an inside wall
 - 3) Away from where glass could shatter around windows, mirrors, pictures, or where heavy bookcases or other heavy furniture could fall over
 - 4) In the open, away from buildings, trees, telephone and electrical lines, flyovers, bridges
- Educate yourself and family members
- Know emergency telephone numbers (doctor, hospital, police, etc)

Have a disaster emergency kit ready

- Battery operated torch
- Extra batteries
- Battery operated radio
- First aid kit and manual
- Emergency food (dry items) and water (packed and sealed)
- Candles and matches in a waterproof container
- Knife
- Chlorine tablets or powdered water purifiers
- Can opener.
- Essential medicines
- Cash and credit cards
- Thick ropes and cords
- Sturdy shoes

Develop an emergency communication plan

District Disaster Management Plan

- In case family members are separated from one another during an earthquake (a real possibility during the day when adults are at work and children are at school), develop a plan for reuniting after the disaster.
- Ask an out-of-state relative or friend to serve as the 'family contact' After a disaster, it's often easier to call long distance. Make sure everyone in the family knows the name, address, and phone number of the contact person.

Help your community get ready

- 1) Publish a special section in your local newspaper with emergency information on earthquakes. Localize the information by printing the phone numbers of local emergency services offices and hospitals.
- 2) Conduct a week-long series on locating hazards in the home.
- 3) Work with local emergency services and officials to prepare special reports for people with mobility impairments on what to do during an earthquake.
- 4) Provide tips on conducting earthquake drills in the home.
- 5) Interview representatives of the gas, electric, and water companies about shutting off utilities.

During an Earthquake

Stay as safe as possible during an earthquake. Be aware that some earthquakes are actually foreshocks and a larger earthquake might occur. Minimize your movements to a few steps to a nearby safe place and stay indoors until the shaking has stopped and you are sure exiting is safe.

If indoors

- **DROP** to the ground; take **COVER** by getting under a sturdy table or other piece of furniture; and **HOLD ON** until the shaking stops. If there isn't a table or desk near you, cover your face and head with your arms and crouch in an inside corner of the building.
- Protect yourself by staying under the lintel of an inner door, in the corner of a room, under a table or even under a bed.
- Stay away from glass, windows, outside doors and walls, and anything that could fall, such as lighting fixtures or furniture.
- Stay in bed if you are there when the earthquake strikes. Hold on and protect your head with a pillow, unless you are under a heavy light fixture that could fall. In that case, move to the nearest safe place.
- Use a doorway for shelter only if it is in close proximity to you and if you know it is a strongly supported, loadbearing doorway.
- Stay inside until the shaking stops and it is safe to go outside. Research has shown that most injuries occur when people inside buildings attempt to move to a different location inside the building or try to leave.
- Be aware that the electricity may go out or the sprinkler systems or fire alarms may turn on.
- DO NOT use the elevators.

If outdoors

- Stay there.
- Move away from buildings, trees, streetlights, and utility wires.

District Disaster Management Plan

- Once in the open, stay there until the shaking stops. The greatest danger exists directly outside buildings, at exits, and alongside exterior walls. Most earthquake-related casualties result from collapsing walls, flying glass, and falling objects.

If in a moving vehicle

- Stop as quickly as safety permits and stay in the vehicle. Avoid stopping near or under buildings, trees, overpasses, and utility wires.
- Proceed cautiously once the earthquake has stopped. Avoid roads, bridges, or ramps that might have been damaged by the earthquake.

If trapped under debris

- Do not light a match.
- Do not move about or kick up dust.
- Cover your mouth with a handkerchief or clothing.
- Tap on a pipe or wall so rescuers can locate you. Use a whistle if one is available. Shout only as a last resort. Shouting can cause you to inhale dangerous amounts of dust.

After an earthquake

- Keep calm, switch on the radio/TV and obey any instructions you hear on it.
- Keep away from beaches and low banks of rivers. Huge waves may sweep in.
- Expect aftershocks. Be prepared.
- Turn off the water, gas and electricity.
- Do not smoke and do not light matches or use a cigarette lighter. Do not turn on switches. There may be gas leaks or short-circuits.
- Use a torch.
- If there is a fire, try to put it out. If you cannot, call the fire brigade.
- If people are seriously injured, do not move them unless they are in danger.
- Immediately clean up any inflammable products that may have spilled (alcohol, paint, etc).
- If you know that people have been buried, tell the rescue teams. Do not rush and do not worsen the situation of injured persons or your own situation.
- Avoid places where there are loose electric wires and do not touch any metal object in contact with them.
- Do not drink water from open containers without having examined it and filtered it through a sieve, a filter or an ordinary clean cloth.
- If your home is badly damaged, you will have to leave it. Collect water containers, food, and ordinary and special medicines (for persons with heart complaints, diabetes, etc.)
- Do not re-enter badly damaged buildings and do not go near damaged structures.

Flood

What is flood?

Floods refer to huge amount of water reaching land in a short span of time, causing land surface to be submerged under water – at places, where, land surface is usually not covered with water.

Floods could be caused due to natural causes, or, human activities, or, a combination of both. Floods are caused by discharge of huge volume of water in a short span of time, at a rate, such that the water can not be carried away from the scene of discharge.

Some of the possible reasons for such huge discharge of water could be:

- A. Very heavy rainfall (say: due to cyclones, typhoons etc.) in a short span of time. It should be noted that the amount of rainfall itself is not a sufficient cause, the duration within which the rainfall is receive is equally important contributor
- B. breach in levy, dams etc
- C. very high tidal waves (sometimes in the aftermath of a seismic activity, e.g. earthquakes) etc. – also called tsunamis

Usually, flooding impacts a large area, wherein entire district or states might be flooded. However, sometimes, flooding is very local, i.e. limited to just one city, or, parts of it. Most often, the localized flooding is caused due to human activities, rather than natural phenomenon. A natural phenomenon might seem like the immediate trigger, but, in reality, this is caused by human activity.

Among various kinds of disasters, flooding is unique in the sense that it has a very high degree of predictability, both in the short term, as well as long term. In most situations, flood prone areas are quite known – in the sense that they have a history of flooding. Only in very rare situations, a place might be flooded – without having any past history of flooding. Even in such cases, a careful study of the area could give an indication of possible flooding.

Flood Prone Areas

The areas, which are prone to flood-risks, are:

- places, which have a history of flooding (most important)
- area receiving heavy rainfall, with not much naturally sloping landscape
- areas at the lower levels of naturally sloping landscape – where, the higher areas are receiving heavy rainfall
- areas around sea-coasts, or, river banks
- areas downstream of dams etc. As water level upstream of dams might rise, the dam authorities might be forced to release water (to safeguard the dam) – which might cause flooding of downstream areas
- areas on the other side of levies (in case, the levy gets breached)
- Low-lying areas (say: foot of an overbridged etc.)

Loss due to Flooding

The most common kinds of loss that are caused during flooding include:

Lack of water: It's an irony, that a disaster which means water everywhere, results in lack of water to drink and sanitation. Lack of proper drinking water and sanitation causes widespread outbreak of diseases.

Lack of food: Most of the food items get damaged, causing a severe shortage of food. This shortage could be for the food to be consumed in the near future, or, even standing crops could be damaged, causing long-term food shortage.

Lack of utilities: Utility services might have to be turned off, for the fear of electrocution, as, there is water everywhere.

Widespread damage to structure

Drowning: People, livestock, goods etc. might get drowned.

Snakes and other creatures: Some of the dangerous creatures which usually stay underground would be forced to come up, as their natural habitat becomes unliveable. These could prove dangerous to human beings and cattle.

Submerging of vehicles and other equipment's: Vehicles and other equipment's might get permanently damaged – as they remain submerged under water – for prolonged duration.

Because of wide-spread impact of such floods, the suffering could be long-drawn, besides the immediate impact – as mentioned above.

Indicators of Possible Flooding

Usually, any of the following situations should indicate the possibility of flooding:

- heavy rainfall in/around the vicinity, especially, if the specific location falls in the pathway of the water-discharge system from the area receiving heavy rainfall
- if there is heavy rainfall/flow of water/accumulation of water, on the other side of a boundary, e.g. across a dam, across a levy, side of a river-embankment etc., because, these boundaries might get breached

As can be seen, both the above situations can be predicted to a reasonable degree. These days, the meteorological predictions are accurate enough for upto 4-5 days. Hence, it's usually possible to know about the possibility of heavy rainfall about 4-5 days in advance.

Also, areas which are prone to heavy rainfall, cyclones, typhoons etc. are also well-known. Hence, the predictability is very high even in long-term, in the sense, that certain areas are known to be flood-prone. The advantage of long-term predictability is that people might be able to take long-term precautionary measures also – requiring heavy investments.

Also, for situations, where, there is a boundary between huge mass of water, and, your living place, again, keeping an eye on the following two situations should be a good indication of the possibility of flooding:

- increase in the volume/mass of water being built up on the other side of the boundary
- general maintenance and upkeep of the boundary

General level of civic maintenance is a good indication of the possibility of flooding, during rainfall. If the drains and streets are generally clean, the possibility of flooding gets reduced; on the other hand, if the drains and streets are generally choked or dirty, the chances of flooding (atleast at the local level) gets increased.

Now, that we know, how can we figure out the possibility of flooding, lets look at the possibility of preventing it.

Prevention of Flood

Sometimes, it might not be possible to prevent a flood, even if we know that its about to get flooded. However, there are certain actions that can be taken to reduce the impact significantly, or, to reduce the possibility of flooding:

- The first step is to keep the drainage system clean. This allows water to be carried down very fast. Choked drains cause a significant reduction in the ability and speed of the water to be drained away. In most situations of urban flooding – this is a major cause. The drains might get choked due to throwing of solid-wastes inside storm drains. These solid-wastes might include construction material, plastics, paper etc. This is a clear example, how human activity can amplify the process of flooding. Drains might also get choked due to falling tree-leaves etc.
- General clean-up of streets is also important. As rain-water falls down the street, it rushes into the storm drains. if the streets are not clean, the rain water trying to go into the drain – carries solid wastes into the drain with itself, which then obstructs the flow of water by the drainage system.
- Rain water harvesting system: As more rain-water tries to flow down the drains, it puts that much more stress on the drainage system. Instead, if there are several rain-water harvesting systems, the rainfall falling in that much area would try to go to the sub-soil of the region locally, rather than straining the drainage system. Lower is the amount of water trying to go through the drainage system, the easier it is for the drainage system to drain off the water.
- Desilting: The drains should be desilted before the onset of the rainy season. This prevents the drains from getting choked. And, it also increases the holding capacity of the drain, as, accumulated silt prevents that much more water from being accumulated in the drains.
- Inspection and repair of dams, levees, embankments etc: Before the onset of seasons causing accumulation and/or carrying of heavy volume of water (such as rainy season), these structures should be thoroughly inspected for possible weak-spots, and, these should be repaired.
- Afforestation: Forestation helps in binding the loose soil. The most major impact of this is, as flood-water races through, it might take loose soil with it. This loose soil will now choke the drains, as well as water-harvesting systems, thus, rendering both of these as ineffective. On the other hand, trees will prevent soil to flow with the water, as, the roots of the trees will act as binding force. Another major impact that afforestation provides is by reducing the impact of flowing water. This has impact on large-scale flooding, such as overflowing river. As water charges forward, its speed is reduced to some extent due to resistance offered by trees. This can reduce the force of the charging water – thereby, reducing structural damage – due to weakening in the force with which water hits various structures.

- Local lowlands (say: foot of an over bridge) should have storm drains, so that water does not get accumulated there. These drains should have some kind of mesh covering, so that only water can flow in. Leaves and other solid debris should not go in these drains.
- Local embankments around low-lying houses etc: Lets say, for some reason, your house is at a level lower than its vicinity (e.g. road-level). This can happen, because, say: you have constructed a basement – which is obviously lower than the road-level, or, over a period of years, the road-level has risen due to repeated tarring etc. In such cases, you should create a “local” embankment between the street/road and your property, so that water can not flow “down” from the street/road inside your house. These embankment might be permanent – in the form of concrete structure.

Besides impacting the process of flooding itself, most (not all) of these factors also have an immense impact on the rate at which water levels might recede – after the source of the flooding has been removed. e.g. Lets say a city got flooded, after heavy rainfall. Now, once the rainfall is stopped, the water levels in the streets etc. might tend to recede. At this stage, once again, the rate at which water levels can recede is dependent on the ability of the storm drains to carry the accumulated water, as well as the total amount of water that has been accumulated – which needs to be drained out.

Being Prepared

- People who stay in flood-prone areas should construct their houses using material which does not get damaged severely due to flood-water. Also, since, there is a strong risk of structural damage (for large-scale flooding), the material used to construct the house should be such that it can withstand high impact – due to the charge of flowing water. One should prefer areas, which are slightly elevated. These could be local elevations, i.e. higher parts of the city etc. There should be strong embankments along all entrances of the houses – so that flood water does not enter the house easily.
- Cement bags, covered with plastic sheets might be used to keep the flood water from entering the houses.
- Besides, long boots should always be kept, so that one does not run the risk of being bitten by snakes and/or other insects that might also be trying to save themselves from the twirling flood-waters.
- One should keep arrangements for raising the height of items, which might get damaged in water, e.g. put a few pieces of bricks below the legs of the furniture, such as bed etc. to raise its height.
- Important document should always be kept on higher shelves.
- As water, food and utilities would not be available – and that too – for possibly several days, one should also take measures towards General Preparedness

Macro Level Efforts

- While some of the steps mentioned above need to be taken at municipal/city level, and, some at individual level, there are some other techniques which have been tried/used at some places. However, these require efforts at a much larger level. Some of these steps include:
- Identified flood diversion areas: Flood waters are diverted to these unpopulated areas, so that populated urban areas may be protected.
- Construction of dams etc. at strategic locations

- Levees, embankments around cities lying along river/sea coasts. The flooding of New Orleans – in the aftermath of Katrina hurricane was due to a breach in such a levee.
- Sea walls
- Beach nourishment: The sea-beaches are widened, so that they can absorb the impact of flood-waters – due to rise in sea-levels.
- Conversion of flood-prone areas into wetlands, where, urbanization is not allowed, i.e. one can not construct residential houses, or, any other permanent structures etc.
- As can be seen, such efforts require a very high degree of financial commitment, not just for constructing the system, but, also for maintaining it.

➤ **Types of Flooding**

Flooding can be divided into different categories according to their duration:

1. Slow-Onset Floods

- Slow-Onset Floods usually last for a relatively longer period, it may last for one or more weeks, or even months. As this kind of flood last for a long period, it can lead to lose of stock, damage to agricultural products, roads and rail links.

2. Rapid-Onset Floods

- Rapid-Onset Floods last for a relatively shorter period, they usually last for one or two days only. Although this kind of flood lasts for a shorter period, it can cause more damages and pose a greater risk to life and property as people usually have less time to take preventative action during rapid-onset floods.

3. Flash Floods

- Flash Floods may occur within minutes or a few hours after heavy rainfall, tropical storm, failure of dams or levees or releases of ice jams. And it causes the greatest damages to society.

Flooding can also be divided into different categories according to their location:

1. Coastal Floods

- Coastal Floods usually occur along coastal areas. When there are hurricanes and tropical storms which will produce heavy rains, or giant tidal waves created by volcanoes or earthquakes, ocean water may be driven onto the coastal areas and cause coastal floods.

2. Arroyos Floods

- A arroyo is river which is normally dry. When there are storms approaching these areas, fast-moving river will normally form along the gully and cause damages.

3. River Floods

- This is the most common type of flooding. When the actual amount of river flow is larger than the amount that the channel can hold, river will overflow its banks and flood the areas alongside the river. And this may cause by reasons like snow melt or heavy spring rain.

4. Urban Floods

- In most of the urban area, roads are usually paved. With heavy rain, the large amount of rain water cannot be absorbed into the ground and leads to urban floods.

How vulnerable is Mumbai to Flood?

Mumbai is located on the western seacoast of India on the Arabian Sea at 18°53 N to 19°16 N latitude and 72°59 E to 72°59 E longitude. It was originally a cluster of seven islands, which were later joined to form the present city. Greater Mumbai Region (referred to as Mumbai in the text) consists of 7 islands in the city area and 4 islands in the suburbs. The present day city is divided into two revenue districts, Mumbai City District, i.e, the island city in the South and Mumbai Suburban District comprising the Western and Eastern suburbs. Mumbai occupies an area of 468 square kilometers (sq. km.) and its width is 17 km. east to west and 42 km. north to south. The entire region encompasses rich natural heritage, such as, hills, lakes, coastal water, forests, and mangroves, alongside built areas. The coastline of Mumbai has been reclaimed for development purposes; e.g., areas like Cuff Parade and Mahim creek were wetlands, later reclaimed for residential and commercial uses.

Mumbai is an island outside the mainland of Konkan in Maharashtra State and is separated from the mainland by a narrow creek known as Thane Creek and a Harbour Bay. The city is surrounded on three sides by the sea: Arabian Sea to the West, Harbour Bay in the West and Thane Creek in the East. The height of the city is just 10-15 meters above the sea level. A large part of the City District and Suburban District is land reclaimed from the sea. The new industrial, commercial and residential settlements have developed along the reclaimed coastal areas which are low-lying and flood prone.

Mumbai, being on the seacoast, experiences a tropical savanna climate with a heavy southwest monsoon rainfall of more than 2100 millimetres a year. Mumbai experiences three seasons – summer from March to May, monsoon between June and September and winter during October to February. The city receives heavy rainfall during monsoon and relative humidity is quite high during this season. Similarly, winds are generally moderate but pick up during monsoon months. This district receives the average annual total rainfall of 2363.0 mm. The flash floods that led to the complete disruption of normal life in Mumbai in July 2005 were the result of an unprecedented rainfall of 944.2 mm on July 26 th in the Suburban District.

Causes of flooding:

Flooding is a natural event; the water cycle is a balanced system. Water flowing into one part of the cycle (like streams) is balanced by water flowing back to the sea. Sometimes, however the amount flowing into one area is greater than the capacity of the system to hold it within natural confines. The result is a flood, which occurs when the amount of water arriving on land (from rainfall, snow melt, surface flow, flow in watercourses or inundation by the sea) exceeds the capacity of the land or drainage-system to discharge that water. It can occur on any location but mainly occurs on land adjacent to watercourses (fluvial flood plains) or low laying areas.

The following could be additional contributing factors to flooding impacts,

- Building developments in floodplains, where they are vulnerable to flood hazards;
- Built development in catchments and other changes in land use, that increase the rate and volume of run off in a catchment;
- Sediment movement changing river cross-sections and affecting flood levels
- Lack of maintenance of flood defence systems, watercourses, culverts (including flood storage areas around them) and road gullies, particularly where this leads to channel blockage
- Canalisation, modification and diversion of rivers and watercourses, which increase the rate of flow and decrease the time taken for water to travel within a catchment

District Disaster Management Plan

- The building of structures e.g. (embankments), which restrict flows over historical flood plains and thereby create additional flood risks both upstream and downstream.
- Land management practises that increase blockages of hydraulic structures.

Standard Operating Procedure

ESF - I - Communication

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> ● Conduct coordination meetings with representatives of supporting agencies. ● Update telephone numbers of all agencies. ● Check and maintain communication facilities. ● Renew licenses of communication facilities. ● Allocate funds for communication services. ● Link EOCs and other control rooms with necessary communication devices. ● Organize a communication facility that can be transported to affected sites. ● Identify and rectify damaged communication facilities. ● Check the maintenance of equipment of private communication operators. ● Establish temporary communication facilities like HAM radio, mobiles, VHF, landline etc. on priority wherever required. ● Establish temporary communication facilities for public use. ● Coordinate with other ESFs the procedures for restoration of communication. 	<ul style="list-style-type: none"> ● Deploy representatives of Supporting Agencies in the EOC. ● Make test calls to agencies on hotlines and VHF. ● On receipt of emergency call, operationalize level of activation based on nature & severity of incident. ● Brief other ESF representatives and monitor activities. ● Provide regular updates & coordinate with support agency staff, other ESFs & higher authorities. ● Inform the military and paramilitary forces to get ready for emergency response. ● Dispatch rain forecast to control room. ● Port and Fishery alert fishermen not to venture sea and contact swimmers and divers for emergency response. ● If the rainfall is more than 10 mm in 15 minutes inform the concerned Assistant Commissioners to take rounds in vulnerable areas. ● Determine and restore damaged communication facilities ● Contact MTNL / BSNL to set up the alternative communication system. ● Establish SMS and email communication with citizens ● Update mumbai monsoon website. ● Maintain a log of actions taken, communication resource needs and capabilities. 	<ul style="list-style-type: none"> ● Conduct debriefing meetings with all agencies. ● Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 2 – Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none"> • Conduct a mock drill for the law & order situation during floods. • Train personnel for flood rescue • Keep rescue ropes and life jackets ready. • Arrange First Responder Training for Police personnel • Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication systems • Identify alternative routes for traffic in flood prone areas • Identify convenient parking lots and seek appropriate permission from the land owners. • Identify the web site on flood related incidents • Undertake any other activity considered necessary 	<ul style="list-style-type: none"> • On receipt of an emergency call, operationalize level activation based on nature and severity of incident • The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff. • Monitor weather information. • Issue alert warnings to coastal and low lying areas for likely evacuation. • Assess the available resources and determine the need for additional resources. • Ensure law and order situation in affected area • Coordination with rescue, relief and medical teams for times response. • Provide extra police personnel at traffic diversions. • Divert traffic to alternate roads as and when necessary. • Protect life and property, and keep close watch on anti-social elements • Provide information about traffic flow to the public through media, public address system, sign boards and display boards • Transport / Shift stranded or affected persons through Police and other vehicles • Organise towing of stranded vehicles obstructing traffic • Prevent theft at evacuated houses with the help of volunteers. • Maintain a log of reports / action taken, needs and capabilities • Undertake any other activity as per site condition 	<ul style="list-style-type: none"> • Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters. • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 3 - Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firemen in basic flood rescue and response. • Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner • Repair and maintain rescue boats and other ancillary equipment. • Conduct Training and Refresher Courses for Flood Rescue Teams • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for flood rescue. • Keep communication devices in a state of readiness. • Conduct mock drills, awareness programs etc. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident. • Determine needs and available resources • Dispense resources required based on need and augment men and machinery if necessary. • Locate the incident command post and staging areas appropriately • Direct operations from a safe distance and ensure ability to escape. • Ensure safety from electrical installations or power supply at the disaster site. • If required establish communication from the incident site with other tactical operators • Monitor activities and regularly update support agencies. • Organise rescue, evacuation and salvage operations. • Transport injured persons to hospitals. • Clear roads or pathways of uprooted trees. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 4 - Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firefighters in basic search & rescue operations. • Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner. • Repair and maintain rescue Equipment. • Conduct Training and Refresher Courses for Search & Rescue Teams. • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue. • Keep communication devices in a state of readiness. • Recce disaster prone areas along with other agencies. • Conduct mock drills, awareness programs etc. • Undertake any other activity required. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs. • Operationalize level of activation depending on the nature and severity of the incident. • Determine needs and available resources. • Locate incident command post and staging areas appropriately. • Direct operations from a safe distance, with capability of escape. • Augment men and machinery if necessary. • Establish communications from the incident site with other tactical operations, and EOC. • Monitor activities and update support agency staff. • Transport injured persons to hospitals. • Shift victims to temporary shelters as per requirement. • Clear roads or pathways of uprooted trees. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none"> • Prepare alternate transport arrangement plan in consultation with Supporting Agencies. • Appoint labour to remove accumulated silt to prevent waterlogging along the railway track. • Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai. • Provide and assign emergency transportation resources to the requesting organizations. • Instruct schools, colleges and other education institutes to assume responsibility for protection of students, staff, equipment and facilities as well as the safe transportation of students. • Update information prepared by Board of Education of available transportation and resources owned and maintained by them in an around Mumbai. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff. • Monitor activities and update support agency staff. • Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas. • Monitor flood situation on railway tracks and on roads by coordinating with MCGM Control Room. • Coordinate with MCGM Control Room for draining of flood waters from railway tracks. • Determine transportation needs and available resources. • Establish and maintain public transportation and available resources. • Disseminate updated information to passengers through Public Address System. • Organize transportation of sick or injured persons in need of medical attention. • Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities. 	<ul style="list-style-type: none"> • Prepare an After- Action Report to identify lessons learnt and improvements needed.

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Commission Central Control Room and Epidemic Control Unit. • Initiate Information, Education and Communication activities. • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. • Undertake vaccination and disinfection programmes • Assess and provide technical assistance on potable water, wastewater, solid waste disposal etc. • Conduct field investigations, collect and analyze relevant samples. • Assess the threat of vector-borne disease and provide technical assistance and consultation for prevention. • Provide vector control equipment and supplies • Ensure garbage removal machinery is in working condition. • Provide monsoon protective gear to staff. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation resources. • Validate requests from affected areas for public health and sanitation resources. • Assess the medical needs, take close health surveillance and keep medical teams ready. • Provide health care and sanitation services, set up portable, modular hospital units. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy paramedical teams for spraying of insecticides. • Compile information about incidence of diseases. • Collect water samples for evidence of contamination and take containment measures for water borne disease. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management, and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Deploy paramedical teams for fogging and vector control measures. • Compile information about incidence of diseases. • Compile information about injured & deaths. • Collect water samples periodically for evidence of contamination. • Prepare an After- Action Report to identify lessons learnt and improvements needed.

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community and their neighbours. • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

ESF - 8 - Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none"> • Update list of public information media (print, radio and TV). • Prepare the duty roster for deploying representative of Lead Agency at EOC • Disseminate information to the citizens about action taken for monsoon preparedness by MCGM through print and electronic media. 	<ul style="list-style-type: none"> • The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation. • The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff. • Disseminate information about flood affected areas and actions taken by government through media. • Disseminate evacuation information to the affected people through media. • Provide mass notifications to the populace and provide periodic media updates. • Issue messages for public safety and mutual cooperation. • Organize a press briefing in EOC as appropriate. • Maintain a log of actions taken, reports of resources needs and capabilities. 	<ul style="list-style-type: none"> • Continue public information activities and update citizen on recovery efforts. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 9 – Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Shift students to shelter schools or let them off depending upon the intensity of rain. • Instruct school in low-lying area school to contact local fire station/ward control rooms to evacuate students to shelter schools. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Maintain liaison with other ESFs. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Ensure proper distribution of relief to all, ladies like family heads, widows, old and disable persons should be given priority. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 11 – Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none"> • Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts. • Monitor energy system likely to be damaged during a disaster and in need of repair work. • Provide separate lines and separate sources of power for critical substations. • Collect, assess, and provide information on energy supply and demand. • Identify resources needed to restore energy systems. • Train staff to attend to emergencies. • Ensure sufficient stocks of essential spares such as cables. • Raise level of transformers and substation equipment above flood level. • Conduct awareness programmes for consumers. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff. • Update Support Agency staff and monitor activities. • Determine needs and available communication means. • Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts. • Collect current information on damage and area affected. • Switch off power supply if necessary. • Officers at site to coordinate with fault engineers and mains engineers. • Maintain a log of actions taken, reports of communication resource needs and capabilities 	<ul style="list-style-type: none"> • Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system • Assess the requirements of restoration • Coordinate with supporting agencies for temporary arrangement of fuel, gas and power • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 12 - Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none"> • Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures. • Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency. • Commission SWD control room. • Appoint additional contractual labour as per requirement. • Widen, deepen and remove silt from storm water drains, outfalls, rivers etc. • Deposit money with railway authorities for de-silting work • Inspect and monitor de-silting work carried out by railway and SWD contractors. • Pre deploy pump operating agency's representative in the EOC. • Install de-watering pumps at chronic flood-prone location. • Ascertain flood gates are in working condition, man with trained staff and provide tide table to them. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The Lead Agency representative will receive and give briefings and updates to the EOC staff • Update support agency staff and monitor activities • Determine needs and available resources. • Start responding to utilities shortages and disruptions and take care of public safety and health. • Monitor flood gates operation regularly. • Coordinate with pump operators at flooding spots by deploying their representatives in the EOC • Open sewer manholes to drain storm water and barricade them. 	<ul style="list-style-type: none"> • Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services. • Discontinue pump operation services. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 13 – Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritize equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Tag buildings and structures based on damage and communicate information to EOC and supporting agencies to secure them. • Issue alert warning to residents of dilapidated buildings / landslide prone areas. Initiate process to demolish unsafe buildings. • Coordinate training of engineers on damage assessment and restoration. • Reinstate potholes and paver blocks. • Suspend major infrastructure work by 31st May. • Desilt culverts and drains wherever required. • Maintain flyovers, subways, bridges and allied structures. • Prune branches of unbalanced and newly planted trees. • Paint tree trunks to protect them from insects. • Keep a stock of saplings for planting during monsoon. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility in affected area. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Cut fallen trees and transport to appropriate location. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Reinstatement of potholes and paver blocks. • Repair tree guards • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos & Don'ts

Before a Flood

To prepare for a flood, you should:

- Avoid building in a flood prone area unless you elevate and reinforce your home.
- Elevate the furnace, water heater, and electric panel if susceptible to flooding.
- Install "check valves" in sewer traps to prevent floodwater from backing up into the drains of your home.
- Contact community officials to find out if they are planning to construct barriers (levees, beams, floodwalls) to stop floodwater from entering the homes in your area.
- Seal the walls in your basement with waterproofing compounds to avoid seepage.

During a Flood

If a flood is likely in your area, you should:

- Listen to the radio or television for information.
- Be aware that flash flooding can occur. If there is any possibility of a flash flood, move immediately to higher ground. Do not wait for instructions to move.
- Be aware of streams, drainage channels, canyons, and other areas known to flood suddenly. Flash floods can occur in these areas with or without such typical warnings as rain clouds or heavy rain.

If you must prepare to evacuate, you should do the following:

- Secure your home. If you have time, bring in outdoor furniture. Move essential items to an upper floor.
- Turn off utilities at the main switches or valves if instructed to do so.
- Disconnect electrical appliances. Do not touch electrical equipment if you are wet or standing in water.

If you have to leave your home, remember these evacuation tips:

- Do not walk through moving water. Six inches of moving water can make you fall. If you have to walk in water, walk where the water is not moving.
- Use a stick to check the firmness of the ground in front of you.
- Do not drive into flooded areas. If floodwaters rise around your car, abandon the car and move to higher ground if you can do so safely. You and the vehicle can be quickly swept away.

Driving Flood Facts

- The following are important points to remember when driving in flood conditions:
- Six inches of water will reach the bottom of most passenger cars causing loss of control and possible stalling.
- A foot of water will float many vehicles.
- Two feet of rushing water can carry away most vehicles including sport utility vehicles (SUV's) and pick-ups.

After a Flood

The following are guidelines for the period following a flood:

- Listen for news reports to learn whether the community's water supply is safe to drink.
- Avoid floodwaters; water may be contaminated by oil, gasoline, or raw sewage. Water may also be electrically charged from underground or downed power lines.
- Avoid moving water.
- Be aware of areas where floodwaters have receded. Roads may have weakened and could collapse under the weight of a vehicle.
- Stay away from downed power lines, and report them to the power company.
- Return home only when authorities indicate it is safe.
- Stay out of any building if it is surrounded by floodwaters.
- Use extreme caution when entering buildings; there may be hidden damage, particularly in foundations.
- Service damaged septic tanks, cesspools, pits, and leaching systems as soon as possible. Damaged sewage systems are serious health hazards.
- Clean and disinfect everything that got wet. Mud left from floodwater can contain sewage and chemicals.

Cyclone

What is Cyclone?

A tropical cyclone can be regarded as a large and tall rotating cylinder of clouds containing enormous amount of water and packing heavy winds. It is like a giant heat engine fueled by the release of latent heat due to condensation of huge quantity of water vapour drawn from the warm sea surface waters. The release latent heat warms up air, making the air lighter in that column which rise up creating a drop in pressure near the sea surface. This gives rise to rapid inflow of air making more warm and moist air to rise and consequently more release of latent heat over the same place. Thus air rushes in from all sides and rise vertically up creating a rotating vortex. If the process continue for a longer time, the pressure fall in that place could be very much below normal resulting in further growth of the tropical cyclone and strengthening the winds. To get this engine started, a large quantity of warm and moist air is required. Steady supply is needed to keep the process going. Scientific studies indicate that this is possible under certain conditions. These conditions are necessary, though not necessarily sufficient, for cyclone formation. These conditions are:

- i) sufficiently large areas of ocean with sea-surface temperature around 26-27 degree Celsius
- ii) depth of warm water, at least 50 to 60 meters so that sufficient supply of warm and moist air is ensured
- iii) initial rotation trigger should be provided by some favourable meteorological condition

Cyclones continue to gather strength while on warm sweater increasing their speed of movement as well as the wind speed in the rotational field. They normally decay rapidly into a depression after entering the land, and at times may continue moving as a depression over the land for a few days giving widespread rainfall but much less wind. Cyclones also die over the ocean by entering a region of cold water or unfavourable meteorological environment even when it is over the ocean.

Cyclone Structure:

A cyclone start as a low pressure area and passes through different stages of its development and intensification. The classification of these stages is as below

Type of disturbance	Associated maximum sustained wind (MSW)
1. Low Pressure Area	Not exceeding 17 knots (>31 kmph)
2. Depression	17 to 27 knots (31-49 kmph)
3. Deep Depression	28 to 33 knots (50-61 kmph)
4. Cyclonic Storm	34 to 47 knots (62-88 kmph)
5. Severe Cyclonic Storm	48 to 63 knots (118-221 kmph)

6. Very Severe Cyclonic Storm	64 to 119 knots (118-221 kmph)
7. Super Cyclonic Storm	120 knots and above (>222 kmph)

Hazards due to Cyclone

Severe tropical cyclones are responsible for large casualties and considerable damage to life, property and agricultural crop. The destruction is mostly confined to the coastal districts; the maximum destruction being confined within about 100 km from the centre of the cyclone and on the right side of the storm track. **Principal dangers from a cyclone are 1) very strong winds 2) torrential rains and iii) high storm tides known as surges.**

Most of the casualties are caused by coastal inundation by storm tides. Heavy rainfall and floods come in next in order of devastation potential. They are often responsible for much loss of life and damage to property. Death and destruction purely due to winds are relatively less. The collapse of buildings, falling trees, flying debris, electrocution, aircraft accidents and diseases from contaminated food and water in the post cyclone period contribute considerably to the loss of life and destruction of property.

How Mumbai is vulnerable to Cyclone:

Mumbai used to be congregation of seven tiny islands. The city is surrounded on three sides by water; the Arabian Sea and Harbour Bay to the west and Thane creek to the east and it is just 10-15 meters above sea level. Mumbai is considered one of the largest megacities in the world and one of the world's top 10 centers of commerce. In terms of population, Mumbai is currently ranked fourth in the world after Tokyo, Mexico city, and New York. It is the capital of the leading industrial, commercial and financial hub of India. Being a Coastal city, Mumbai is prone to cyclones and heavy winds.

Standard Operating Procedure

ESF - I - Communication

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> ● Conduct coordination meetings with representatives of supporting agencies. ● Update telephone numbers of all agencies. ● Check and maintain communication facilities. ● Renew licenses of communication facilities. ● Allocate funds for communication services. ● Link EOCs and other control rooms with necessary communication devices. ● Organize a communication facility that can be transported to affected sites. ● Identify and rectify damaged communication facilities. ● Check the maintenance of equipment of private communication operators. ● Establish temporary communication facilities like HAM radio, mobiles, VHF, landline etc. on priority wherever required. ● Establish temporary communication facilities for public use. ● Coordinate with other ESFs the procedures for restoration of communication. 	<ul style="list-style-type: none"> ● Deploy representatives of Supporting Agencies in the EOC. ● Make test calls to agencies on hotlines and VHF. ● On receipt of emergency call, operationalize level of activation based on nature & severity of incident. ● Brief other ESF representatives and monitor activities. ● Provide regular updates & coordinate with support agency staff, other ESFs & higher authorities. ● Dispatch IMD's forecast to control room. ● Port and Fishery alert fishermen not to venture sea and contact swimmers and divers for emergency response. ● Inform the military and paramilitary forces to get ready for emergency response. ● Advise to Railway, Airport, transport, educational institutions and others to take necessary actions. ● Determine and restore damaged communication facilities ● Contact MTNL / BSNL to set up the alternative communication system. ● Establish SMS and email communication with citizens ● Update mumbai monsoon website. ● Maintain a log of actions taken, communication resource needs and capabilities. 	<ul style="list-style-type: none"> ● Conduct debriefing meetings with all agencies. ● Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 2 – Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none"> • Conduct a mock drill for the law & order situation during floods. • Train personnel for rescue Operations • Keep rescue ropes and life jackets ready. • Arrange First Responder Training for Police personnel • Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication systems • Identify alternative routes for traffic in affected areas • Identify convenient parking lots and seek appropriate permission from the land owners. • Identify the web site on cyclone related incidents • Undertake any other activity considered necessary 	<ul style="list-style-type: none"> • On receipt of an emergency call, operationalize level activation based on nature and severity of incident • The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff. • Monitor weather information. • Issue alert warnings to coastal and low lying areas for likely evacuation. • Assess the available resources and determine the need for additional resources. • Ensure law and order situation in affected area • Coordination with rescue, relief and medical teams for times response. • Provide extra police personnel at traffic diversions. • Divert traffic to alternate roads as and when necessary. • Protect life and property, and keep close watch on anti-social elements • Provide information about traffic flow to the public through media, public address system, sign boards and display boards • Transport / Shift stranded or affected persons through Police and other vehicles • Organise towing of stranded vehicles obstructing traffic • Prevent theft at evacuated houses with the help of volunteers. • Maintain a log of reports / action taken, needs and capabilities • Undertake any other activity as per site condition 	<ul style="list-style-type: none"> • Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters. • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 3 - Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firemen in basic rescue and response. • Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner • Repair and maintain rescue boats and other ancillary equipment. • Conduct Training and Refresher Courses for Flood Rescue Teams • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for rescue operation. • Keep communication devices in a state of readiness. • Conduct mock drills, awareness programs etc. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident. • Determine needs and available resources • Dispense resources required based on need and augment men and machinery if necessary. • Locate the incident command post and staging areas appropriately • Direct operations from a safe distance and ensure ability to escape. • Ensure safety from electrical installations or power supply at the disaster site. • If required establish communication from the incident site with other tactical operators • Monitor activities and regularly update support agencies. • Organise rescue, evacuation and salvage operations. • Transport injured persons to hospitals. • Clear roads or pathways of uprooted trees. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 4 - Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firefighters in basic search & rescue operations. • Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner. • Repair and maintain rescue Equipment. • Conduct Training and Refresher Courses for Search & Rescue Teams. • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue. • Keep communication devices in a state of readiness. • Recce disaster prone areas along with other agencies. • Conduct mock drills, awareness programs etc. • Undertake any other activity required. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs. • Operationalize level of activation depending on the nature and severity of the incident. • Determine needs and available resources. • Locate incident command post and staging areas appropriately. • Direct operations from a safe distance, with capability of escape. • Augment men and machinery if necessary. • Establish communications from the incident site with other tactical operations, and EOC. • Monitor activities and update support agency staff. • Transport injured persons to hospitals. • Shift victims to temporary shelters as per requirement. • Clear roads or pathways of uprooted trees. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none"> • Prepare alternate transport arrangement plan in consultation with Supporting Agencies. • Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai. • Provide and assign emergency transportation resources to the requesting organizations. • Instruct schools, colleges and other education institutes to assume responsibility for protection of students, staff, equipment and facilities as well as the safe transportation of students. • Update information prepared by Board of Education of available transportation and resources owned and maintained by them in an around Mumbai. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff. • Monitor activities and update support agency staff. • Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas. • Monitor situation by coordinating with MCGM Control Room. • Determine transportation needs and available resources. • Establish and maintain public transportation and available resources. • Disseminate updated information to passengers through Public Address System. • Organize transportation of sick or injured persons in need of medical attention. • Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities. 	<ul style="list-style-type: none"> • Prepare an After- Action Report to identify lessons learnt and improvements needed.

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Commission Central Control Room and Epidemic Control Unit. • Initiate Information, Education and Communication activities. • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. • Undertake vaccination and disinfection programmes • Assess and provide technical assistance on potable water, wastewater, solid waste disposal etc. • Conduct field investigations, collect and analyze relevant samples. • Ensure garbage removal machinery is in working condition. • Provide monsoon protective gear to staff. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation resources. • Validate requests from affected areas for public health and sanitation resources. • Assess the medical needs, take close health surveillance and keep medical teams ready. • Provide health care and sanitation services, set up portable, modular hospital units. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy paramedical teams for spraying of insecticides. • Compile information about incidence of diseases. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management, and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Deploy paramedical teams for fogging and vector control measures. • Compile information about incidence of diseases. • Compile information about injured & deaths. • Collect water samples periodically for evidence of contamination. • Prepare an After- Action Report to identify lessons learnt and improvements needed.

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community and their neighbours. • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

ESF - 8 - Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none"> • Update list of public information media (print, radio and TV). • Prepare the duty roster for deploying representative of Lead Agency at EOC • Disseminate information to the citizens about action taken for monsoon preparedness by MCGM through print and electronic media. 	<ul style="list-style-type: none"> • The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation. • The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff. • Disseminate information about affected areas and actions taken by government through media. • Disseminate evacuation information to the affected people through media. • Provide mass notifications to the populace and provide periodic media updates. • Issue messages for public safety and mutual cooperation. • Organize a press briefing in EOC as appropriate. • Maintain a log of actions taken, reports of resources needs and capabilities. 	<ul style="list-style-type: none"> • Continue public information activities and update citizen on recovery efforts. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 9 – Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Instruct school in low-lying area school to contact local fire station/ward control rooms to evacuate students to shelter schools. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Maintain liaison with other ESFs. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Ensure proper distribution of relief to all, ladies like family heads, widows, old and disable persons should be given priority. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 11 - Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none"> • Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts. • Monitor energy system likely to be damaged during a disaster and in need of repair work. • Provide separate lines and separate sources of power for critical substations. • Collect, assess, and provide information on energy supply and demand. • Identify resources needed to restore energy systems. • Train staff to attend to emergencies. • Ensure sufficient stocks of essential spares such as cables. • Conduct awareness programmes for consumers. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff. • Update Support Agency staff and monitor activities. • Determine needs and available communication means. • Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts. • Collect current information on damage and area affected. • Switch off power supply if necessary. • Officers at site to coordinate with fault engineers and mains engineers. • Maintain a log of actions taken, reports of communication resource needs and capabilities 	<ul style="list-style-type: none"> • Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system • Assess the requirements of restoration • Coordinate with supporting agencies for temporary arrangement of fuel, gas and power • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 12 - Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none"> • Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures. • Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency. • Commission SWD control room. • Appoint additional contractual labour as per requirement. • Widen, deepen and remove silt from storm water drains, outfalls, rivers etc. • Ascertain flood gates are in working condition, man with trained staff and provide tide table to them. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The Lead Agency representative will receive and give briefings and updates to the EOC staff • Update support agency staff and monitor activities • Determine needs and available resources. • Start responding to utilities shortages and disruptions and take care of public safety and health. • Monitor flood gates operation regularly. • Open sewer manholes to drain storm water and barricade them. 	<ul style="list-style-type: none"> • Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 13 – Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritize equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Tag buildings and structures based on damage and communicate information to EOC and supporting agencies to secure them. • Issue alert warning to residents of dilapidated buildings / landslide prone areas. Initiate process to demolish unsafe buildings. • Coordinate training of engineers on damage assessment and restoration. • Reinstate potholes and paver blocks. • Maintain flyovers, subways, bridges and allied structures. • Prune branches of unbalanced and newly planted trees. • Paint tree trunks to protect them from insects. • Keep a stock of saplings for planting during monsoon. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility in affected area. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Cut fallen trees and transport to appropriate location. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Reinstatement of potholes and paver blocks. • Repair tree guards • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritize equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination activities; • Seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Make emergency plan to control and clean up hazardous materials. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Disseminate safety information through media • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos & Don'ts

- Check houses, secure loose tiles by cementing wherever necessary, repair doors and windows.
- Check the area around the house. Remove dead or dying trees, anchor removable objects like lumber piles, loose bricks, garbage cans, sign-boards, loose zinc sheets etc.
- Keep some wooden boards ready so that glass windows can be boarded.
- If you do not have wooden boards handy, paste paper strips on glasses to prevent splinters flying into the house.
- Keep a hurricane Lantern filled with kerosene, flash light and enough dry cells and keep them handy.
- Promptly demolish condemned buildings.
- Those who have radio sets should ensure that the radio is fully serviceable. In the case of transistors an extra set of batteries should be kept handy.
- Keep your radio on and listen to latest weather warnings and advisories from the nearest AIR station. Pass the information to others.
- Pass only the official information you have got from the radio to others.
- Get away from low lying beaches or other locations which may be swept by high tides or storm waves. Leave sufficiently early before your way to high ground gets flooded. Do not delay and run the risk of being marooned.
- If your house is out of danger from high tides and flooding from the river, and it is well built, it is then probably the best place. However, please act promptly if asked to evacuate.
- Be alert for high water in areas where streams of rivers may flood due to heavy rains.
- Get extra food, especially things which can be eaten without cooking or with very little preparation. Store extra drinking water in suitably covered vessel.
- If you are in one of the evacuation areas, move your valuable articles to upper floors to minimise flood damage
- Check on everything that might blow away or be torn loose. Kerosene tins, cans, agricultural implements, garden tools, road signs and other objects become weapon of destruction in strong winds. Remove them and store them in a covered room.
- Be sure that a window or door can be opened on the lee side of the house i.e. the side opposite the one facing the wind.
- Make provisions for children and adults requiring special diets.
- If the centre of 'eye' of the storm passes directly over your place, there will be a lull in the wind and rain, lasting for half an hour or more. During this period stay in safe place. Make emergency repairs during the lull period if necessary, but remember that strong wind will return suddenly from the opposite direction, frequently with even greater violence.
- Be calm. Your ability to meet emergency will inspire and help others.

District Disaster Management Plan

- You should remain in shelters until informed by those in charge that you may return home.
- Any loose and dangling wire from the lamp post should be strictly avoided.
- People should keep away from disaster areas unless you are required to assist.
- Anti-social elements should be prevented from doing mischief and reported to the police.
- Cars, buses, lorries and carts should be driven carefully.
- The houses and dwellings should be cleared of debris
- The losses should be reported to the appropriate authorities.
- Relatives should be promptly informed about the safety of persons in the disaster area.

Don'ts

- Avoid being misled by rumours.
- Don't leave shelters until informed by the rescue personals.
- Don't leave the safer place during lull, however minor repairs can be carried out.
- Don't touch the loose and dangling wire from lamp post, it may have electric current.

Tsunami

What is Tsunami?

Tsunami is a Japanese word with the English translation, "harbor wave." Represented by two characters, the top character, "tsu," means harbor, while the bottom character, "nami," means "wave." In the past, tsunamis were sometimes referred to as "tidal waves" by the general public and as "seismic sea waves" by the scientific community. The term "tidal wave" is a misnomer; although a tsunami's impact upon a coastline is dependent upon the tidal level at the time a tsunami strikes, tsunamis are unrelated to the tides. Tides result from the imbalanced, extra-terrestrial, gravitational influences of the moon, sun, and planets. The term "seismic sea wave" is also misleading. "Seismic" implies an earthquake-related generation mechanism, but a tsunami can also be caused by a non-seismic event, such as a landslide or meteorite impact.

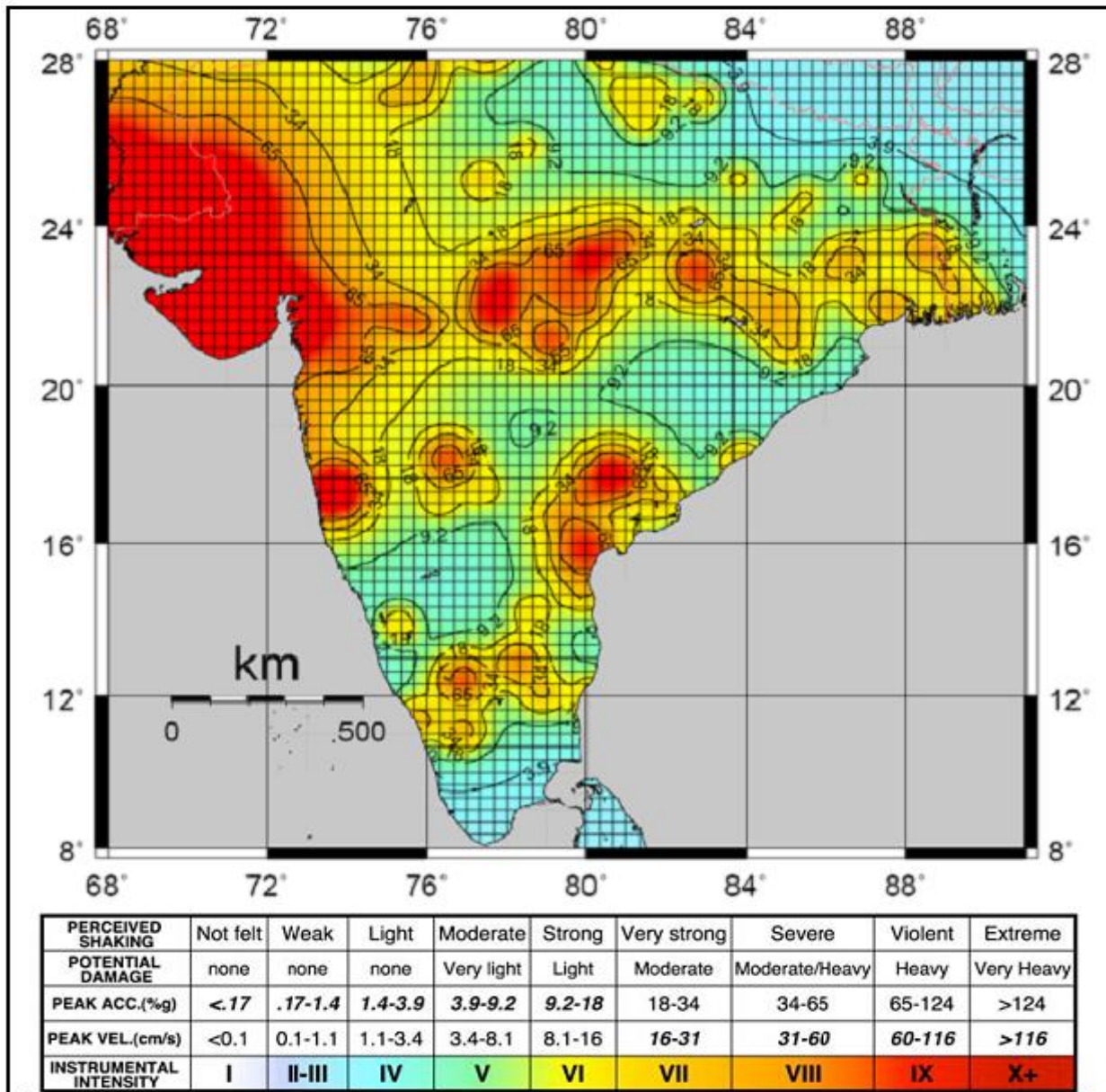
Tsunamis are unlike wind-generated waves, which many of us may have observed on a local lake or at a coastal beach, in that they are characterised as shallow-water waves, with long periods and wave lengths. The wind-generated swell one sees at a California beach, for example, spawned by a storm out in the Pacific and rhythmically rolling in, one wave after another, might have a period of about 10 seconds and a wave length of 150 m. A tsunami, on the other hand, can have a wavelength in excess of 100 km and period on the order of one hour.

As a result of their long wave lengths, tsunamis behave as shallow-water waves. A wave becomes a shallow-water wave when the ratio between the water depth and its wave length gets very small. Shallow-water waves move at a speed that is equal to the square root of the product of the acceleration of gravity (9.8 m/s/s) and the water depth.

Tsunamis can be generated when the sea floor abruptly deforms and vertically displaces the overlying water. Tectonic earthquakes are a particular kind of earthquake that are associated with the earth's crustal deformation; when these earthquakes occur beneath the sea, the water above the deformed area is displaced from its equilibrium position. Waves are formed as the displaced water mass, which acts under the influence of gravity, attempts to regain its equilibrium. When large areas of the sea floor elevate or subside, a tsunami can be created. Large vertical movements of the earth's crust can occur at plate boundaries. Plates interact along these boundaries called faults. Around the margins of the Pacific Ocean, for example, denser oceanic plates slip under continental plates in a process known as subduction. Subduction earthquakes are particularly effective in generating tsunamis.

A tsunami can be generated by any disturbance that displaces a large water mass from its equilibrium position. In the case of earthquake-generated tsunamis, the water column is disturbed by the uplift or subsidence of the sea floor. Submarine landslides, which often accompany large earthquakes, as well as collapses of volcanic edifices, can also disturb the overlying water column as sediment and rock slump downslope and are redistributed across the sea floor. Similarly, a violent submarine volcanic eruption can create an impulsive force that uplifts the water column and generates a tsunami. Conversely, super marine landslides and cosmic-body impacts disturb the water from above, as momentum from falling debris is transferred to the water into which the debris falls. Generally speaking, tsunamis generated from these mechanisms, unlike the Pacific-wide tsunamis caused by some earthquakes, dissipate quickly and rarely affect coastlines distant from the source area. What happens to a tsunami as it approaches land?

As a tsunami leaves the deep water of the open ocean and travels into the shallower water near the coast, it transforms. If you read the "How do tsunamis differ from other water waves?" section, you discovered that a tsunami travels at a speed that is related to the water depth hence, as the water depth decreases, the tsunami slows. The tsunami's energy flux, which is dependent on both its wave speed and wave height, remains nearly constant. Consequently, as the tsunami's speed diminishes as it travels into shallower water, its height grows. Because of this shoaling effect, a tsunami, imperceptible at sea, may grow to be several meters or more in height near the coast. When it finally reaches the coast, a tsunami may appear as a rapidly rising or falling tide, a series of breaking waves, or even a bore.



How vulnerable is Mumbai to Earthquake?

Mumbai falls in the seismic zone III which is Moderate Damage Risk Zone. As per 2001 census, Mumbai has over 276,000 dwellings (residential, industrial and commercial) of which only 9% are made of reinforced concrete, 31% are engineered constructions and around 60% are non-engineered constructions, which correspond with the large presence of slum settlements. The major risk category is the engineered constructions, some of which are 'cessed' buildings. These buildings, on account of rent control, have suffered from lack of maintenance

and apathy from landlords and are now in dilapidated conditions. Such constructions are more vulnerable to extreme weather events as well. Many slum settlements also face the risk of landslides usually occurring during heavy rains with gusty winds. These are generally located on the hill slopes, bottom of hills or near abandoned quarries. DMAP identifies 117 such settlements which are extremely vulnerable to landslides, loss of life and damage to property in case of heavy precipitation.

Mumbai the metro is developing at a fast pace especially in the housing sector. The high-rise buildings attempting to tear across the sky are a proof of this. Sometimes one wonders, 'What will happen if there is an earthquake?' The builders claim their constructions are earthquake resistant. Are the complexes being built structurally safe against earthquake? How vulnerable is Mumbai in the event of an earthquake are some of the questions that often dog the mind.

Mumbai is located in the Peninsular India and compared to the Himalayan Plate boundary region is considered less hazardous as far as earthquakes are concerned. Yet the disastrous earthquakes of peninsular India at Koyna (1967, Mw = 6.3), Killari (1993, Mw = 6.1), Jabalpur (1999, Mw = 5.8) and Bhuj (2001, Mw = 7.7) disprove this myth. The intra-plate earthquakes unlike the plate boundary shakings are less frequent but kill more people.

The seismologists probing the causes of earthquakes in the past tell that faults that are active are one of the perpetrators of earthquakes. These make an area seismically active. Mumbai, for example lies in the Panvel zone, which is seismically active. This zone extends in north-northwest direction along the west coast. Deccan Traps, the volcanic rocks those appear very stable on the surface have a system of north-northwest running faults underneath, with some of the faults being quite large.

After receiving Tsunami Warning:

Standard Operating Procedure

ESF – I – Communication

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • To form the Incident Management Team • To form the Damage Assessment Team • To organize orientation and training of responders including community in disaster management • To coordinate with relevant departments regarding enforcement of Building Codes, Fire Safety Rules and Certification of Building etc. • To follow-up with concerned agencies about the arrangements for putting up stop gap bridges on emergency basis & formation and training of the team for the erection of temporary bridges. • To follow-up with MTNL about the arrangements for the restoration of communication system & act accordingly • To follow-up with Health Department about facilities available, both in private & public sector, for health services in emergencies in vulnerable areas and act accordingly • To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly • To follow-up with Energy Department about arrangements for the restoration of power supply and providing for supply of power through alternative sources of energy & act accordingly • To follow-up with Ward EOCs about the implementation of mitigation, preparedness and response measures and present status of the same & act accordingly 	<ul style="list-style-type: none"> • To coordinate the disaster response operation • Activate Emergency Support Functions as per requirement • To deploy SAR Teams to the incident site • If required dispatch NDRF to the incident site • Inform the military and paramilitary forces to get ready for emergency response • To alert higher authorities • Activate HAM Radio Operators • To organize the restoration of communication, transportation • Coordinate for relief distribution • To hold meeting with donor agencies • To organize disposal of dead bodies both human and livestock 	<ul style="list-style-type: none"> • To select the sight for resettlement of victims • To get the resettlement plan prepared • To deactivate the response operation but continue with relief and other support service operations. • Maintain records containing all relevant information relating to action points and contact points • Conduct debriefing meetings with all agencies • Prepare an After Action Report to identify lessons learnt and improvements needed

District Disaster Management Plan

<ul style="list-style-type: none">• To organize the orientation and training undertake earthquake resistance constructions and retrofitting on a large scale• To follow-up with Fire Department about the reach and capacity of their fire-extinguishers, fire safety policy and plan to increase their spread and improve their capacity and policy to train security guards, habitants of high rise building, civil defence, Home Guards personnel and volunteers in fire safety measures & act accordingly• To follow-up with Armed Forces about the emergency support services available with them and keep in regular touch with them.		
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ESF - 2 - Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none"> • Conduct a mock drill for the law & order situation during Aircraft emergency • Arrange First Responder Training for Police personnel • Keep rescue ropes & other lifesaving material ready • Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system • Identify alternative routes for traffic • Undertake any other activity considered necessary 	<ul style="list-style-type: none"> • On receipt of an emergency call, operationalize level activation based on nature and severity of incident • The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff. • Assess the available resources and determine the need for additional resources • Ensure law and order situation in affected area • Provide extra police personnel at traffic diversions • Protect life and property, control traffic and keep close watch on anti-social elements • Provide information about traffic flow to the public through media, public address system, sign boards and display boards • Transport / Shift stranded or affected persons through Police and other vehicles • Organise towing of stranded vehicles if any with the help of volunteers • Maintain a log of reports / action taken, needs and capabilities • Undertake any other activity as per site condition 	<ul style="list-style-type: none"> • Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters. • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 3 - Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firemen • Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner • Repair and maintain ancillary equipment • Conduct Training and Refresher Courses for Rescue Teams • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery • Keep communication devices in a state of readiness • Conduct mock drills, awareness programs etc. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident. • Determine needs and available resources • Dispense resources required based on need and augment men and machinery if necessary. • Locate the incident command post and staging areas appropriately • Direct operations from a safe distance and ensure ability to escape. • Ensure safety from electrical installations or power supply at the disaster site. • If required establish communication from the incident site with other tactical operators • Monitor activities and regularly update support agencies • Organise rescue, evacuation and salvage operations. • Transport injured persons to hospitals. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 4 - Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firefighters in basic search & rescue operations. • Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner. • Repair and maintain rescue Equipment • Conduct Training and Refresher Courses for Search & Rescue Teams. • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue. • Keep communication devices in a state of readiness. • Recce disaster prone areas along with other agencies. • Conduct mock drills, awareness programs etc. • Undertake any other activity required. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs. • Operationalize level of activation depending on the nature and severity of the incident • Determine needs and available resources. • Locate incident command post and staging areas appropriately • Direct operations from a safe distance, with capability of escape. • Augment men and machinery if necessary • Establish communications from the incident site with other tactical operations, and EOC • Monitor activities and update support agency staff. • Transport injured persons to hospitals. • Shift victims to temporary shelters as per requirement. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none"> • If required prepare alternate transport arrangement plan in consultation with Supporting Agencies. • Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai. • Provide and assign emergency transportation resources to the requesting organizations. • Update information of available transportation and resources owned in and around Mumbai. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff. • Monitor activities and update support agency staff. • Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas. • Determine transportation needs and available resources. • Establish and maintain public transportation and resources. • Disseminate updated information to passengers through Public Address System. • Organize transportation of sick or injured persons in need of medical attention. • Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities. 	<ul style="list-style-type: none"> • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • To follow-up with Road & Building Construction Department about the availability of heavy duty cutting, debris clearing machines, their specifications, placement, storage and their operators & upkeep of the same for ready use. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

ESF - 8 - Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none"> • Update list of public information media (print, radio and TV). • Participate in Mock Drills, Table Top exercises 	<ul style="list-style-type: none"> • The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation. • The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff. • Disseminate information about earthquake affected areas and actions taken by government through media • Disseminate evacuation information to the affected people through media. • Provide mass notifications to the populace and provide periodic media updates. • Issue messages for public safety and mutual cooperation. • Organize a press briefing in EOC as appropriate. • Maintain a log of actions taken, reports of resources needs and capabilities. 	<ul style="list-style-type: none"> • Continue public information activities and update citizen on recovery efforts. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 9 - Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 11 - Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none"> • Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts. • Monitor energy system likely to be damaged during a disaster and in need of repair work. • Provide separate lines and separate sources of power for critical substations. • Collect, assess, and provide information on energy supply and demand. • Identify resources needed to restore energy systems. • Train staff to attend to emergencies. • Ensure sufficient stocks of essential spares such as cables. • Conduct awareness programmes for consumers. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff. • Update Support Agency staff and monitor activities. • Determine needs and available communication means. • Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts. • Collect current information on damage and area affected. • Switch off power supply if necessary. • Officers at site to coordinate with fault engineers and mains engineers. • Maintain a log of actions taken, reports of communication resource needs and capabilities 	<ul style="list-style-type: none"> • Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system • Assess the requirements of restoration • Coordinate with supporting agencies for temporary arrangement of fuel, gas and power • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 12 - Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none"> • Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures. • Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency. • Appoint additional contractual labour as per requirement. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The Lead Agency representative will receive and give briefings and updates to the EOC staff • Update support agency staff and monitor activities • Determine needs and available resources. • Start responding to utilities shortages and disruptions and take care of public safety and health 	<ul style="list-style-type: none"> • Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 13 - Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritize equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination and decontamination activities; • Seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Provide area security and prohibit unauthorized personnel from area with assistance from ESF Public Safety and Law & Order. • Determine with the help of appropriate agencies guidelines for re-entry of emergency personnel & residents. • Make emergency plan to control and clean up hazardous materials. • Conclude clean-up operations when the area is declared safe by responsible personnel. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Disseminate safety information through media • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos and Don'ts

- You should find out if your home, school, workplace, or other frequently visited locations are in tsunami hazard areas along seashore.
- Know the height of your street above sea level and the distance of your street from the coast or other high-risk waters. (Local administration may put sign boards).
- Plan evacuation routes from your home, school, workplace, or any other place you could be where tsunamis present a risk.
- If your children's school is in an identified inundation zone, find out what the school evacuation plan is.
- Practice your evacuation routes.
- Use a Weather Radio or stay tuned to a local radio or television station to keep informed of local watches and warnings.
- Talk to your insurance agent. Homeowners' policies may not cover flooding from a tsunami. Ask the Insurance Agent about the benefits from Multi-Hazard Insurance Schemes.
- Discuss tsunamis with your family. Everyone should know what to do in a tsunami situation. Discussing tsunamis ahead of time will help reduce fear and save precious time in an emergency. Review flood safety and preparedness measures with your family.

If you are in an area at risk from tsunamis

- You should find out if your home, school, workplace, or other frequently visited locations are in tsunami hazard areas.
- Know the height of your street above sea level and the distance of your street from the coast or other high-risk waters. (Local administration may put sign boards). Also find out the height above sea level and the distance from the coast of outbuildings that house animals, as well as pastures or corrals.
- Plan evacuation routes from your home, school, workplace, or any other place you could be where tsunamis present a risk. If possible, pick areas (30 meters) above sea level or go as far as 3 kilometers inland, away from the coastline. If you cannot get this high or far, go as high or far as you can. Every meter inland or upward may make a difference. You should be able to reach your safe location on foot within 15 minutes. After a disaster, roads may become blocked or unusable. Be prepared to evacuate by foot if necessary. Footpaths normally lead uphill and inland, while many roads parallel coastlines. Follow posted tsunami evacuation routes; these will lead to safety. Local emergency management officials can advise you on the best route to safety and likely shelter locations.
- If your children's school is in an identified inundation zone, find out what the school evacuation plan is. Find out if the plan requires you to pick your children up from school or from another location. Telephone lines during a tsunami watch or warning may be overloaded and routes to and from schools may be jammed.
- Practice your evacuation routes. Familiarity may save your life. Be able to follow your escape route at night and during inclement weather. Practicing your plan makes the appropriate response more of a reaction, requiring less thinking during an actual emergency.
- Use a Weather Radio or stay tuned to a local radio or television station to keep informed of local watches and warnings.
- Talk to your insurance agent. Homeowners' policies may not cover flooding from a tsunami. Ask the Insurance Agent about the benefits from Multi-Hazard Insurance Schemes.
- Discuss tsunamis with your family. Everyone should know what to do in a tsunami situation. Discussing tsunamis ahead of time will help reduce fear and save precious time in an emergency. Review flood safety and preparedness measures with your family.

If you are visiting an area at risk from tsunamis

- Check with the hotel or campground operators for tsunami evacuation information and find out what the warning system is for tsunamis. It is important to know designated escape routes before a warning is issued.
- One of the early warning signals of a tsunami is that the sea water recedes several metres, exposing fish on shallow waters or on the beaches. If you see the sea water receding, you must immediately leave the beach and go to higher ground far away from the beach.
- **Protect Your Property**
- You should avoid building or living in buildings within 200 meters of the high tide coastline.
- These areas are more likely to experience damage from tsunamis, strong winds, or coastal storms.
- Make a list of items to bring inside in the event of a tsunami.
- A list will help you remember anything that can be swept away by tsunami water.
- Elevate coastal homes.
- Most tsunami waves are less than 3 meters. Elevating your house will help reduce damage to your property from most tsunamis.
- Take precautions to prevent flooding.
- Have an engineer check your home and advise about ways to make it more resistant to tsunami water.
- There may be ways to divert waves away from your property. Improperly built walls could make your situation worse. Consult with a professional for advice.
- Ensure that any outbuildings, pastures, or corrals are protected in the same way as your home. When installing or changing fence lines, consider placing them in such a way that your animals are able to move to higher ground in the event of a tsunami.

What to Do if You Feel a Strong Coastal Earthquake

If you feel an earthquake that lasts 20 seconds or longer when you are in a coastal area, you should:

- Drop, cover, and hold on. You should first protect yourself from the earthquake damages.

When the shaking stops.

- Gather members of your household and move quickly to higher ground away from the coast. A tsunami may be coming within minutes.

Avoid downed power lines and stay away from damaged buildings and bridges from which heavy objects might fall during an aftershock.

If you are on land

- Be aware of tsunami facts. This knowledge could save your life! Share this knowledge with your relatives and friends. It could save their lives!

If you are in school and you hear there is a tsunami warning,

- You should follow the advice of teachers and other school personnel.

If you are at home and hear there is a tsunami warning,

- You should make sure your entire family is aware of the warning. Your family should evacuate your house if you live in a tsunami evacuation zone. Move in an orderly, calm and safe manner to the evacuation site or to any safe place outside your evacuation zone. Follow the advice of local emergency and law enforcement authorities.

If you are at the beach or near the ocean and you feel the earth shake,

- Move immediately to higher ground, DO NOT wait for a tsunami warning to be announced. Stay away from rivers and streams that lead to the ocean as you would stay away from the

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beach and ocean if there is a tsunami. A regional tsunami from a local earthquake could strike some areas before a tsunami warning could be announced.

- Tsunamis generated in distant locations will generally give people enough time to move to higher ground. For locally-generated tsunamis, where you might feel the ground shake, you may only have a few minutes to move to higher ground.
- High, multi-storied, reinforced concrete hotels are located in many low-lying coastal areas. The upper floors of these hotels can provide a safe place to find refuge should there be a tsunami warning and you cannot move quickly inland to higher ground.
- Homes and small buildings located in low-lying coastal areas are not designed to withstand tsunami impacts. Do not stay in these structures should there be a tsunami warning.
- Offshore reefs and shallow areas may help break the force of tsunami waves, but large and dangerous wave can still be a threat to coastal residents in these areas.
- Staying away from all low-lying areas is the safest advice when there is a tsunami warning.

If you are on a boat,

- Since tsunami wave activity is imperceptible in the open ocean, do not return to port if you are at sea and a tsunami warning has been issued for your area. Tsunamis can cause rapid changes in water level and unpredictable dangerous currents in harbours and ports.

If there is time to move your boat or ship from port to deep water (after a tsunami warning has been issued), you should weigh the following considerations:

- Most large harbours and ports are under the control of a harbor authority and/or a vessel traffic system. These authorities direct operations during periods of increased readiness (should a tsunami be expected), including the forced movement of vessels if deemed necessary. Keep in contact with the authorities should a forced movement of vessel be directed.
- Smaller ports may not be under the control of a harbor authority. If you are aware there is a tsunami warning and you have time to move your vessel to deep water, then you may want to do so in an orderly manner, in consideration of other vessels.
- Owners of small boats may find it safest to leave their boat at the pier and physically move to higher ground, particularly in the event of a locally-generated tsunami.
- Concurrent severe weather conditions (rough seas outside of safe harbor) could present a greater hazardous situation to small boats, so physically moving yourself to higher ground may be the only option.
- Damaging wave activity and unpredictable currents can affect harbours for a period of time following the initial tsunami impact on the coast. Contact the harbor authority before returning to port making sure to verify that conditions in the harbor are safe for navigation and berthing.

What to do after a Tsunami

- You should continue using a Weather Radio or staying tuned to a Coast Guard emergency frequency station or a local radio or television station for updated emergency information.
- The Tsunami may have damaged roads, bridges, or other places that may be unsafe.
- Check yourself for injuries and get first aid if necessary before helping injured or trapped persons.
- If someone needs to be rescued, call professionals with the right equipment to help.
- Help people who require special assistance— Infants, elderly people, those without transportation, large families who may need additional help in an emergency situation, people with disabilities, and the people who care for them.
- Avoid disaster areas.
- Your presence might hamper rescue and other emergency operations and put you at further risk from the residual effects of floods, such as contaminated water, crumbled roads, landslides, mudflows, and other hazards.

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- Use the telephone only for emergency calls. Telephone lines are frequently overwhelmed in disaster situations. They need to be clear for emergency calls to get through.
- Stay out of a building if water remains around it. Tsunami water, like floodwater, can undermine foundations, causing buildings to sink, floors to crack, or walls to collapse.
- When re-entering buildings or homes, use extreme caution. Tsunami-driven floodwater may have damaged buildings where you least expect it. Carefully watch every step you take.
- Wear long pants, a long-sleeved shirt, and sturdy shoes. The most common injury following a disaster is cut feet.
- Use battery-powered lanterns or flashlights when examining buildings. Battery-powered lighting is the safest and easiest to use, and it does not present a fire hazard for the user, occupants, or building. **DO NOT USE CANDLES.**
- Examine walls, floors, doors, staircases, and windows to make sure that the building is not in danger of collapsing. Inspect foundations for cracks or other damage. Cracks and damage to a foundation can render a building uninhabitable.
- Look for fire hazards. Under the earthquake action there may be broken or leaking gas lines, and under the tsunami flooded electrical circuits, or submerged furnaces or electrical appliances. Flammable or explosive materials may have come from upstream. Fire is the most frequent hazard following floods.
- Check for gas leaks. If you smell gas or hear a blowing or hissing noise, open a window and get everyone outside quickly. Turn off the gas using the outside main valve if you can, and call the gas company from a neighbour's home. If you turn off the gas for any reason, it must be turned back on by a professional.
- Look for electrical system damage. If you see sparks or broken or frayed wires, or if you smell burning insulation, turn off the electricity at the main fuse box or circuit breaker. If you have to step in water to get to the fuse box or circuit breaker, call an electrician first for advice. Electrical equipment should be checked and dried before being returned to service.
- Check for damage to sewage and water lines. If you suspect sewage lines are damaged under the quake, avoid using the toilets and call a plumber. If water pipes are damaged, contact the water company and avoid using water from the tap. You can obtain safe water from undamaged water heaters or by melting ice cubes that were made before the tsunami hit. Turn off the main water valve before draining water from these sources. Use tap water only if local health officials advise it is safe.
- Watch out for wild animals, especially poisonous snakes that may have come into buildings with the water. Use a stick to poke through debris. Tsunami floodwater flushes snakes and animals out of their homes.
- Watch for loose plaster, drywall, and ceilings that could fall.
- Take pictures of the damage, both of the building and its contents, for insurance claims. Open the windows and doors to help dry the building.
- Shovel mud before it solidifies.
- Check food supplies.
- Any food that has come in contact with floodwater may be contaminated and should be thrown out.
- Expect aftershocks. If the earthquake is of large magnitude (magnitude 8 to 9+ on the Richter scale) and located nearby, some aftershocks could be as large as magnitude 7+ and capable of generating another tsunami. The number of aftershocks will decrease over the course of several days, weeks, or months depending on how large the main shock was.
- Watch your animals closely. Keep all your animals under your direct control. Hazardous materials abound in flooded areas. Your pets may be able to escape from your home or through a broken fence. Pets may become disoriented, particularly because flooding usually affects scent markers that normally allow them to find their homes. The behaviour of pets may change dramatically after any disruption, becoming aggressive or defensive, so be aware of

their well-being and take measures to protect them from hazards, including displaced wild animals, and to ensure the safety of other people and animals.

Landslide

What is Landslide?

Landslides (also called "Landslips") are a major threat to the environment, human settlements and infrastructure. They are mostly hill events and cover a wide variety of land forms and processes involving the movement of soil and rock down-slope under the influence of gravity.

The debris originating from landslides results in siltation of streams and rivers, inducing further problems of erosion and floods. Damages to structures, loss of lives as well as properties occur extensively every year as a result of landslides. A majority of landslides are triggered by natural causes, including substantial rainfalls, cloud bursts, earthquakes etc.

Over the past 50 years, the landslide problem seems to have increased in magnitude as well as frequency due to human activities. Large scale construction works in hilly areas involving dams, hydroelectric projects, mining activities, extensive expansion of road network, as well as deforestation resulting from the exploitation of the forests, have all taken their toll of the fragile ecosystems of hill ranges. The result is widely evidenced in the shape of enormous increase in the landslide problems. At the same time, increasing needs for defence services, development of hilly areas and providing un-interrupted communication system to the remote and far-flung areas, have all created a very high demand for developing and keeping the transport and communication network in the hills always open.

Definition of Landslide:

Landslide may be defined as failure of a slope, mainly under the action of its own weight in which the displacement has both vertical and horizontal components of considerable magnitude. Landslide denotes downward and outward movement of slope-forming materials composed of natural rock, soil, artificial fill or a combination of these materials. The moving mass follows anyone of the three principal types of movements, via falling, sliding, flowing or their combinations. The rate of movement may vary from slow to rapid.

Classification of Landslides

Type of Movement			Type of Material		
			Bedrock	Engineering soils	
				Mostly coarse	Mostly fine
Falls.			Rock fall	Debris fall	Earth fall
Topples			Rock Topple	Debris topple	Earth topple
Slides	Rotational	Few units	Rock slump	Debris slump	Earth Slump
	Translational		Rock block slide	Debris block slide	Earth block slide
		Many units	Rock slide	Debris slide	Earth slide
Lateral spreads			Rock spread	Debris spread	Earth spread

Flows	Rock flow	Debris flow	Earth flow
Complex	Combination of two or more principal types of movement		

Causes of Landslides:

The principle of limiting equilibrium indicates that landslides occur when the forces driving the ground mass are greater than the forces resisting ground movement. Landslides can be caused by poor ground conditions, geomorphic phenomena, natural physical forces, and quite often due to man-made reasons.

i) Change in the Slope Gradient

A progressive increase in the slope angle due to undermining of the foot of a slope by erosion, i.e., by streams, rivers and glaciers and undercutting of banks by rivers or by waves or tidal currents, contributes to slope failures. Change in the angle of slope may also occur due to previous rock fall or slide, or subsidence. Human activities, such as, mining, cuts, quarries, pits, canals, lakes, reservoirs and alteration of water levels may lead to slope instability. Increase in slope gradient causes a change in the internal stress of rock mass and equilibrium conditions may be disturbed by such increase in the stress.

ii) Surcharge:

The surcharge or the overloading may lead to increase in shear stresses and increase in the pore- water pressure in clay type soils or rocks, which in turn produces a decrease in shear strength.

iii) Shocks and Vibrations

Earthquakes, large-scale explosive and machine vibrations produce-vibrations of different frequencies and affect the equilibrium of slopes. This may trigger a landslide on account of temporary changes of stress. In saturated fine sand and sensitive clays, vibrations may even result in sudden liquefaction of the soil.

iv) Changes in Water Content

Rainfall and snowmelt water penetrate into the joints and crevices and produce hydrostatic pressure. The increase in pore-water pressure in soils causes decrease in the mobilized shear resistance which may eventually lead to instability. The deleterious effect of rain water is more when the rain comes after a long dry period and clayey soils are desiccated and shrunken so that water readily percolates deep into the fissures. Changes in water content often occur because of human activities, such as, diversion of streams, blockage of drainage and deforestation. Flowing or confined ground water also exerts pressure on overlying beds, which leads to decrease in the stability of the slope. if the ambient temperatures are in the sub-freezing range, the freezing water in rock fissures increases in volume and tends to widen them there by reducing the cohesion. Ice laminate formed in clays, clayey and sandy soils increase the water content on melting during the thaw period.

Rainfall and Cloud Bursts

Rainfall has come to be increasingly recognized as a major factor that triggers slope movements and controls the frequency of landslides. The magnitude of its influence depends on climatic conditions, topography of the area, the geological structure or slopes and permeability and other properties of rocks and soils, as well as the amount, intensity and frequency of rainfall.

Studies conducted specially in the Himalayan areas have shown a good correlation between annual rainfall precipitation and the extent of landslide activity. Flashes of cloudbursts often punctuate rainfall, specially in the Himalayas. A cloud burst brings intense rainfall all of a sudden which lasts for a few minutes and leaves behind a trail of devastation, worse than that inflicted by the combined effect of rainfall for the rest of the season.

v) Changes due to Weathering

Changes due to mechanical effects of weathering, such as, softening of fissured clays, physical disintegration of granular rocks, such as, granite or sandstone under frost action or thermal expansion occur frequently. Chemical alterations, such as, hydration and ion exchange in clays, influence of seasonal and diurnal fluctuations of temperature, freeze-thaw cycles, drying of clays and shales generally result in deterioration of the strength characteristics of the slope forming materials, thereby, increasing the risk of instability. Over-consolidated clays and clay shales form a major rock type in the Shiwalik range of the Himalayas. These rock types are specially prone to landslides and slope stability problems. The Clay shales and over-consolidated clays are highly fissured due to past stress history and stress relief combined with absorption of water, wherever available, renders these formations unstable, which is yet another major cause of landslides in the Himalayas.

vi) Structure, Slope Geometry and Stratigraphy

The structural and stratigraphic features and slope geometry control slope failure in predominantly rock slopes. Some of these factors are: discontinuities; such as, faults and bedding planes; foliations in weak rock, such as schist's joints fractured zone. Massive beds over weak materials, such as, sandstones resting on clay beds, lead to slope failure. If the rock strata are inclined towards the slope face, the probability of the occurrence of landslide is enhanced.

vii) Landslides Induced due to Surface Erosion

Yet another cause of landslide occurrence, specially peculiar to the Western Himalayas, is surface erosion. The soils covering slopes in the Western Himalayas have low cohesion and the rainfall is moderate. The combination of these conditions is highly conducive to the initiation of shallow surface erosion and if such erosion is allowed to continue unchecked, the extent of slope area affected by erosion increases as well as deepens. Eventually, overall stability of the slope is affected resulting in large-scale mass movements.

ix). influence of Developmental Activities

Increased pace of developmental activities in the hill areas has also resulted in increased incidence of landslides. Slope cutting for roads, housing, etc. and denudation of hill slopes due to clearing of forests and mining activities have adverse effects on the stability of hill slopes.

Impacts of Landslides

In considering the adverse impacts of landslides, it should be kept in mind that landslides occur in remote mountain areas with difficult terrain and adverse physical and climatic conditions. The settlements built on steep slopes, weak soils, at the base of steep slopes, or at

the mouths of streams emerging from mountain valleys are vulnerable. Mostly, landslides give no notice and enormous amounts of rock and soil come crashing with speed on the unwarned and unprepared victims. In most cases, damage may occur to buildings, even if foundations have been strengthened. Furthermore, infrastructural elements such as buried utilities or brittle pipes contribute to vulnerability. Keeping in view the above situations, the adverse effects of landslides may be divided into two parts; i.e. direct and indirect impacts.

Direct impacts include anything on top or in the path of a landslide which results in total destruction. The resulting rubble damages lines of communications and blocks roadways; blockage in the waterways created flash flood with disastrous effects. In landslide disaster, casualties may not be widespread, except in cases when associated with earthquakes or volcanoes. Fatalities are more where population pressure has prompted settlements in areas vulnerable to landslides. In this context, casualties result from collapse of buildings or burial by landslide debris. Table 11.4 highlights the roadway damage intensity related to landslide movement rate.

It is evident from the data that landslides affect roadways on the basis of landslide movement rate. In case of extremely rapid landslides, damage level is catastrophic and it leads to total destruction of roadway and adjoining areas where escape for people and vehicles is almost impossible. However in very slow landslide movement rate, maintenance keeps road open with only infrequent road closures if repair work is not urgent. The effect of road damage by landslides on socio-economic activities can be seen as village isolation, house relocation, evacuation of persons, increase in prices of essential commodities in short supply and so on. A well-developed road network or an alternate alignment with little detours may minimize the effects.

Landslides cause indirect impacts apart from loss of houses, destruction to property and disturbance in family life. They lead to loss of productivity in agriculture, poultry, small-scale cottage industry or forest produce; reduced real estate values in high-risk areas; changes in streams and irrigation facilities; and, flooding. Landslides damage roads and other infrastructures. They cause disruption to traffic due to collapse of road infrastructure or accumulation of collapsed material on road from upper slopes, and bridge failures due to debris flows.

Ground causes

1. Weak, sensitive, or weathered materials
2. Adverse ground structure (joints, fissures)
3. Physical property variation (permeability, plasticity)

Morphological causes

1. Ground uplift (volcanic, tectonic)
2. Erosion (wind, water)
3. Scour
4. Deposition loading in the slope crest
5. Vegetation removal (by forest fire, drought)

Physical causes

1. Intense or prolonged precipitation
2. Rapid drawdown
3. Earthquake
4. Volcanic eruption

5. Thawing.
6. Shrink and swell -
7. Artesian pressures

Man-made causes

1. Excavation (particularly at the toe of slope) .
2. Loading of slope crest
3. Drawdown (of reservoirs)
4. Deforestation
5. Irrigation
6. Mining
7. Artificial vibration
8. Water impoundment and leakage from utilities

The surcharge may be due to natural or human actions. The surcharge from natural causes may be due to rain, hail, snow, water from springs, accumulation of talus on existing landslide materials, accumulated volcanic material, etc. The surcharge from human activities may be on account of construction of buildings, and other structures, loaded vehicles, construction of earth fills, stockpiles of ore, etc.

How vulnerable is Mumbai to Landslide?

Mumbai, formed by the amalgamation of two groups of seven islands each, is connected to the mainland across the major water bodies surrounding it via roads and railways. It is thus vulnerable to be isolated from the mainland during a disaster. Its insular character also results in an acute paucity of land in the city, resulting in high density of population and one of the highest prices of real estate in the world. Since a substantial area of the city, about half of the Island City, and one-fifth to one-fourth of the suburban area, has been reclaimed from below sea-level by infilling, there is high risk of liquefaction during an earthquake.

About 60 per cent of the population of the city lives in squatter settlements. The growth rate of slum population is greater than the general urban growth rate. Slums are vulnerable primarily because of their location, density and lack of access to infrastructure. These settlements are located in areas that invariably get flooded during high tides, in coastal locations, along water mains or open drainage, on steep slopes, within industrial zones or under high tension wires. These communities suffer from inadequate access to potable water and sanitation and are more prone to health problems.

One of the most vulnerable elements in Mumbai is its building stock, which contributes to increasing risk of its population. The building stock exhibits a rich mix of several different building technologies. Buildings located in the 'A', 'B' and 'C' wards in Island City and about 10,000 buildings in the suburbs are dilapidated - many in a state of imminent collapse. These structures act as a death trap in case of tragic accidents, like fire. The government has instituted various amendments in the Development Control Regulations to address the problem.

Though Mumbai is acknowledged as having one of the more extensive and efficient transport networks within India, its infrastructure is woefully inadequate by world-class standards. The

problem is aggravated due to the physiography of the city and the large concentration of financial, commercial and administrative functions in the southern end of the city. Lack of east-west connectivity within the city is also a major constraint. The suburban rail system is the lifeline of the city. The fares, which are the lowest compared to any other transit system in the world, also results in super dense crush load of 14-16 standing passengers per square metre of floor space. With one of the highest population densities in the world, service providers find it difficult to supply basic amenities like health, water and sanitation.

Mumbai is situated in seismic zone III, that denotes moderate seismic hazard. As per this code, structures need to be designed in Seismic Zone III for earthquake force corresponding to damage intensity of VII on MSK-64 scale. A review of the historical as well as the recent earthquake activity in peninsular India indicates that different parts of the region are characterized by low to moderate level of seismic activity. Occasionally some large and damaging earthquakes have occurred in the region.

**Standard Operating Procedure
ESF - I - Communication**

Lead Agency: Disaster Management Unit

	Before	During	After
	<ul style="list-style-type: none"> • To form the Incident Management Team • To form the Damage Assessment Team • To organize orientation and training of responders including community in disaster management • To coordinate with relevant departments regarding enforcement of Building Codes, Fire Safety Rules and Certification of Building etc. • To follow-up with concerned agencies about the arrangements for putting up stop gap bridges on emergency basis & formation and training of the team for the erection of temporary bridges. • To follow-up with MTNL about the arrangements for the restoration of communication system & act accordingly • To follow-up with Health Department about facilities available, both in private & public sector, for health services in emergencies in vulnerable areas and act accordingly • To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly • To follow-up with Energy Department about arrangements for the restoration of power supply and providing for supply of power through alternative sources of energy & act accordingly • To follow-up with Ward EOCs about the implementation of mitigation, preparedness and response measures and present status of the same & act 	<ul style="list-style-type: none"> • To coordinate the disaster response operation • Activate Emergency Support Functions as per requirement • To deploy SAR Teams to the incident site • If required dispatch NDRF to the incident site • Inform the military and paramilitary forces to get ready for emergency response • To alert higher authorities • Activate HAM Radio Operators • To organize the restoration of communication, transportation • Coordinate for relief distribution • To hold meeting with donor agencies • To organize disposal of dead bodies both human and livestock 	<ul style="list-style-type: none"> • To select the sight for resettlement of victims • To get the resettlement plan prepared • To deactivate the response operation but continue with relief and other support service operations. • Maintain records containing all relevant information relating to action points and contact points • Conduct debriefing meetings with all agencies • Prepare an After Action Report to identify lessons learnt and improvements needed

District Disaster Management Plan

<p>accordingly</p> <ul style="list-style-type: none">• To organize the orientation and training undertake earthquake resistance constructions and retrofitting on a large scale• To follow-up with Fire Department about the reach and capacity of their fire-extinguishers, fire safety policy and plan to increase their spread and improve their capacity and policy to train security guards, habitants of high rise building, civil defence, Home Guards personnel and volunteers in fire safety measures & act accordingly• To follow-up with Armed Forces about the emergency support services available with them and keep in regular touch with them.		
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ESF - 2 - Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none"> • Conduct a mock drill for the law & order situation during Aircraft emergency • Arrange First Responder Training for Police personnel • Keep rescue ropes & other lifesaving material ready • Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system • Identify alternative routes for traffic • Undertake any other activity considered necessary 	<ul style="list-style-type: none"> • On receipt of an emergency call, operationalize level activation based on nature and severity of incident • The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff. • Assess the available resources and determine the need for additional resources • Ensure law and order situation in affected area • Provide extra police personnel at traffic diversions • Protect life and property, control traffic and keep close watch on anti-social elements • Provide information about traffic flow to the public through media, public address system, sign boards and display boards • Transport / Shift stranded or affected persons through Police and other vehicles • Organise towing of stranded vehicles if any with the help of volunteers • Maintain a log of reports / action taken, needs and capabilities • Undertake any other activity as per site condition 	<ul style="list-style-type: none"> • Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters. • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 3 - Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firemen • Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner • Repair and maintain ancillary equipment • Conduct Training and Refresher Courses for Rescue Teams • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery • Keep communication devices in a state of readiness • Conduct mock drills, awareness programs etc. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident. • Determine needs and available resources • Dispense resources required based on need and augment men and machinery if necessary. • Locate the incident command post and staging areas appropriately • Direct operations from a safe distance and ensure ability to escape. • Ensure safety from electrical installations or power supply at the disaster site. • If required establish communication from the incident site with other tactical operators • Monitor activities and regularly update support agencies • Organise rescue, evacuation and salvage operations. • Transport injured persons to hospitals. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 4 - Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firefighters in basic search & rescue operations. • Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner. • Repair and maintain rescue Equipment • Conduct Training and Refresher Courses for Search & Rescue Teams. • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue. • Keep communication devices in a state of readiness. • Recce disaster prone areas along with other agencies. • Conduct mock drills, awareness programs etc. • Undertake any other activity required. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs. • Operationalize level of activation depending on the nature and severity of the incident • Determine needs and available resources. • Locate incident command post and staging areas appropriately • Direct operations from a safe distance, with capability of escape. • Augment men and machinery if necessary • Establish communications from the incident site with other tactical operations, and EOC • Monitor activities and update support agency staff. • Transport injured persons to hospitals. • Shift victims to temporary shelters as per requirement. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none"> • If required prepare alternate transport arrangement plan in consultation with Supporting Agencies. • Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai. • Provide and assign emergency transportation resources to the requesting organizations. • Update information of available transportation and resources owned in and around Mumbai. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff. • Monitor activities and update support agency staff. • Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas. • Determine transportation needs and available resources. • Establish and maintain public transportation and resources. • Disseminate updated information to passengers through Public Address System. • Organize transportation of sick or injured persons in need of medical attention. • Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities. 	<ul style="list-style-type: none"> • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • To follow-up with Road & Building Construction Department about the availability of heavy duty cutting, debris clearing machines, their specifications, placement, storage and their operators & upkeep of the same for ready use. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

ESF - 8 - Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none"> • Update list of public information media (print, radio and TV). • Participate in Mock Drills, Table Top exercises 	<ul style="list-style-type: none"> • The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation. • The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff. • Disseminate information about earthquake affected areas and actions taken by government through media • Disseminate evacuation information to the affected people through media. • Provide mass notifications to the populace and provide periodic media updates. • Issue messages for public safety and mutual cooperation. • Organize a press briefing in EOC as appropriate. • Maintain a log of actions taken, reports of resources needs and capabilities. 	<ul style="list-style-type: none"> • Continue public information activities and update citizen on recovery efforts. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 9 - Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 11 - Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none"> • Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts. • Monitor energy system likely to be damaged during a disaster and in need of repair work. • Provide separate lines and separate sources of power for critical substations. • Collect, assess, and provide information on energy supply and demand. • Identify resources needed to restore energy systems. • Train staff to attend to emergencies. • Ensure sufficient stocks of essential spares such as cables. • Conduct awareness programmes for consumers. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff. • Update Support Agency staff and monitor activities. • Determine needs and available communication means. • Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts. • Collect current information on damage and area affected. • Switch off power supply if necessary. • Officers at site to coordinate with fault engineers and mains engineers. • Maintain a log of actions taken, reports of communication resource needs and capabilities 	<ul style="list-style-type: none"> • Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system • Assess the requirements of restoration • Coordinate with supporting agencies for temporary arrangement of fuel, gas and power • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 12 - Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none"> • Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures. • Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency. • Appoint additional contractual labour as per requirement. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The Lead Agency representative will receive and give briefings and updates to the EOC staff • Update support agency staff and monitor activities • Determine needs and available resources. • Start responding to utilities shortages and disruptions and take care of public safety and health 	<ul style="list-style-type: none"> • Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 13 – Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritize equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination and decontamination activities; • Seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Provide area security and prohibit unauthorized personnel from area with assistance from ESF Public Safety and Law & Order. • Determine with the help of appropriate agencies guidelines for re-entry of emergency personnel & residents. • Make emergency plan to control and clean up hazardous materials. • Conclude clean-up operations when the area is declared safe by responsible personnel. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Disseminate safety information through media • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos & Don'ts

Do's

- Always be watchful on hill roads and try to note features like cracks on roads or slopes, blocking of drains and seepage points.
- Always seal the tension cracks or fissures to prevent percolation of water.
- Always try to keep the drainage channels free from obstructions.
- Always maintain a gentle gradient on hill roads for smooth traffic movements and to have less vibration due to overloaded vehicles.
- For critical locations, always look for alternate alignments, which should be based on landslide hazard zonation studies.

Don'ts

- Do not allow cultivation/grazing on the slide-affected slope.
- Do not provide drains flowing through the slide-affected area.
- Do not put the slided material at the crown of the downhill slope.
- Do not cut or remove the material from the toe of slide.

If trapped under debris

- Do not light a match.
- Do not move about or kick up dust.
- Cover your mouth with a handkerchief or clothing.
- Tap on a pipe or wall so rescuers can locate you. Use a whistle if one is available. Shout only as a last resort. Shouting can cause you to inhale dangerous amounts of dust.

- **Have a disaster emergency kit ready**
- Battery operated torch
- Extra batteries
- Battery operated radio
- First aid kit and manual
- Emergency food (dry items) and water (packed and sealed)
- Candles and matches in a waterproof container
- Knife
- Chlorine tablets or powdered water purifiers
- Can opener.
- Essential medicines
- Cash and credit cards
- Thick ropes and cords
- Sturdy shoes

Airport Emergency

1) What is Airport Emergency?

Airports differ in complexity, but each has unique features. Some are small, uncomplicated facilities serving a more rural environment, while others represent a good-sized community complete with industrial and commercial installations serving major metropolitan areas. Airports are operated by the local government such as a city or county; or by an Authority representing multiple local governments; and even some are operated by the State. However, one thing they all have in common is that they are all subject to emergencies.

An airport emergency is any occasion or instance, natural or man-made that warrants action to save lives and protect. An airport emergency is any occasion or instance, natural or man-made that warrants action to save lives and protects property and public health.

Virtually no airport has sufficient resources to respond to every emergency situation independently. Each airport must depend to some degree on the resources from its surrounding communities. It is essential to prepare for emergencies that face an airport in order to be able to respond quickly, efficiently and effectively. While every contingency cannot be anticipated and prepared for, a strong emergency preparedness program can assist in limiting the negative impact of these events, including liability and other post-emergency issues.

2) How vulnerable is Mumbai to Airport Emergency?

The Chhatrapati Shivaji International Airport (formerly Sahar International Airport) is the main aviation hub in the city and the busiest airport in India in terms of passenger traffic. CSIA handled traffic of 29.1 million passengers and around 670,235 tonnes of cargo in the FY 2010–2011. An upgrade plan was initiated in 2006, targeted at increasing the capacity of the airport to handle up to 40 million passengers annually. The Juhu Aerodrome was India's first airport, and now hosts a flying club and a heliport.

3) Probable disasters:

- a) Aircraft incidents and Accidents: Any occurrence associated with the operation of an aircraft that takes place between the time a person boards the aircraft with the intention of flight and the time such person has disembarked, in which a person suffers death or serious injury as a result of the occurrence or in which the aircraft receives substantial damage.

Aircraft Incident. Any occurrence associated with the operation of an aircraft that is not considered an "aircraft accident."

Incident Classification System

Level 1. Accident may happen. Landing Gear Problem. A situation or emergency exists or is perceived to exist, that may result in an incident or accident. This includes situations where it is not known if an incident or accident emergency has actually occurred.

Level 2. An aircraft is known or suspected to have an operational defect that affects normal flight operations to the extent that there is danger of an accident.

Level 3. An aircraft accident has occurred on or in the vicinity of the Airport.

- b) **Natural Disasters:** In the event of a natural disaster such as tornadoes, hailstorms, flooding, severe thunderstorms, high winds, or other natural disasters, the Emergency Management Plan and the Hazardous Weather Emergency Operations Plan will be followed. The IMD should be monitored to ascertain the conditions that will affect the airport.
- c) **Bomb incidents:** Should anyone receive a bomb threat directed towards any airport building, structure, or an aircraft, the person receiving the call should contact 1916 immediately, and notify the Airport Director. Use the BDS (Bomb Disposal Squad), "Bomb Threat" checklist by asking the caller the following questions.
- a) When is the bomb going to explode?
 - b) Where is it right now?
 - c) What does it look like?
 - d) What kind of bomb is it?
 - e) What will cause it to explode?
 - f) Did you place the bomb?
 - g) What is your address:
 - h) What is your name?
 - i) Note the exact wording of the threat.
 - j) What is the sex, race, and age of the caller.
 - k) What was the length in time of the call?
 - l) What was the number at which the call was received:
 - m) List the time and date received.
 - n) Was the caller's voice familiar? If so, who did it sound like:
 - o) Was the caller's voice calm, angry, excited, slow, rapid, soft, loud, laughter, crying, normal, distinct, slurred, nasal, stutter, lisp, raspy, deep, ragged, clearing throat, deep breathing, cracking, disguised, accent, familiar, or whispered?
 - p) Did you hear any background sounds?
 - q) Was the threat language well spoken, foul, irrational, incoherent, taped or read like a rehearsed message?
- d) **Hazardous Materials Incidents:** This emergency situation involves the possible spillage of radiological or hazardous material on a commercial, military or private aircraft in flight.
- e) **Structural Fires:** This emergency situation involves fires occurring at or in airport buildings such as terminals or hangars.

- f) **Failure of Power for Movement Area Lighting:** This emergency situation involves failure of power for movement area lighting.

**Standard Operating Procedure
ESF - I - Communication**

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Conduct Coordination meetings with the representatives of Airport Authority • Update telephone numbers of all agencies • Check and maintain communication facilities • Link EOC and other control rooms with necessary communication devices • Organize a communication facility that can be transported to affected sites • Identify and rectify damaged communication facilities • Check the maintenance of equipment of private communication operators • Establish temporary communication facilities like HAM radio, mobiles, VHF, landline etc on priority wherever required • Coordinate with other ESFs as per procedures for restoration of communication 	<ul style="list-style-type: none"> • Receive and process disaster alerts and warnings from nodal agencies and other sources and communicate the same to all designated authorities and stakeholders. • Facilitate coordination among primary and secondary ESF Departments/Agencies • Provide regular updates & coordinate with support agency staff, other ESFs and higher authorities • Monitor emergency operations • Perform such other functions and duties as may be entrusted by Chief Officer, Disaster 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Conduct debriefing meetings with all agencies • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF – 2 – Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none"> • Conduct a mock drill for the law & order situation during Aircraft emergency • Arrange First Responder Training for Police personnel • Keep rescue ropes & other lifesaving material ready • Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system • Identify alternative routes for traffic in aircraft emergency area • Undertake any other activity considered necessary 	<ul style="list-style-type: none"> • On receipt of an emergency call, operationalize level activation based on nature and severity of incident • The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff • Assess the available resources and determine the need for additional resources • Provide extra police personnel at traffic diversions • Provide information about traffic flow to the public through media, public address system, sign boards and display boards • Transport / Shift stranded or affected persons through Police and other vehicles • Organise towing of stranded vehicles if any with the help of volunteers • Maintain a log of reports / action taken, needs and capabilities • Undertake any other activity as per site condition 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 3 - Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firemen • Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner • Repair and maintain ancillary equipment • Conduct Training and Refresher Courses for Rescue Teams. • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery • Keep communication devices in a state of readiness • Conduct mock drills, awareness programs etc. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident. • Determine needs and available resources. • Dispense resources required based on need and augment men and machinery if necessary. • Locate the incident command post and staging areas appropriately • Direct operations from a safe distance and ensure ability to escape. • Ensure safety from electrical installations or power supply at the disaster site. • If required establish communication from the incident site with other tactical operators • Monitor activities and regularly update support agencies • Organise rescue, evacuation and salvage operations. • Transport injured persons to hospitals. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 4 - Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firefighters in basic search & rescue operations. • Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner. • Repair and maintain rescue Equipment. • Conduct Training and Refresher Courses for Search & Rescue Teams. • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue. • Keep communication devices in a state of readiness. • Recce disaster prone areas along with other agencies. • Conduct mock drills, awareness programs etc. • Undertake any other activity required. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs. • Operationalize level of activation depending on the nature and severity of the incident • Determine needs and available resources. • Locate incident command post and staging areas appropriately. • Direct operations from a safe distance, with capability of escape. • Augment men and machinery if necessary • Establish communications from the incident site with other tactical operations, and EOC • Monitor activities and update support agency staff. • Transport injured persons to hospitals. • Shift victims to temporary shelters as per requirement. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none"> • If required prepare alternate transport arrangement plan in consultation with Supporting Agencies. • Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai. • Provide and assign emergency transportation resources to the requesting organizations. • Update information of available transportation and resources owned in and around Mumbai. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff. • Monitor activities and update support agency staff. • Determine transportation needs and available resources. • Establish and maintain public transportation and resources. • Disseminate updated information to passengers through Public Address System. • Organize transportation of sick or injured persons in need of medical attention. • Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities. 	<ul style="list-style-type: none"> • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 6 - Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyse the potential of the emergency situation to know what types of resources would be needed. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

ESF - 8 - Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none"> • Update list of public information media (print, radio and TV). • Participate in Mock Drills, Table Top exercises 	<ul style="list-style-type: none"> • The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation. • The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff. • Disseminate evacuation information to the affected people through media. • Provide mass notifications to the populace and provide periodic media updates. • Organize a press briefing in EOC as appropriate. • Maintain a log of actions taken, reports of resources needs and capabilities. 	<ul style="list-style-type: none"> • Continue public information activities and update citizen on recovery efforts. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 9 - Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 11 – Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none"> • Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts. • Monitor energy system likely to be damaged during a disaster and in need of repair work. • Provide separate lines and separate sources of power for critical substations. • Collect, assess, and provide information on energy supply and demand. • Identify resources needed to restore energy systems. • Train staff to attend to emergencies. • Ensure sufficient stocks of essential spares such as cables. • Conduct awareness programmes for consumers. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff. • Update Support Agency staff and monitor activities. • Determine needs and available communication means. • Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts. • Switch off power supply if necessary. • Officers at site to coordinate with fault engineers and mains engineers. • Maintain a log of actions taken, reports of communication resource needs and capabilities 	<ul style="list-style-type: none"> • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 12 - Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none"> • Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures. • Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency. • Appoint additional contractual labour as per requirement. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The Lead Agency representative will receive and give briefings and updates to the EOC staff • Update support agency staff and monitor activities • Determine needs and available resources. 	<ul style="list-style-type: none"> • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 13 – Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritise equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination and decontamination activities; • seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Provide area security and prohibit unauthorized personnel from area with assistance from ESF Public Safety and Law & Order. • Determine with the help of appropriate agencies guidelines for re-entry of emergency personnel & residents. • Conclude clean-up operations when the area is declared safe by responsible personnel. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos and Don'ts

- Follow instructions and pay attention to notices or announcements.
- Take extra care of children, women and the elderly.
- Contact staff on duty immediately if you see anything suspicious.
- Use emergency and safety equipment only in case of emergency. Any misuse causing damage will result in legal action against the offender.

Don'ts

- Smoke; carry inflammable materials, hazardous chemicals or animals.
- Push or play on the Airport.
- Cause damage to Airport property. It may lead to prosecution.

Building Collapse

What is building collapse?

Buildings, like all structures, are designed to support certain loads without deforming excessively. The loads are the weights of people and objects, the weight of rain and snow and the pressure of wind--called *live loads*--and the *dead load* of the building itself. With buildings of a few floors, strength generally accompanies sufficient rigidity, and the design is mainly that of a roof that will keep the weather out while spanning large open spaces. With tall buildings of many floors, the roof is a minor matter, and the support of the weight of the building itself is the main consideration. Like long bridges, tall buildings are subject to catastrophic collapse.

The causes of building collapse can be classified under general headings to facilitate analysis. These headings are:

- Bad Design
- Faulty Construction
- Foundation Failure
- Extraordinary Loads
- Unexpected Failure Modes
- Combination of Causes

Bad design does not mean only errors of computation, but a failure to take into account the loads the structure will be called upon to carry, erroneous theories, reliance on inaccurate data, ignorance of the effects of repeated or impulsive stresses, and improper choice of materials or misunderstanding of their properties. The engineer is responsible for these failures, which are created at the drawing board.

Faulty construction has been the most important cause of structural failure. The engineer is also at fault here, if inspection has been lax. This includes the use of salty sand to make concrete, the substitution of inferior steel for that specified, bad riveting or even improper tightening torque of nuts, excessive use of the drift pin to make holes line up, bad welds, and other practices well known to the construction worker.

Even an excellently designed and constructed structure will not stand on a bad foundation. Although the structure will carry its loads, the earth beneath it may not. The Leaning Tower of Pisa is a famous example of bad foundations, but there are many others. The old armory in St. Paul, Minnesota, sank 20 feet or more into soft clay, but did not collapse. The displacements due to bad foundations may alter the stress distribution significantly. This was such a problem with railway bridges in America that statically-determinate trusses were greatly preferred, since they were not subject to this danger.

Extraordinary loads are often natural, such as repeated heavy snowfalls, or the shaking of an earthquake, or the winds of a hurricane. A building that is intended to stand for some years should be able to meet these challenges. A flimsy flexible structure may avoid destruction in an

earthquake, while a solid masonry building would be destroyed. Earthquakes may cause foundation problems when moist filled land liquefies.

Unexpected failure modes are the most complex of the reasons for collapse, and we have recently had a good example. Any new type of structure is subject to unexpected failure, until its properties are well understood. Suspension bridges seemed the answer to bridging large gaps. Everything was supported by a strong cable in tension, a reliable and understood member. However, sad experience showed that the bridge deck was capable of galloping and twisting without restraint from the supporting cables. Ellet's bridge at Wheeling collapsed in the 1840's, and the Tacoma Narrows bridge in the 1940's, from this cause.

The conservative, strong statically-determinate trusses were designed with pin-connected eye bars to be as strong and safe as possible. Sad experience brought the realization of stress concentration at the holes pierced in the eye bars. From earliest times, it has been recognized that tension members have no surprises. They fail by pulling apart when the tension in them becomes too high. If you know the tension, then proportioning a member is easy. A compression member, a column, is different. If it is short and squat, it bears its load until it crushes. But if you try to support a load with a 12-foot column that will just support the load with a 1-foot column, you are in for a surprise. The column bends outward, or *buckles*, and the load crashes to earth.

Suppose you have a beam supported at the ends, with a load in the center. You know the beam will bend, and if the load is too great, it may break apart at the bottom, or crush at the top, under the load. This you expect. However, the beam may fail by splitting into two beams longitudinally, or *shearing*, or by the top of the beam deflecting to one side or the other, also called buckling. In fact, a beam will usually fail by shearing or buckling before breaking.

A hollow tube makes a very efficient column or beam. If you think about it, it is the material on the surface that most resists buckling and bending. A column that is modified from a compact cross-section, like a cylinder, to an extended cross-section, like a pipe, can still support the same load per unit area, but with much greater resistance to buckling. As a beam, one side is in compression and the other in tension, while the pipe cannot buckle to one side or the other. When you do bend a pipe, notice that it crushes inward reducing the cross-section to a line, which bends easily. Tubes need to be supported against buckling. Such a tube has a very high ratio of strength to weight, and hence strength to cost.

Tall buildings have generally been made with a rigid steel skeleton, sheathed in the lightest materials to keep out the weather. Alternatively, reinforced concrete, where the compression resisting and protecting concrete surrounds the tough, tension-resisting steel, integrated into a single body, has been used. Such structures have never failed (when properly built on good foundations), and stoutly resist demolition. When the lower supports of a steel skeleton are destroyed, the weight of the building seems to crush the lower parts and the upper parts descend slowly into the pile of debris. Monolithic reinforced-concrete buildings are difficult to demolish in any fashion.

The World Trade Center towers used neither a steel skeleton nor reinforced concrete. They were designed as square tubes made of heavy, hollow welded sections, braced against buckling by the building floors. Massive foundations descended to bedrock, since the towers had to be safe against winds and other lateral forces tending to overturn them. All this was taken into consideration in the design and construction, which seems to have been first-rate. An attempt to damage the buildings by a bomb at the base had negligible effect. The strong base and foundation would repel any such assault with ease, as it indeed did. The impact of aircraft on the upper stories had only a local effect, and did not impair the integrity of the buildings, which remained solid. The fires caused weakening of the steel, and some of the floors suddenly received a load for which they were not designed.

What happened next was unexpected and catastrophic. The slumped floors pushed the steel modules outwards, separating them from the floor beams. The next floor then collapsed on the one below, pushing out the steel walls, and this continued, in the same way that a house of cards collapses. The debris of concrete facing and steel modules fell in shower while the main structure collapsed at almost the same rate. In 15 seconds or so, 110 stories were reduced to a pile 9 stories high, mainly of steel wall modules and whatever was around them. The south tower collapsed 47 minutes after impact, the north tower 1 hour 44 minutes after impact. The elapsed times show that the impacts were not the proximate cause of collapse; the strong building easily withstood them. When even one corner of a floor was weakened and fell, the collapse would soon propagate around the circumference, and the building would be lost.

It is clear that buildings built in this manner have a catastrophic mode of failure ("house of cards") that should rule out their future construction. It is triggered when there is a partial collapse at any level that breaks the continuity of the tube, which then rolls up quickly, from top to bottom. The collapse has a means of propagation that soon involves the whole structure, bypassing its major strengths and impossible to interrupt. There is no need for an airliner; a simple explosion would do the job. There were central tubes in the towers, for elevators and services, but they appeared to play no substantial role in the collapse, and were not evident in the pictures or wreckage.

Why Mumbai is vulnerable to Building Collapse:

As per the 2011 census, Greater Mumbai has 28037046 dwellings, including residential, commercial and industrial establishments. Of these, only % of the dwellings were made of re-inforced concrete while % were engineered masonry constructions. Thus, % of all constructions were non-engineered. This can partly be attributed to the large percentage of population living in the slums.

There are 19642 cessed buildings in Mumbai city district. Due to the Rent Control Act restrictions against raising the monthly rent, the landlord did not take up maintenance of buildings for several years. This has resulted in the deterioration of the buildings ultimately leading to their collapse. The Maharashtra Government intervened and took over the responsibility of maintaining these building by constituting the Bombay Building Repairs & Reconstruction Board in the year 1969.

The break up of these 19642 buildings is as follows .

1) A- category (constructed prior to 1-9-40)	16502
2) B- category (constructed between 1-9-1940 to 31-12-50)	1489
3) C- category (constructed between 1-1-51 to Sept. 1969)	1651

Total	19642

Out of the total 19642 buildings, some of the buildings have been reconstructed and some have collapsed. Thus the total number of cessed buildings existing are around 16,104. Many of these buildings have been repaired several times in the past from the permissible cost ceiling .

The Engineers of the Board undertake frequent inspection of these buildings and take all preventive measures to protect the building from any collapse due to its weak structural constitution. Usually dangerous portion of these buildings are propped up and in many cases demolition of dangerous portion also has also been resorted to.

Apart from the legal hurdles, paucity of funds has slowed down the work of Mumbai Repairs Board considerably. House Collapse is therefore a regular phenomenon and in the absence of adequate transit accommodation, emergency shelters become a major requirement in the event of house collapse.

**Standard Operating Procedure
ESF - I - Communication**

Lead Agency: Disaster Management Unit

	Before	During	After
	<ul style="list-style-type: none"> • To form the Incident Management Team • To form the Damage Assessment Team • To organize orientation and training of responders including community in disaster management • To coordinate with relevant departments regarding enforcement of Building Codes, Fire Safety Rules and Certification of Building etc. • To follow-up with concerned agencies about the arrangements for putting up stop gap bridges on emergency basis & formation and training of the team for the erection of temporary bridges. • To follow-up with MTNL about the arrangements for the restoration of communication system & act accordingly • To follow-up with Health Department about facilities available, both in private & public sector, for health services in emergencies in vulnerable areas and act accordingly • To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly • To follow-up with Energy Department about arrangements for the restoration of power supply and providing for supply of power through alternative sources of energy & act accordingly • To follow-up with Ward EOCs about the implementation of mitigation, preparedness and response measures and present status of the same & act 	<ul style="list-style-type: none"> • To coordinate the disaster response operation • Activate Emergency Support Functions as per requirement • To deploy SAR Teams to the incident site • If required dispatch NDRF to the incident site • To alert higher authorities • To organize the restoration of communication, transportation • Coordinate for relief distribution • To hold meeting with donor agencies • To organize disposal of dead bodies both human and livestock 	<ul style="list-style-type: none"> • To select the sight for resettlement of victims • To get the resettlement plan prepared • To deactivate the response operation but continue with relief and other support service operations. • Maintain records containing all relevant information relating to action points and contact points • Conduct debriefing meetings with all agencies • Prepare an After Action Report to identify lessons learnt and improvements needed

District Disaster Management Plan

<p>accordingly</p> <ul style="list-style-type: none">• To follow-up with Fire Department about the reach and capacity of their fire-extinguishers, fire safety policy and plan to increase their spread and improve their capacity and policy to train security guards, habitants of high rise building, civil defence, Home Guards personnel and volunteers in fire safety measures & act accordingly• To follow-up with Armed Forces about the emergency support services available with them and keep in regular touch with them.		
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ESF – 2 – Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none"> • Conduct a mock drill for the law & order situation during Aircraft emergency • Arrange First Responder Training for Police personnel • Keep rescue ropes & other lifesaving material ready • Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system • Identify alternative routes for traffic • Undertake any other activity considered necessary 	<ul style="list-style-type: none"> • On receipt of an emergency call, operationalize level activation based on nature and severity of incident • The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff. • Assess the available resources and determine the need for additional resources • Ensure law and order situation in affected area • Provide extra police personnel at traffic diversions • Protect life and property, control traffic and keep close watch on anti-social elements • Provide information about traffic flow to the public through media, public address system, sign boards and display boards • Transport / Shift stranded or affected persons through Police and other vehicles • Organise towing of stranded vehicles if any • Maintain a log of reports / action taken, needs and capabilities • Undertake any other activity as per site condition 	<ul style="list-style-type: none"> • Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters. • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF – 3 – Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firemen • Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner • Repair and maintain ancillary equipment • Conduct Training and Refresher Courses for Rescue Teams • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery • Keep communication devices in a state of readiness • Conduct mock drills, awareness programs etc. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident. • Determine needs and available resources • Dispense resources required based on need and augment men and machinery if necessary. • Locate the incident command post and staging areas appropriately • Direct operations from a safe distance and ensure ability to escape. • Ensure safety from electrical installations or power supply at the disaster site. • If required establish communication from the incident site with other tactical operators • Monitor activities and regularly update support agencies • Organise rescue, evacuation and salvage operations. • Transport injured persons to hospitals. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 4 - Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firefighters in basic search & rescue operations. • Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner. • Repair and maintain rescue Equipment • Conduct Training and Refresher Courses for Search & Rescue Teams. • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue. • Keep communication devices in a state of readiness. • Recce disaster prone areas along with other agencies. • Conduct mock drills, awareness programs etc. • Undertake any other activity required. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs. • Operationalize level of activation depending on the nature and severity of the incident • Determine needs and available resources. • Locate incident command post and staging areas appropriately • Direct operations from a safe distance, with capability of escape. • Augment men and machinery if necessary • Establish communications from the incident site with other tactical operations, and EOC • Monitor activities and update support agency staff. • Transport injured persons to hospitals. • Shift victims to temporary shelters as per requirement. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none"> • If required prepare alternate transport arrangement plan in consultation with Supporting Agencies. • Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai. • Provide and assign emergency transportation resources to the requesting organizations. • Update information of available transportation and resources owned in and around Mumbai. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff. • Monitor activities and update support agency staff. • Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas. • Determine transportation needs and available resources. • Establish and maintain public transportation and resources. • Organize transportation of sick or injured persons in need of medical attention. • Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities. 	<ul style="list-style-type: none"> • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community. • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • To follow-up with Road & Building Construction Department about the availability of heavy duty cutting, debris clearing machines, their specifications, placement, storage and their operators & upkeep of the same for ready use. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

ESF - 8 - Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none"> • Update list of public information media (print, radio and TV). • Participate in Mock Drills, Table Top exercises 	<ul style="list-style-type: none"> • The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation. • The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff. • Disseminate information about affected areas and actions taken by MCGM through media • Disseminate evacuation information to the affected people through media. • Provide mass notifications to the populace and provide periodic media updates. • Issue messages for public safety and mutual cooperation. • Organize a press briefing in EOC as appropriate. • Maintain a log of actions taken, reports of resources needs and capabilities. 	<ul style="list-style-type: none"> • Continue public information activities and update citizen on recovery efforts. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 9 - Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 11 - Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none"> • Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts. • Monitor energy system likely to be damaged during a disaster and in need of repair work. • Provide separate lines and separate sources of power for critical substations. • Collect, assess, and provide information on energy supply and demand. • Identify resources needed to restore energy systems. • Train staff to attend to emergencies. • Ensure sufficient stocks of essential spares such as cables. • Conduct awareness programmes for consumers. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff. • Update Support Agency staff and monitor activities. • Determine needs and available communication means. • Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts. • Collect current information on damage and area affected. • Switch off power supply if necessary. • Officers at site to coordinate with fault engineers and mains engineers. • Maintain a log of actions taken, reports of communication resource needs and capabilities 	<ul style="list-style-type: none"> • Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system • Assess the requirements of restoration • Coordinate with supporting agencies for temporary arrangement of fuel, gas and power • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 12 - Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none"> • Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures. • Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency. • Appoint additional contractual labour as per requirement. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The Lead Agency representative will receive and give briefings and updates to the EOC staff • Update support agency staff and monitor activities • Determine needs and available resources. • Start responding to utilities shortages and disruptions and take care of public safety and health 	<ul style="list-style-type: none"> • Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 13 – Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritize equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination and decontamination activities; • Seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Provide area security and prohibit unauthorized personnel from area with assistance from ESF Public Safety and Law & Order. • Determine with the help of appropriate agencies guidelines for re-entry of emergency personnel & residents. • Make emergency plan to control and clean up hazardous materials. • Conclude clean-up operations when the area is declared safe by responsible personnel. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Disseminate safety information through media • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos & Don'ts

What should be done before an emergency

- Make a family emergency plan.
- Prepare a family emergency kit in case you need to evacuate the premises.
- Get first aid training.
- Know your emergency telephone numbers.
- Get all the safety equipment necessary for your protection (gloves, safety glasses, helmet, work boots, anti-dust mask).

What to do

- Think before you act and be careful.
- Warn or have somebody warn the authorities about the damages and the number of casualties in your sector.
- Do a reconnaissance before you start work. This will not be time wasted.
- Walk as closely to the wall as possible when on damaged stairs and upper floors.
- Use gloves when removing debris by hand.
- Be careful how you move debris from the vicinity of a casualty.
- Protect a casualty from falling debris and dust by using blankets, tarpaulins, corrugated iron sheets, etc.
- Keep off wreckage as much as possible; leave it undisturbed or the neutral voids may be destroyed by further collapse.
- Be careful how you remove debris and obstacles, especially from voids, to prevent further collapse.
- Exercise great care when using sharp tools in debris.
- It is often necessary to use props or struts to strengthen a floor loaded with debris before passing over or working underneath it.
- In situations where the number of casualties is greater than the help available, do not waste time. Use your resources wisely.
- Examine a casualty before removal and give first aid for all life-threatening conditions only.
- Free the nose and mouth of a casualty from dust and grit to ease breathing.
- Keep a casualty warm to slow the progress of shock.
- Make sure that the stretcher is properly blanketed so that the casualty has the maximum amount of warmth and comfort.
- Use appropriate procedures to carry a stretcher over debris and obstacles.
- Keep a list of all casualties handled.

Don't

- Move an injured person without rendering first aid unless the casualty is in immediate danger.
- Smoke or strike matches in case there is a gas leak.
- Crawl over debris or disturb parts of the damaged structure unless you are compelled to do so by circumstances.
- Pull timber out of the wreckage indiscriminately or you may cause further collapse.
- Enter any site without informing the other members of your party or, if possible, without a companion to help in case of accident.
- Touch loose electrical wiring.
- Throw debris aimlessly – you may have to move it again.

Chemical Hazards

Introduction: The terms “chemical accident” or “Chemical hazards” refer to an event resulting in the release of a substance or substances hazardous to human health and/or the environment in the short or long term. Such events include fires, explosions, leakages or releases of toxic or hazardous materials that can cause people illness, injury, disability or death. An example is the introduction of hydrocarbon methyl that increases the risk of heart cancer because it changes the way blood cells flow through the body.

While chemical accidents may occur whenever toxic materials are stored, transported or used, the most severe accidents are industrial accidents, involving major chemical manufacturing and storage facilities. The most significant chemical accidents in recorded history was the 1984 Bhopal disaster in India, in which more than 3,000 people were killed after a highly toxic vapour, (methyl isocyanate), was released at a Union Carbide pesticides factory.

A Chemical disaster may take place either due to an accident or explosion involving hazardous material or due to indiscriminate use of chemical warfare agents by terrorists. This Unit has brought out the institutional aspects in India. At the Central Government level, the Ministry of Environment and Forest is the nodal agency for management of chemical disaster. A layered structure to manage such disasters at the central, state, district and local levels is essential. For this, Crisis Management Groups are required to be set up at each level.

The severity and impact of chemical disasters depend upon the extent of physical damage, casualties and environmental damage. Chemical disasters affect the environment because of likely contamination of air, water supply, land, vegetation and animal life. -

Chemical Hazards Causes & Impacts:

i) Causes

A Chemical disaster may take place due to any one or more of the following.

- An accident or explosion at the production facility of hazardous material.
- An accident at the storage facility of hazardous material.
- An accident during transportation of hazardous material through population centres.
- Inadequacies in toxic waste management. This results in long-term health effect on communities. Toxic waste can cause environmental pollution as well as ground water pollution. Failures in safety systems of chemical plants.
- Deliberate sabotage of a manufacturing area or storage facility of a hazardous chemical substance or sabotage during transportation of such substance.
- Occurrence of natural disasters, such as, earthquakes, cyclones etc. can also trigger chemical disasters essentially through damage and destruction to chemical industrial units storing or producing hazardous material.

Chemical Terrorism

Chemical disaster can also be caused due to indiscriminate use of chemical warfare agents by terrorists. Such chemical agents include Sarin, Chlorine, Sulfur Mustards, Hydrogen, Cyanide and VX etc.

ii) Impacts

Chemical disasters lead to serious and varied impacts. These can result into explosions and/or fires. The most hazardous impact of a chemical disaster lies in the extreme pollution of air, water and food chain up to life-threatening levels even. The long-term health impairment can even extend to coming generations.

A chemical disaster may result into one or all of the following.

Physical Damage

This includes damage or destruction of structure and infrastructure. A transportation accident may damage the means of transport used for transporting hazardous material viz. vehicle, rail etc. Industrial fires, if not contained, may affect large areas.

Casualties

Chemical disaster may result in large-scale casualties. While quick medical relief is essential to save lives, immediate disposal of dead bodies will also need planning.

Environmental Damage

Chemical disasters affect the environment because of likely contamination of air, water supply, land, crops, vegetation and animal life. In some cases certain areas may become uninhabitable for humans and animals. The possibility of mega scale migration/evacuation/resettlement could loom large.

Hazard Mapping

An accurate information allocation, type and quantities of hazardous material being stored, used or produced should be known at district and state levels.

Hazardous Material Identification

The hazardous material should be stored and handled as per laid down norms. These are usually divided into different categories with each having identification mark for packaging and transportation.

Inspection of Chemical Plants & Storage Facilities

A regular and systematic inspection of chemical plants and storage facilities of hazardous material is important. Most of the chemical disasters can be avoided if laid down norms are followed strictly by all. A common understanding on requirements of safety by government officials and those running industries with hazardous material is essential

Monitoring of Toxic Waste Disposal

Disposal of toxic waste by industrial units must be monitored. There have been cases where toxic wastes dumped underground have resulted in pollution of sub-soil water. Disposal of toxic waste in rivers and drains, especially passing through populated areas, needs to be stopped in totality.

Monitoring Pollution Levels

Monitoring of pollution levels gives warning of toxicity in land, water or atmosphere. It can also forewarn the authorities of any unusual and hazardous substance in the environment.

Preparation of On-site and Off-site Emergency Management Plans

Emergency management plans need to be prepared for on-site and off-site contingencies. On-site contingencies are those where the impact of the accident is localized and it is likely to cause damage or destruction of plant and equipment or injury or loss of life to workers. In off-site emergencies, the impact of the accident is widespread i.e. beyond the premises of a hazardous industrial unit.

The chemical disaster management plans should generally include the following aspects:

- Awareness among workers and the people likely to be affected.
- Procedure for warning.
- Immediate action to be taken.
- Specific responsibilities of officials and their training.
- Plan for casualty evacuation and medical aid.
- Fire fighting arrangements.
- Command, Control and Communication system.
- List of specialists, personnel, and organisations who could provide assistance.
- Practice Drills.

Rehearsal of Plans

Emergency plans, both off-site and on-site, should be periodically rehearsed. An honest feedback and prompt action to plug the gaps observed during such mock drills is one of the most important features of preparedness.

Awareness

Improvement in awareness of potential hazards particularly in the vulnerable section of population is essential. This includes workers closely associated with hazardous material or with industrial units handling hazardous material, and also the people staying in vicinity of such units.

Training

Industry, plants and hazard specific training in safety and handling of emergencies, if any, is essential. Different training orientation is needed for government officials, managers of industrial units, both technical and administrative, and the workers.

➤ Why Mumbai is vulnerable to Chemical disasters?

Chembur-Trombay industrial area consists of major refineries, petro-chemical, fertilizer; thermal power station nuclear power and other industries engaged in handling, storage and manufacturing activities / some of these chemicals are hazardous in nature. Apart from storage -and manufacture, large quantities of these chemicals are transported by road.

All MAH industries have prepared On-site emergency management plan. Almost all these industries are equipped with resources, equipment's and trained manpower to handle these emergencies, pooling the available resources during an emergency and prevent disaster from occurring.

With this objective DISH and MARG, Chembur-Trombay Region have joined hands together in order to have professional approach to the whole objective and its

implementation.

The main objectives of MARG are:

To provide help as and when required by any of the members in emergency, in minimum possible time to save life, property and with minimum damage.

To create community awareness and confidence among the people living around.

Private Sector's role

The private sector has the potential to play a major role in the preparation for response to emergency operations by integrating their capabilities with the government organizations. The private sector has a large infrastructure and is engaged in R&D for development of various products and services, which form a part of the countermeasures required to tackle the emergencies.

A large part of the chemical infrastructure is owned by the private sectors, which has the crucial responsibility of developing their On-Site plans and in addressing many issues related to the management of emergencies, including those for preparation, response, and post disaster phases of rehabilitation and recovery. All industries, which stock and use chemical agents that can be released due to loss of containment during a natural disaster will form part of the DM system at the district level for better On-Site and Off- Site management.

The private sectors have adequate capabilities in search and rescue, and have sufficient trained manpower and medical facilities. These resources can be requisitioned by the district authorities, if necessary. Such a mechanism will be developed between district authorities and public and private sectors on mutually agreeable terms.

Private sector facilities are required to be included in district-level DM plans and collaborative strategies shall be evolved at the district level for the utilization of their manpower and infrastructure. Private medical and paramedical staff must be made part of the resources. Community based social workers can assist in first aid, psycho-social care, distribution of food, water and organization of community shelters under the Overall supervision of elected representatives of the community.

The accident occurred on the night of 2-3 December 1984 at the Union Carbide Factory at Bhopal producing pesticides.

About 40 tonnes of Methyl Iso- Cynate (HCM) leaked from the plant. The gas affected the residents of Bhopal in a big way. Most affected were those staying in the localities downwind in the vicinity of the plant. About 8000 persons were killed. Health of more than 530,000 persons were severely affected causing multi-system injuries.

Thirty-six municipal wards were affected. The toxic gas was absorbed into the blood stream of the people causing (MIC) and other toxic gases including Hydrogen Cyanide lasting and damaging effect to lungs, brain, kidney, reproductive, as well as immune system of victims.

Causes of Disaster

The Bhopal Gas Disaster was caused by a complex set of independent human, organisational and technological errors. The salient aspects are summarized below.

Human Factors

- Inadequate safety training of employees.

District Disaster Management Plan

- Low employee morale.
- Lack of awareness regarding the hazard potential of the plant among the managers and workers.
- Overlooking minor indicators of a possible accident occurred on earlier occasions. (There was a technical snag in storage tank E-610 on 21 October 1984 which was ignored and not investigated)

Organizational Factors

- Lack of resources and inadequate managerial attention, which contributed to lower safety standards.
- Lack of urgency in preparing contingency plans for possible accidents in the plant.

Technological Factors

- Numerous design errors
- Absence of computerized early warning system.
- Long-term storage of huge quantities of MIC.
- Outmoded manual safety system. (An electronically controlled four stages back-up safety system was used in similar plants elsewhere).
- Poor maintenance.

Certain Observations on Response to the Disaster

The medical facilities were over stretched. Besides, the doctors in Bhopal were not aware of the possible cause of the disaster. They were unaware of the type of gas, which had leaked out, and its toxicity. The plant officials insisted that MIC was not lethal; it was only an irritant.

There was no awareness of the hazard potential of the plant among politicians, government officials, media and the general population. This resulted in a total lack of preparedness to meet the eventuality of a disaster of such a magnitude. There was no credible public information system in place that resulted in total confusion, fear and panic.

Procedure for mitigation and prevention:

- Create a pool of well-trained medical professionals
- Ensure availability stocks and ready availability of diagnostic re-agents
- Develop an effective network of surveillance system to detect outbreak of epidemics.
- Improve skills of medical professionals towards early diagnoses and identification of epidemics.
- Improve public awareness to enable people to help the administration and medical authorities in disaster management
- Have a reliable and credible public information system for dissemination of factual information to avoid fear and panic among masses.
- Organizing mass scale immunization programme
- Providing effective and efficient (timely) treatment
- Maintaining high standards of hygiene and sanitation in the communities.
- Preventing spread of disease and

Creating public awareness towards health care.

Standard Operating Procedure

ESF – I – Communication

Lead Agency: Disaster Management Unit

	Before	During	After
	<ul style="list-style-type: none"> • To form the Incident Management Team • To form the Damage Assessment Team • To organize orientation and training of responders including community in disaster management • To coordinate with relevant departments regarding enforcement of Building Codes, Fire Safety Rules and Certification of Building etc. • To follow-up with concerned agencies about the arrangements for putting up stop gap bridges on emergency basis & formation and training of the team for the erection of temporary bridges. • To follow-up with MTNL about the arrangements for the restoration of communication system & act accordingly • To follow-up with Health Department about facilities available, both in private & 	<ul style="list-style-type: none"> • To coordinate the disaster response operation • Activate Emergency Support Functions as per requirement • To deploy SAR Teams to the incident site • If required dispatch NDRF to the incident site • Inform the military and paramilitary forces to get ready for emergency response • To alert higher authorities • Activate HAM Radio Operators • To organize the restoration of communication, transportation • Coordinate for relief distribution • To hold meeting with donor agencies 	<ul style="list-style-type: none"> • To select the sight for resettlement of victims • To get the resettlement plan prepared • To deactivate the response operation but continue with relief and other support service operations. • Maintain records containing all relevant information relating to action points and contact points • Conduct debriefing meetings with all agencies • Prepare an After Action Report to identify lessons learnt and improvements needed

<p>public sector, for health services in emergencies in vulnerable areas and act accordingly</p> <ul style="list-style-type: none"> • To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly • To follow-up with Energy Department about arrangements for the restoration of power supply and providing for supply of power through alternative sources of energy & act accordingly • To follow-up with Ward EOCs about the implementation of mitigation, preparedness and response measures and present status of the same & act accordingly • To organize the orientation and training undertake earthquake resistance constructions and retrofitting on a large scale • To follow-up with Fire Department about the reach and capacity of their fire-extinguishers, fire safety policy and plan to increase their spread and improve their capacity and policy to train security guards, habitants of high rise building, civil defence, Home Guards personnel and volunteers in fire safety measures & act accordingly • To follow-up with Armed Forces about the emergency support services available with them and keep in regular touch with them. 	<ul style="list-style-type: none"> • To organize disposal of dead bodies both human and livestock 	
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ESF - 2 - Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none"> • Conduct a mock drill for the law & order situation during Aircraft emergency • Arrange First Responder Training for Police personnel • Keep rescue ropes & other lifesaving material ready • Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system • Identify alternative routes for traffic • Undertake any other activity considered necessary 	<ul style="list-style-type: none"> • On receipt of an emergency call, operationalize level activation based on nature and severity of incident • The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff. • Assess the available resources and determine the need for additional resources • Ensure law and order situation in affected area • Provide extra police personnel at traffic diversions • Protect life and property, control traffic and keep close watch on anti-social elements • Provide information about traffic flow to the public through media, public address system, sign boards and display boards • Transport / Shift stranded or affected persons through Police and other vehicles • Organise towing of stranded vehicles if any with the help of volunteers • Maintain a log of reports / action taken, needs and capabilities • Undertake any other activity as per site condition 	<ul style="list-style-type: none"> • Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters. • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF – 3 – Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firemen • Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner • Repair and maintain ancillary equipment • Conduct Training and Refresher Courses for Rescue Teams • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery • Keep communication devices in a state of readiness • Conduct mock drills, awareness programs etc. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident. • Determine needs and available resources • Dispense resources required based on need and augment men and machinery if necessary. • Locate the incident command post and staging areas appropriately • Direct operations from a safe distance and ensure ability to escape. • Ensure safety from electrical installations or power supply at the disaster site. • If required establish communication from the incident site with other tactical operators • Monitor activities and regularly update support agencies • Organise rescue, evacuation and salvage operations. • Transport injured persons to hospitals. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 4 - Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none"> • Train newly recruited officers and firefighters in basic search & rescue operations. • Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner. • Repair and maintain rescue Equipment • Conduct Training and Refresher Courses for Search & Rescue Teams. • Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue. • Keep communication devices in a state of readiness. • Recce disaster prone areas along with other agencies. • Conduct mock drills, awareness programs etc. • Undertake any other activity required. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs. • Operationalize level of activation depending on the nature and severity of the incident • Determine needs and available resources. • Locate incident command post and staging areas appropriately • Direct operations from a safe distance, with capability of escape. • Augment men and machinery if necessary • Establish communications from the incident site with other tactical operations, and EOC • Monitor activities and update support agency staff. • Transport injured persons to hospitals. • Shift victims to temporary shelters as per requirement. 	<ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none"> • If required prepare alternate transport arrangement plan in consultation with Supporting Agencies. • Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai. • Provide and assign emergency transportation resources to the requesting organizations. • Update information of available transportation and resources owned in and around Mumbai. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff. • Monitor activities and update support agency staff. • Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas. • Determine transportation needs and available resources. • Establish and maintain public transportation and resources. • Disseminate updated information to passengers through Public Address System. • Organize transportation of sick or injured persons in need of medical attention. • Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities. 	<ul style="list-style-type: none"> • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • To follow-up with Road & Building Construction Department about the availability of heavy duty cutting, debris clearing machines, their specifications, placement, storage and their operators & upkeep of the same for ready use. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

ESF - 8 - Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none"> • Update list of public information media (print, radio and TV). • Participate in Mock Drills, Table Top exercises 	<ul style="list-style-type: none"> • The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation. • The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff. • Disseminate information about earthquake affected areas and actions taken by government through media • Disseminate evacuation information to the affected people through media. • Provide mass notifications to the populace and provide periodic media updates. • Issue messages for public safety and mutual cooperation. • Organize a press briefing in EOC as appropriate. • Maintain a log of actions taken, reports of resources needs and capabilities. 	<ul style="list-style-type: none"> • Continue public information activities and update citizen on recovery efforts. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 9 - Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 11 - Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none"> • Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts. • Monitor energy system likely to be damaged during a disaster and in need of repair work. • Provide separate lines and separate sources of power for critical substations. • Collect, assess, and provide information on energy supply and demand. • Identify resources needed to restore energy systems. • Train staff to attend to emergencies. • Ensure sufficient stocks of essential spares such as cables. • Conduct awareness programmes for consumers. • Undertake any other activity as per site condition. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff. • Update Support Agency staff and monitor activities. • Determine needs and available communication means. • Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts. • Collect current information on damage and area affected. • Switch off power supply if necessary. • Officers at site to coordinate with fault engineers and mains engineers. • Maintain a log of actions taken, reports of communication resource needs and capabilities 	<ul style="list-style-type: none"> • Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system • Assess the requirements of restoration • Coordinate with supporting agencies for temporary arrangement of fuel, gas and power • Prepare an After-Action Report to identify lessons learnt and improvements needed

ESF - 12 - Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none"> • Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures. • Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency. • Appoint additional contractual labour as per requirement. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster. • The Lead Agency representative will receive and give briefings and updates to the EOC staff • Update support agency staff and monitor activities • Determine needs and available resources. • Start responding to utilities shortages and disruptions and take care of public safety and health 	<ul style="list-style-type: none"> • Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 13 - Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritize equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination and decontamination activities; • Seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Provide area security and prohibit unauthorized personnel from area with assistance from ESF Public Safety and Law & Order. • Determine with the help of appropriate agencies guidelines for re-entry of emergency personnel & residents. • Make emergency plan to control and clean up hazardous materials. • Conclude clean-up operations when the area is declared safe by responsible personnel. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Disseminate safety information through media • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos and Don'ts

- Do not panic
- Don't trust or spread rumors
- Close doors and windows –draw curtain and seal ventilators
- Turn off A.C and extinguish naked flames.
- Move to a room furthest away from the hazard area
- Go to basement or underground area.
- Stay indoors till all clear signals is given.
- Wash and peel vegetables and fruits before use
- Move in opposite direction of wind
- If doubtful of exposure- take shower (head first) and change clothes and shoes.
- Items in plastic bag and seal and go for medical check-up.

Epidemics

An **epidemic** is the rapid spread of infectious disease to a large number of people in a given population within a short period of time, usually two weeks or less. For example, in meningococcal infections, an attack rate in excess of 15 cases per 100,000 people for two consecutive weeks is considered an epidemic.

Epidemics of infectious disease are generally caused by several factors including a change in the ecology of the host population (e.g. increased stress or increase in the density of a vector species), a genetic change in the pathogen reservoir or the introduction of an emerging pathogen to a host population. Generally, an epidemic occurs when host immunity to either an established pathogen or newly emerging novel pathogen is suddenly reduced below that found in the endemic equilibrium and the transmission threshold is exceeded.

An epidemic may be restricted to one location; however, if it spreads to other countries or continents and affects a substantial number of people, it may be termed a pandemic. The declaration of an epidemic usually requires a good understanding of a baseline rate of incidence; epidemics for certain diseases, such as influenza, are defined as reaching some defined increase in incidence above this baseline. A few cases of a very rare disease may be classified as an epidemic, while many cases of a common disease (such as the common cold) would not.

How Mumbai is vulnerable to Epidemics?

Mumbai city, one of the mega metropolises of the country established on an area of 437.71 sq. km, provides extensive health facilities to the populace of 12.43 million, where 53% of them staying in the slums with minimum basic amenities. These facilities include not only preventive & curative services but also speciality, super speciality and prevention of communicable diseases at the budget of about Rs. 466 crores per year.

These health services are provided through 18 Peripheral Hospitals, 5 Specialized Hospitals i.e ENT, Eye, TB, Leprosy and Kasturba Hospital for Infectious Diseases, 28 Maternity Homes, 169 Dispensaries, 183 Health Posts, 23 Post-Partum Centres, S.T.D. clinic, Drug-De-Addiction Centre etc.

Public Health Department infrastructure focuses on preventive aspects of the health services, where the emphasis is on control measures of important diseases such as Malaria, Tuberculosis, Leprosy, Sexually Transmitted Diseases (STDs), HIV/ AIDS etc. and important programmes viz. Polio Eradication, Immunisation against vaccine preventable diseases, Family Welfare and Maternal & Child Health, School Health for the children of Municipal schools, and Disposal of Bio Medical Waste.

In spite of successful rigorous efforts to implement the programmes to control the above said diseases, the new challenges, problems are evolving because of the metropolis life style and migration of population from the rural area. The challenges would be summarised as population density exceeding 28462 per sq. kms., more than 4,00,000 vehicles plying on the roads per day and more than 50% of the population travelling extensively for various purposes, communication barriers, rising slums & unsanitary conditions, inadequate civic amenities, various types of diseases due to the pollution, various types of cancers and diseases due to the stress factor, which Public Health Department has to contemplate. 12.43 million, where 53% of them staying in the slums with minimum basic amenities. These facilities include not only preventive & curative services but

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also speciality, super speciality and prevention of communicable diseases at the budget of about Rs. 466 crores per year. These health services are provided through 17 Peripheral Hospitals, 5 Specialised Hospitals i.e ENT, Eye, TB, Leprosy and Kasturba Hospital for Infectious Diseases, 29 Maternity Homes, 169 Dispensaries, 183 Health Posts(of which 61 combined dispensaries and health posts under one structure have been upgraded to provide laboratory facilities), 21 new urban primary health centers (UPHCS) have been started since January 2016, 23 Post Partum Centres, S.T.D. clinic, Drug-De-Addiction Centre etc. Public Health Department infrastructure focuses on preventive aspects of the health services, where the emphasis is on control measures of important diseases such as Malaria, Tuberculosis, Leprosy, Sexually Transmitted Diseases (STDs), HIV/ AIDS etc. and important programmes viz. Polio Eradication, Immunisation against vaccine preventable diseases, Family Welfare and Maternal & Child Health, School Health for the children of Municipal schools, and Disposal of Bio Medical Waste.

In spite of successful rigorous efforts to implement the programmes to control the above said diseases, the new challenges, problems are evolving because of the metropolis life style and migration of population from the rural area. The challenges would be summarised as population density exceeding 9800 per sq. kms., more than 4,00,000 vehicles plying on the roads per day and more than 50% of the population travelling extensively for various purposes, communication barriers, rising slums & unsanitary conditions, inadequate civic amenities, various types of diseases due to the pollution, various types of cancers and diseases due to the stress factor, which Public Health Department has to contemplate.

ACTION PLAN

Epidemiology Cell:

Preparedness

1. SOP and protocol for management of Monsoon related Diseases have been prepared and will be distributed to the concerned department before monsoon.
2. Rapid Response Team at ward level consisting of Medical officer of Health, Asst. Medical officer(Surveillance), Community Development officer and Health post staff
3. All MOH are directed to keep the list high risk areas, chronic flooding spots, & mobilization of resources as per need.
4. Training for Medical & Para Medical of M.C.G.M and sensitization of Private Practitioner, Public representatives, Social workers, ALM, Housing societies and Construction site supervisors and safety officers by involving educational institutes.
5. Circulating national guidelines of investigation and treatment protocols to Municipal health institutes and Private Practitioners.
6. Procurement of Essential Medicine, Kits, Chlorine Tablets & ORS Packets for control of disease outbreak.
7. Provision of separate beds in the hospitals for Monsoon related illness.
8. Preparing IEC material, planning IEC activities for Community awareness.
9. Co-ordination with SWM, IO, Water & Veterinary College.

Activities:

1. Establishment of Control Room from 1st June 2017 at Epidemiology Cell for monitoring disease trend.
2. Daily collection, compilation & Analysis of admitted cases of Monsoon related diseases from Municipal & Government hospitals for trend monitoring & feedback to MOH/PCO/AE Water works for prevention and control measures to be undertaken .
3. Containment measures for water & vector borne diseases & preparedness for out breaks.
4. Alert regarding any untoward increase in cases is given to health post and hospitals for immediate containment measures.
5. As a part of Mumbai Arogya Abhiyan, Special Sunday Medical camps are organized in high risk areas in collaboration with Public health department, secondary and tertiary hospitals.
6. Regular review & co ordination meetings with the medical colleges, peripheral hospitals & infectious disease hospital.
7. IEC Campaign will be carried out for Community awareness through various media, like hand bills, posters, banners, electronic medium, interpersonal communications etc.
Helpline no: (022-24114000) for queries regarding Monsoon related disease is activated.

Surveillance Department:(Malaria)

1. **Training and Awareness:** All MCGM medical officers and paramedical staff will be trained. Elected representatives of each ward will be sensitized in ward committee meeting. Safety Officers/Site Supervisors of construction sites will also be sensitized.
2. Training for Medical & Para Medical of M.C.G.M has been arranged in co-ordination with training cell by involving educational institutes.
3. **Co-ordination meeting** with major Private Hospitals and laboratories has been conducted for better co-ordination with private health care facilities.
4. Training of trainers (TOTs), sensitization of PMPs, security and safety officers at construction sites, public representatives, etc. scheduled and was completed in the second week of May 2017.
5. **Construction Sites:** Special Blood Examination drives for labour working in 3 shifts on construction sites in all over Mumbai was conducted and fever patients were treated.
6. **Availability of Drug:** Availability of drug stock was ensured and sufficient medicines were kept in stock.
7. **Micro Trend Mapping:** Daily cases reported from each ward were mapped and high risk areas were identified. Monitored high risk areas for vector and parasitic control was done regularly by MOH and PCO of concern ward together.

8. **Special Health camps** on Sundays conducted in the high risk areas from the month of June 2017.
9. **Rapid Test Kits** was used for construction sites and dispensaries whenever necessary.
10. **Breeding Mass Surveys, High Risk Surveys** were conducted by Surveillance staff.
11. Malaria/Dengue Awareness Programme was carried out with help of N.S.S. students of Mumbai University and an N.G.O. - United Way.
12. **Routine survey** was started in the community by the Surveillance Inspectors and Surveillance Investigators and Health post staff as well as rapid survey conducted after reporting of Malaria positive/admitted cases in hospital.
13. In High Risk areas, rapid and routine survey was conducted after reporting of breeding spots, Malaria Positive Patients, suspected death due to Malaria etc. also completed treatment given to malaria positive patients by Surveillance Staff.
14. **Helpline number- 022-41140000** was activated to provide information to the public

PREVENTION OF WATER BORNE DISEASES

Intervention	Activity
<p>Prevention, Early diagnosis, treatment & surveillance</p> <p>MOH, PCO, Hospitals</p>	<p>a) MOH should ensure that visibly contaminated water samples (Turbid/Foul Smelling/Discoloration) should be immediately reported to AEWV and such samples should not be sent to Municipal Lab for testing. Measure the chlorine content of the water sample collected from fixed & complaint spots of which residual chlorine to be detected on spot with chlorinometer before sending for analysis.</p> <p>b) To create awareness amongst the owners/ tenants for regular cleaning of overhead/ underground suction water storage tanks.</p> <p>c) MOH should ensure that there is adequate stock of essential medicines, chlorine tablets, ORS packets etc at HP & Disp.</p> <p>d) MOH should ensure immediate Corrective action from AEWV with in 24 hours against unfit water sample reported.</p> <p>e) To create regular reference system for admission of critically ill patients detected /reported in dispensaries and from community to nearest municipal hospitals.</p> <p>f) Insecticide Officer to ensure that P.C.O.'s under his control would intensify vector control measures.</p>

District Disaster Management Plan

Municipal analyst	a) Water quality monitoring & testing water samples & report within 24 hours. Maintain high quality standards for checking water samples. b) Reporting of unfit water samples to concerned MOH, AEWV & AE (QC) promptly. c) To ensure adequate reagents and testing kits availability for water testing throughout the year. d) Contingency plan for outsourcing the samples for testing in case of excess sample.
Food Safety & Sanitation MOH, AE Environment	a) J.O. (Food Destruction) to ensure that destruction of unwholesome, stale and exposed food like Sharbat, cut fruits etc. b) IEC activity for community awareness regarding food safety and hygiene for prevention of water/food borne disease. c) AE Environment at ward to ensure prompt removal of garbage.

Sr. No	Vector Control (Mosquito: Anopheles Stephensi)	Parasite Control (Plasmodium Vivax, Falciparum)
1	Ward-wise Identification and mapping of breeding sites, Identification of high risk wards and high risk areas in a ward	Early Case detection through Active surveillance and slide collection at Construction sites, house to house survey and through Mass activity like breeding mass/ death mass, etc
2	Mosquito proofing of all the water storage tanks on Municipal properties in 24 wards.	Micro mapping of areas and development of special strategies for high risk areas
3	Involvement of Govt, Non-Govt sectors and other stake-holders for mosquito proofing of their properties.	Case detection at all passive centers and complete Treatment of patients at all health facilities as per NDP 2010
4	Procurements of insecticide including MLO & availability logistics, manpower ,equipments and vehicles etc.	Linkages between health post staff, dispensary and surveillance staff like Rapid fever survey through health post staff & early referral to dispensaries
5	Wardwise & Areawise micro plan for anti-larval, IRS, & fogging activity for destruction of Breeding sites.	Medical camps- Sunday and weekday's camp & outreach services in high risk areas through Mumbai Aarogya Abhiyan
6	Focused activities for vector control (i.e.antilarva & antiadult) at construction sites. Strict Implementation of BY LAWS.	Ward wise special activities in form of night surveys, special Sunday drives to improve coverage to cater to floating population/ Migrant population
7	Ensure distribution & use of Bed nets at construction sites by the Builder.	Early diagnosis in 24 hrs at all the level of health care with strict no backlog; outsourcing from central lab and quality assurance check thereon
8	Treatment of water containers using Temephos through CHVs and Dattakvasti Yojna staff in Slums.	RT(Radical Treatment) monitoring and verification at various levels like surveillance staff, MOH, AHO, DEHO, Asst. Commissioners.
9	Awareness & Sensitization to Observe weekly dry day in all the areas.	Micro trend mapping of cases, deaths and feedback to MOHs for necessary action
10	Involvement of Public representatives, community & NGOs for vector control and Micro planning.	Regular review meetings with all stake holders for effective control
11	Daily coordination with MOH & other staff of the ward for prompt vector control action related to malaria cases	Involvement of pvt. hospitals & doctors in treatment & diagnosis with provision of training and sensitization to National policy guidelines for Malaria control
12	Mosquito proofing of water storage tanks on private properties by enforcing	Training of Surveillance staff, Lab technicians, Sr MO, AHO, DEHO and sensitization

	section 381 (1) ,381 A & 381 B of BMC act.	workshops of Corporators & developers
13	Programme for creation of breeding places of Guppy fishes (hatcheries) and their release in clean water for larvicidal activity.	Behavior change through extensive IEC for early diagnosis, avoiding self medication, complete treatment & use of bed nets

Comprehensive action plan for preventing Leptospirosis at the ward level

Leptospirosis an acute zoonotic infection caused by Spirochete *Leptospira* and is transmitted from animals to humans directly through contact with urine or tissue of infected animals through broken skin or mucous membranes. The 2015 outbreak of Leptospirosis was investigated and findings show that there is high prevalence of Leptospirosis serovar in animals such as cows, dogs & rats.

To ensure control of transmission of leptospira & other vector borne diseases like Malaria, Dengue etc, on deliberation with technical experts, veterinarians, Medical colleges & Hon'ble MC/AMC(WS), an action plan is attached.

By directions of AMC(WS), Assistant Municipal Commissioners (ACs) of the ward are requested to implement the activities as suggested in attached chart and submit report by email to Epidemiology cell at epidcellmcgm@gmail.com with copy to AMC (WS) every month in non monsoon season & fortnightly during monsoon .

The following action is proposed at the ward level. The actions need to be coordinated monitored and supervised at ward level by Asst. Commissioner of ward involving the concerned departments. The Comprehensive action should be implemented jointly as a team. The Asst. Commissioner will act as nodal officer and will coordinate with the following departments for prevention and control of Leptospirosis. The concerned departments which need to work in coordination are as follows.

1. Health Department
2. Insecticide Officer
3. Solid waste Management
4. A.E. (B&F) /A.E. (Maintenance) of ward
5. Animal Diseases' Control at ward level with veterinary doctor.
6. AHS of respective wards.

7. Water supply dept.

The protocol and comprehensive action plan for control of Leptospirosis involving coordinated actions of various departments is attached herewith. Successful implementation of the action plan will help in reducing the morbidity and mortality due to Leptospirosis.

PROTOCOL AND COMPREHENSIVE ACTION PLAN FOR CONTROL OF LEPTOSPIROSIS

A (1) Inspection of stables to be conducted by MOH or by staff under his supervision

1. Inspection of stables for licenses

The number of animals : The inspection to be done , if number of animals is more or as shown is licenses

Cleanliness of stable – The inspection for maintaining cleanliness at the animals sites, the water storages sites, fodder / grass storages sites to be done categorically.

Disposal of dung, urine, waste fodder, etc. The inspection for arrangements for maintenance of cleanliness maintaining proper disposal of dung, urine, waste fodder, etc to be observed.

Actions :

Action by Health Department :

1. MOH either himself or through the ward sanitary inspector / Sr. Sanitary Inspector to inspect the stables for observance of general and special conditions under section 394 of MMC Act. if there is infringement of license condition, the action under section 394 MMC Act, should be initiated. If there are additional animal seen, immediate action for removal of the excess animals to be undertaken.
2. The medial examination of workers for leptospirosis working at stables shall be periodically done by the owner from any registered medical practitioner having qualification not less than MBBS. The medical test shall include physical examination; blood test for leptospirosis viz, Eliza test. The MOH shall ensure that such medical examination is conducted from time to time.
3. The MOH shall issue instructions to stable owners for providing “personal protection gears” to the workers in the stable, since the transmission of infection occurs through the skin, mucus membranes if it comes in contact with contaminated urine, dung the workers are to be provided with personal protective gears by the stable owners. These include knee height gum boots, hand gloves, disinfectants. etc.
4. The EHO shall prescribe type / nature of disinfectants to be used along with chemical composition, minimum doses and the manner in which it is to be applied. it will be the responsibility of stable owner that only treated urine is disposed in Municipal drain. The AHS of ward to ensure the disinfection of urine waste which may contain infected urine prior to disposal in the Municipal drain.

5. Action by insecticide officer - .

1. Inspection of water storage sites for breeding of mosquito and rat nuisance.
2. Taking suitable action on water storage sites, if there is breeding and also taking action if rat nuisance is detected.

Action by S.W.M. department -

1. Inspection of stable for observing proper drainage facility for flow of animal urine only after with disinfectant. Ensuring animal urine and dung is segregated properly and not thrown in to nallahs and gutters and the dung is transported daily outside MCGM limits.

A (2) Inspection of nallahs in vicinity of stable :

2. Checking of disposal of urine, dung , fodder into the Municipal nallahs, gutters etc, in the vicinity of stable and taking suitable action as suggested.
3. Checking of water lines supplying water to stables. If any unauthorized water connection noticed, suitable action and disconnection of such supply should be done.
4. Checking for rat nuisance in the locality in the vicinity of the stable should be done and if any rat nuisance noticed suitable corrective action to be taken by PCO.

B. Awareness programme by Assistant Commissioner, Health Department and others.

1. Disseminate information on behavioural and environmental factors that predispose humans to leptospiral infections.
2. Disseminating information on “ Dos and Don'ts” for prevention of acquiring infection through various medias like groups talks, meetings, rallies, televisions, radios etc.
3. Meeting with Municipal Councillors, Private medical practitioners and other stake holders.

C. Animal Diseases Control at Ward level by Assistant Commissioners, Veterinary Doctor and Health Department

1. Ensuring the schedule of medical examination by veterinary doctors for the stables in the ward.
2. Taking suitable action in dogs and also at cattle pound.

In view to control the transmission of infection from animal to human and thereby controlling the Leptospirosis and other animal infections, the actions suggested above needs to be implemented under supervision of Assistant Commissioner of the ward with the team of

District Disaster Management Plan

MOH, PCO, AE (Maint), AE (B&F), AE (WW), AHS of the ward. These coordinated efforts require active involvement of other stake holders like, Private Medical practitioners and the community. The Assistant Commissioner is hereby informed to the refer to action plan attached herewith & the additional activities as per the needs of the ward can be included. This action plan has defined roles, responsibilities and accountability for the activities assigned to concerned departments & their staff. The review of these activities is to be undertaken by Asst. Commissioner every fortnightly during monsoon season and monthly in non monsoon season. The report of activities undertaken to be submitted to zonal DMCs, AMC (WS) and Hon'ble M.C. in case of any alarming situation, or sudden reporting of lepto or fever cases, the matter should be reported with action taken immediately on priority.

PREVENTION OF DENGUE & CHIKUNGUNYA

Sr No	Interventions	Department	Activity
1	Work place intervention	Medical Officer-Health, Pest Control Officer	Awareness regarding mosquito breeding sites at workplaces (eg water coolers, fountains, flower pots etc) to Housekeeping staff at commercial establishments, offices and factories.
2	Contact tracing	Health Post staff	Rapid Fever survey in the community Contact persons of Dengue cases are traced and referred for investigations. Regular follow up of necessary treatment of dengue confirmed cases.
3	Involvement of Community Based Originations like ALM's/Housing Societies for Awareness	Medical Officer-Health & Community Development Officer	Prevention of dengue in non slum locality with the help of Advanced Locality Management groups (ALMs). Awareness at community level with the help of housing societies by information of Do's and Don'ts- For prevention & control of dengue .
4	Co-ordination with Private hospitals and Doctors	Medical Officer-Health	Tracing of Dengue cases treated in private sector.
5	Strengthening of testing facilities	Medical colleges and Peripheral hospitals Dispensaries	Introducing ELISA testing facilities in 2 peripheral hospitals (1 each in eastern and western suburbs) as sentinel centers for Dengue testing Rapid testing in all MCGM Dispensaries.
6	Special awareness in Nonslum areas	Medical Officer-Health	Awareness messages regarding prevention of mosquito breeding sites is given in non slum locality.
7	Case management Training	Public Health Department, Medical colleges	Training of MO, PMPs, all Other paramedical staff for case management.

District Disaster Management Plan

8	Public awareness	Public health Department & Public Relation Officer	Design communication strategies and tools for Public awareness like posters, banners, radio jingles, cinema slides, local cables and miking
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Disaster management Plan

Standard Operating Procedure

ESF – I – Communication

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • To organize orientation and training of responders including community in disaster management • To follow-up with concerned agencies about the arrangements for putting up stop gap bridges on emergency basis & formation and training of the team for the erection of temporary bridges. • To follow-up with Health Department about facilities available, both in private & public sector, for health services in emergencies in vulnerable areas and act accordingly • To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly • To follow-up with Ward EOCs about the implementation of mitigation, preparedness and response measures and present status of the same & act accordingly 	<ul style="list-style-type: none"> • To coordinate the disaster response operation • Activate Emergency Support Functions as per requirement • To alert higher authorities • Coordinate for relief distribution • To hold meeting with donor agencies • To organize disposal of dead bodies both human and livestock 	<ul style="list-style-type: none"> • To select the sight for resettlement of victims • To get the resettlement plan prepared • Maintain records containing all relevant information relating to action points and contact points • Conduct debriefing meetings with all agencies • Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF - 2 - Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none">• Conduct a mock drill for the law & order situation• Arrange First Responder Training for Police personnel• Identify alternative routes for traffic• Undertake any other activity considered necessary	<ul style="list-style-type: none">• On receipt of an emergency call, operationalize level activation based on nature and severity of incident• The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff.• Assess the available resources and determine the need for additional resources• Ensure law and order situation in affected area• Transport / Shift or affected persons through Police and other vehicles• Maintain a log of reports / action taken, needs and capabilities• Undertake any other activity as per site condition	<ul style="list-style-type: none">• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none">• If required prepare alternate transport arrangement plan in consultation with Supporting Agencies.• Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai.• Provide and assign emergency transportation resources to the requesting organizations.• Update information of available transportation and resources owned in and around Mumbai.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff.• Monitor activities and update support agency staff.• Ensure transportation facilities for medical teams, supply of water, food and accommodation materials to affected areas.• Determine transportation needs and available resources.• Establish and maintain public transportation and resources.• Disseminate updated information to passengers through Public Address System.• Organize transportation of sick or injured persons in need of medical attention.• Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities.	<ul style="list-style-type: none">• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none">• Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty.• Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc.• Assess need for additional clinical services and staff.• Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc.• Reserve beds in hospitals.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings.• Assess the situation, forecast public health & sanitation response needs.• Deploy medical teams on site for emergency medical support.• Provide technical assistance to the EOC and validate requests for medical services.• Establish communication with other ESFs and provide technical assistance on public health and sanitation.• Validate requests from affected areas for public health and sanitation resources.• Provide reports to the EOC & anticipate future public health & sanitation requirements.• Deploy emergency medical teams where people cannot be shifted from the site.• Provide medicines, water and food in temporary shelters.• Liaise with secondary & tertiary medical institutions for care of critical patients.• Liaise with local blood banks and ambulance services.• Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains.• Safety and security of medicines and medical devices.• Establish temporary morgue facilities & coordinate with police for early disposal of dead.	<ul style="list-style-type: none">• Compile information about injured & deaths• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 7 - Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

Disaster management Plan

ESF – 8 – Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none">• Update list of public information media (print, radio and TV).• Participate in Mock Drills, Table Top exercises	<ul style="list-style-type: none">• The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation.• The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff.• Disseminate information about affected areas and actions taken by MCGM through media• Disseminate evacuation information to the affected people through media.• Provide mass notifications to the populace and provide periodic media updates.• Issue messages for public safety and mutual cooperation.• Organize a press briefing in EOC as appropriate.• Maintain a log of actions taken, reports of resources needs and capabilities.	<ul style="list-style-type: none">• Continue public information activities and update citizen on recovery efforts.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 9 – Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the affected, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 10 – Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Terrorist Activities

What is Terrorism?

Terrorist activities were traditionally not considered as disasters. However, during the last few years, terrorist activities have become more sophisticated in terms of the amount of detonating power on one side, and, the degree of coordination through which these are done, e.g. Several explosions are done almost simultaneously – thereby leaving the law-enforcement agencies and rescue operations in total confusion and disarray. Further, terrorist activities are now using explosive powers of their victims themselves to create more powerful blasts. e.g. Detonation of bombs kept in vehicles. These vehicles along with their fuels then act as still more powerful bombs. Similarly, in one incident, airplanes were made to collide against buildings. These airplanes with a very high velocity and large amounts of highly combustible fuels acted as a very dangerous combination.

Generally, large scale terrorist activities can be prevented only through timely collection and analysis of “intelligence” data. The only precaution that general population can take is to remain observant of their surroundings, and, report any suspicious activity to the law-enforcement agency.

Why Mumbai is vulnerable to Terrorism:

- Mumbai is the capital city of the Indian state of Maharashtra. It is the most populous city in India, and the fourth most populous city in the world.
- Mumbai is the commercial and entertainment capital of India, it is also one of the world's top 10 centres of commerce in terms of global financial flow, generating 5% of India's GDP, and accounting for 25% of industrial output, 70% of maritime trade in India (Mumbai Port Trust & JNPT), and 70% of capital transactions to India's economy.
- As of 2008, Mumbai's GDP is ₹919,600 crore (US\$173.8 billion),[135] and its per-capita income in 2009 was ₹486,000 (US\$9,185.4), which is almost three times the national average. Many of India's numerous conglomerates including Larsen and Toubro, State Bank of India, Life Insurance Corporation of India, Tata Group, Godrej and Reliance), and five of the Fortune Global 500 companies are based in Mumbai. Many foreign banks and financial institutions also have branches in this area, with the World Trade Centre being the most prominent one.
- Mumbai is the 3rd most expensive office market in the world. Mumbai was ranked among the fastest cities in the country for business start-up in 2009.
- The city houses important financial institutions such as the Reserve Bank of India, the Bombay Stock Exchange, the National Stock Exchange of India, the SEBI and the corporate headquarters of numerous Indian companies and multinational corporations.
- Mumbai is home to some of India's premier scientific and nuclear institutes like BARC, NPCL, IREL, TIFR, AERB, AECL, and the Department of Atomic Energy.

Disaster management Plan

- Most of India's major television and satellite networks, as well as its major publishing houses, are headquartered in Mumbai. The city also houses India's Hindi (Bollywood) and Marathi film and television industry. Mumbai's business opportunities, as well as its potential to offer a higher standard of living, attract migrants from all over India and, in turn, make the city a melting pot of many communities and cultures.
- Mumbai also has a large unskilled and semi-skilled self-employed population, who primarily earn their livelihood as hawkers, taxi drivers, mechanics and other such blue collar professions.
- The port and shipping industry is well established, with Mumbai Port being one of the oldest and most significant ports in India.
- In Dharavi, in central Mumbai, there is an increasingly large recycling industry, processing recyclable waste from other parts of the city; the district has an estimated 15,000 single-room factories.
- Public transport systems in Mumbai include the Mumbai Suburban Railway, Brihanmumbai Electric Supply and Transport (BEST) buses, black-and-yellow meter taxis, auto rickshaws and ferries. Suburban railway and BEST bus services together accounted for about 88% of the passenger traffic in 2008.
- The Mumbai Suburban Railway, popularly known as Locals forms the backbone of the city's transport system. It consists of three rail networks: Central, Western, and Harbour Line, running the length of the city, in the north-south direction.
- The Mumbai Monorail and Mumbai Metro are under construction and expected to be partially operational in late 2012 or early 2013, relieving overcrowding on the existing network.
- Mumbai is the headquarters of two of Indian Railways' zones: the Central Railway (CR) headquartered at Chhatrapati Shivaji Terminus (formerly Victoria Terminus), and the Western Railway (WR) headquartered at Churchgate. Mumbai is also well connected to most parts of India by the Indian railways. Long-distance trains originate from Chhatrapati Shivaji Terminus, Dadar Station, Lokmanya Tilak Terminus, Mumbai Central Station, Bandra Terminus, Andheri and Borivali.
- The Chhatrapati Shivaji International Airport (formerly Sahar International Airport) is the main aviation hub in the city and the busiest airport in India in terms of passenger traffic. CSIA handled traffic of 29.1 million passengers and around 670,235 tonnes of cargo in the FY 2010–2011. An upgrade plan was initiated in 2006, targeted at increasing the capacity of the airport to handle up to 40 million passengers annually. The Juhu Aerodrome was India's first airport, and now hosts a flying club and a heliport.
- Mumbai is served by two major ports, Mumbai Port Trust and Jawaharlal Nehru Port Trust, which lies just across the creek in Navi Mumbai. Mumbai Port has one of the best natural harbours in the world, and has extensive wet and dry dock accommodation facilities. The city is also the headquarters of the Western Naval Command, and also an important base for the Indian Navy.

Disaster management Plan

- Under colonial rule, tanks were the only source of water in Mumbai. Many localities have been named after them. The BMC supplies potable water to the city from six lakes, most of which comes from the Tulsi and Vihar lakes. The Tansa lake supplies water to the western suburbs and parts of the island city along the Western Railway. The water is filtered at Bhandup, which is Asia's largest water filtration plant. India's first underground water tunnel is being built in Mumbai.
- Mumbai has the second largest number of Art Deco buildings in the world after Miami. In the newer suburbs, modern buildings dominate the landscape. Mumbai has by far the largest number of skyscrapers in India, with 956 existing buildings and 272 under construction as of 2009.
- The Mumbai Heritage Conservation Committee (MHCC), established in 1995, formulates special regulations and by-laws to assist in the conservation of the city's heritage structures. Mumbai has two UNESCO World Heritage Sites, the Chhatrapati Shivaji Terminus and the Elephanta Caves. Popular tourist attractions in the city are Nariman Point, Girgaum Chowpatti, Juhu Beach, and Marine Drive. Essel World is a theme park and amusement centre situated close to Gorai Beach, and includes Asia's largest theme water park, Water Kingdom.
- In the south of Mumbai, there are colonial-era buildings and Soviet-style offices. In the east are factories and some slums. On the West coast are former-textile mills being demolished and skyscrapers built on top. There are 31 buildings taller than 100m, compared with 200 in Shanghai, 500 in Hong Kong and 500 in New York.
- Mumbai's culture is a blend of traditional festivals, food, music and theatres. The city offers a cosmopolitan and diverse lifestyle with a variety of food, entertainment and night life, available in a form and abundance comparable to that in other world capitals. Mumbai's history as a major trading centre has led to a diverse range of cultures, religions and cuisines coexisting in the city. This unique blend of cultures is due to the migration of people from all over India since the British period.
- Mumbai has numerous newspaper publications, television and radio stations.

ANTI - TERRORISM SQUAD

- Created by Government of Maharashtra, vide G.R. No. SAS-10/03/15/SB-IV, dated July 8, 2004
- To get information about anti-national elements working in any part of Maharashtra
- To co-ordinate with Central information agencies, like IB, RAW and exchange information with them
- To co-ordinate with similar agencies of other States
- To track and eliminate activities of mafia and other organized crime syndicates
- To detect rackets of counterfeit currency notes and smuggling narcotic substances

Disaster management Plan

Standard Operating Procedure

ESF – I – Communication

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • To form the Incident Management Team • To form the Damage Assessment Team • To organize orientation and training of responders including community in disaster management • To coordinate with relevant departments regarding enforcement of Building Codes, Fire Safety Rules and Certification of Building etc. • To follow-up with concerned agencies about the arrangements for putting up stop gap bridges on emergency basis & formation and training of the team for the erection of temporary bridges. • To follow-up with MTNL about the arrangements for the restoration of communication system & act accordingly • To follow-up with Health Department about facilities available, both in private & public sector, for health services in emergencies in vulnerable areas and act accordingly • To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly • To follow-up with Energy Department about arrangements for the restoration of power supply and providing for supply of power through alternative sources of energy & act accordingly • To follow-up with Ward EOCs about the implementation of mitigation, preparedness and 	<ul style="list-style-type: none"> • To coordinate the disaster response operation • Activate Emergency Support Functions as per requirement • To deploy SAR Teams to the incident site • If required dispatch NDRF to the incident site • Inform the military and paramilitary forces to get ready for emergency response • To alert higher authorities • Activate HAM Radio Operators • To organize the restoration of communication, transportation • Coordinate for relief distribution • To hold meeting with donor agencies • To organize disposal of dead bodies both human and livestock 	<ul style="list-style-type: none"> • To select the sight for resettlement of victims • To get the resettlement plan prepared • To deactivate the response operation but continue with relief and other support service operations. • Maintain records containing all relevant information relating to action points and contact points • Conduct debriefing meetings with all agencies • Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

<p>response measures and present status of the same & act accordingly</p> <ul style="list-style-type: none">• To organize the orientation and training undertake earthquake resistance constructions and retrofitting on a large scale• To follow-up with Fire Department about the reach and capacity of their fire-extinguishers, fire safety policy and plan to increase their spread and improve their capacity and policy to train security guards, habitants of high rise building, civil defence, Home Guards personnel and volunteers in fire safety measures & act accordingly• To follow-up with Armed Forces about the emergency support services available with them and keep in regular touch with them.		
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Disaster management Plan

ESF - 2 - Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none"> • Conduct a mock drill for the law & order situation during Aircraft emergency • Arrange First Responder Training for Police personnel • Keep rescue ropes & other lifesaving material ready • Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system • Identify alternative routes for traffic • Undertake any other activity considered necessary 	<ul style="list-style-type: none"> • On receipt of an emergency call, operationalize level activation based on nature and severity of incident • The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff. • Assess the available resources and determine the need for additional resources • Ensure law and order situation in affected area • Provide extra police personnel at traffic diversions • Protect life and property, control traffic and keep close watch on anti-social elements • Provide information about traffic flow to the public through media, public address system, sign boards and display boards • Transport / Shift stranded or affected persons through Police and other vehicles • Organise towing of stranded vehicles • Maintain a log of reports / action taken, needs and capabilities • Undertake any other activity as per site condition 	<ul style="list-style-type: none"> • Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters. • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 3 – Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none">• Train newly recruited officers and firemen• Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner• Repair and maintain ancillary equipment• Conduct Training and Refresher Courses for Rescue Teams• Keep fire stations and Regional Command Centers fully equipped with manpower and machinery• Keep communication devices in a state of readiness• Conduct mock drills, awareness programs etc.• Undertake any other activity as per site condition.	<ul style="list-style-type: none">• On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident.• Determine needs and available resources• Dispense resources required based on need and augment men and machinery if necessary.• Locate the incident command post and staging areas appropriately• Direct operations from a safe distance and ensure ability to escape.• Ensure safety from electrical installations or power supply at the disaster site.• If required establish communication from the incident site with other tactical operators• Monitor activities and regularly update support agencies• Organise rescue, evacuation and salvage operations.• Transport injured persons to hospitals.	<ul style="list-style-type: none">• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 4 – Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none">• Train newly recruited officers and firefighters in basic search & rescue operations.• Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner.• Repair and maintain rescue Equipment• Conduct Training and Refresher Courses for Search & Rescue Teams.• Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue.• Keep communication devices in a state of readiness.• Recce disaster prone areas along with other agencies.• Conduct mock drills, awareness programs etc.• Undertake any other activity required.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs.• Operationalize level of activation depending on the nature and severity of the incident• Determine needs and available resources.• Locate incident command post and staging areas appropriately• Direct operations from a safe distance, with capability of escape.• Augment men and machinery if necessary• Establish communications from the incident site with other tactical operations, and EOC• Monitor activities and update support agency staff.• Transport injured persons to hospitals.• Shift victims to temporary shelters as per requirement.	<ul style="list-style-type: none">• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none">• If required prepare alternate transport arrangement plan in consultation with Supporting Agencies.• Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai.• Provide and assign emergency transportation resources to the requesting organizations.• Update information of available transportation and resources owned in and around Mumbai.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff.• Monitor activities and update support agency staff.• Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas.• Determine transportation needs and available resources.• Establish and maintain public transportation and resources.• Disseminate updated information to passengers through Public Address System.• Organize transportation of sick or injured persons in need of medical attention.• Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities.	<ul style="list-style-type: none">• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • To follow-up with Road & Building Construction Department about the availability of heavy duty cutting, debris clearing machines, their specifications, placement, storage and their operators & upkeep of the same for ready use. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

Disaster management Plan

ESF – 8 – Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none">• Update list of public information media (print, radio and TV).• Participate in Mock Drills, Table Top exercises	<ul style="list-style-type: none">• The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation.• The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff.• Disseminate information about earthquake affected areas and actions taken by government through media• Disseminate evacuation information to the affected people through media.• Provide mass notifications to the populace and provide periodic media updates.• Issue messages for public safety and mutual cooperation.• Organize a press briefing in EOC as appropriate.• Maintain a log of actions taken, reports of resources needs and capabilities.	<ul style="list-style-type: none">• Continue public information activities and update citizen on recovery efforts.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 9 – Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 11 - Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none">• Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts.• Monitor energy system likely to be damaged during a disaster and in need of repair work.• Provide separate lines and separate sources of power for critical substations.• Collect, assess, and provide information on energy supply and demand.• Identify resources needed to restore energy systems.• Train staff to attend to emergencies.• Ensure sufficient stocks of essential spares such as cables.• Conduct awareness programmes for consumers.• Undertake any other activity as per site condition.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster.• The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff.• Update Support Agency staff and monitor activities.• Determine needs and available communication means.• Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts.• Collect current information on damage and area affected.• Switch off power supply if necessary.• Officers at site to coordinate with fault engineers and mains engineers.• Maintain a log of actions taken, reports of communication resource needs and capabilities	<ul style="list-style-type: none">• Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system• Assess the requirements of restoration• Coordinate with supporting agencies for temporary arrangement of fuel, gas and power• Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 12 – Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none">• Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures.• Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency.• Appoint additional contractual labour as per requirement.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The Lead Agency representative will receive and give briefings and updates to the EOC staff• Update support agency staff and monitor activities• Determine needs and available resources.• Start responding to utilities shortages and disruptions and take care of public safety and health	<ul style="list-style-type: none">• Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 13 - Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritize equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination and decontamination activities; • Seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Provide area security and prohibit unauthorized personnel from area with assistance from ESF Public Safety and Law & Order. • Determine with the help of appropriate agencies guidelines for re-entry of emergency personnel & residents. • Make emergency plan to control and clean up hazardous materials. • Conclude clean-up operations when the area is declared safe by responsible personnel. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Disseminate safety information through media • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

Dos & Donts

BEFORE

- Stay away from those areas that may have been the target of terrorism in the past.
- Be aware of the conduct of people around you.
- Look out for objects that should not be there, that cannot be accounted for or that are out of place.
- Under no circumstances should any suspicious package be touched, moved or otherwise disturbed.
- If at any time a package or other object is observed in an area where it should not be or under circumstances that give cause for suspicion, the Security Officer should be notified.
- The area around suspicious packages should be evacuated to at least 300 feet in all directions.
- There must be no mobile radio or cellular phone transmission within 300 feet of a suspicious package or object.
- Draw a plan or map of the building area where the suspicious package or object is found to be given to police to assist them in locating the package.
- Stay away from large gatherings or demonstrations.
- Be observant and alert. If something doesn't look or feel right, it probably isn't.
- When using public transport:
 - Check below the seat for any unattended bag / packet.
 - Be alert of someone leaving the train / bus without taking his belongings.
- If you hear about any incident:
 - Confirm its factual accuracy and ensure it's not a rumour.
 - Please avoid spreading any rumours as they can actually lead to an incident (e.g. stampede etc).

DURING

DO'S

- Stay calm. Do not panic.
- Remember that staircases and basements provide immediate protection from the blast, its effects and falling glass.
- Avoid calling any one. Please send SMS only. Huge amount of load is put on communication infrastructure during an emergency.
- Avoid crowds. Crowds may be targeted for a second attack.
- Avoid unattended cars, trucks or other vehicles. They may contain explosives.
- Stay far away from damaged buildings to avoid falling glass and bricks.
- Hear television and radio reports to keep you updated of the situation.

- In case of an explosion take cover under a sturdy table or desk if things are falling around you. When the situation is better, leave quickly, watching for weakened floors, stairways and falling debris.

Disaster management Plan

- Move away from exit routes to be used by emergency officials.
- If fire alarm has not been activated, remember that fire doors will NOT be free swinging.
- Break the emergency door release to enable fast egress.
- You will know where you are in the building with the signs for the floors.

DON'TS

- Do not run, you may be suspected as the bomber. If you are in a crowd, stay at the fringes.
- Do not return to the impacted area.
- Do not try to manage the situation alone.
- Don't stand in front of windows, glass doors or other hazardous areas.

AFTER

- Don't travel unless absolutely essential.
- Return to the affected area only after approval from Emergency Response Personnel.
- Seek counselling if you have been affected by the incident.

Fire

1. What is fire?

Combustion or burning is a phenomenon, in which substances combine chemically with oxygen from the air and typically give out bright light, heat, and smoke. But fire is really something completely different. Earth, water and air are all forms of matter -- they are made up of millions of atoms collected together. Fire isn't matter at all. It's a visible, tangible side effect of matter changing form -- its one part of a chemical reaction.

Typically, fire comes from a chemical reaction between oxygen in the atmosphere and some sort of fuel (wood or gasoline, for example). Of course, wood and gasoline don't spontaneously catch fire just because they're surrounded by oxygen. For the combustion reaction to happen, the fuel has to be heated to its ignition temperature.

2. Types of fire:



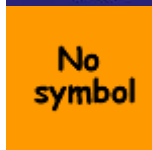
Class A fires involve solid materials of an organic nature such as wood, paper, cloth, rubber and plastics that do not melt.



Class B fires involve liquids. They include petrol, diesel, thinners, oils, paints, wax, cooking fat and plastics that melt.



Class C fires involve electricity.



Class D fires involve flammable metals such as magnesium, aluminum, titanium, sodium and potassium.

3. How vulnerable is Mumbai to fire?

Mumbai is one of the largest mega cities in the world by population and is currently ranked behind Tokyo, Mexico City and New York. The city is the financial capital of India with a large commercial and trading base. It plays host to a number of industries, multinational companies and important financial institutions. With a per capita income thrice the national average, Mumbai's contribution to the total tax revenues of the country are huge. The city is also an important international sea port and located strategically from a defense perspective. The most vulnerable section in the city are its slum dweller and squatter communities that comprise more than half the city's population.

Mumbai is also host to around 900 industries that are involved in manufacturing or processing or storage of hazardous goods. Many of these are located in close proximity to the city's residential and commercial areas, thereby increasing the risk of fires and

Disaster management Plan

explosions. They are majorly concentrated in the Chembur-Trombay belt (Wards M-West and M-East). This area has major chemical complexes, refineries & fertilizer plants. The atomic energy establishment and a thermal power plant are also situated here. Their presence makes the area vulnerable in case of any natural calamities.

Most of the industries in Mumbai are located in the eastern and northeastern corridor of the city with a few scattered in the western region. The number of factories in Mumbai has declined in the last decade (as also its share of factories in the state) from 44% to 34% between 1993 and 2000. As of 2003, there were more than 7800 large, medium and small-scale enterprises operating out of Mumbai. Most of these units are in mixed areas as there is no buffer zone for them. In fact, Mumbai was the first City Corporation to adopt the concept of a development plan under which industrial zones were allowed to be used for residential and commercial purposes. Therefore, there is no clear distinction between residential, commercial and industrial zones for the city. In the suburbs, industrial areas are being converted into residential complexes, leading to a boom in construction activity.. For instance, in recent years, most textile mills have closed down giving way to huge residential and commercial complexes. The land use pattern in the city has undergone major changes with the conversion of industrial areas into residential and commercial complexes.

Mumbai is vulnerable to the following types of fire:

- a. Fire in slum areas
- b. Fire in Houses / building / High rises
- c. Chemical fire
- d. Industrial fire
- e. Forest fire
- f. Electrical fires
- g. Fire in Ships / trains / buses

Causes of fire -

- h. Incidents of Fire caused mainly by overloading, short circuit etc.
- i. Domestic incidents involving cooking gas, cooking oil etc.
- j. Smoking in/around combustible materials could cause fire
- k. Weather: In summer : due to higher ambient temperature & leaves being dry - catch fire easily. This is also the time, when most forest-fires start.
- l. Festive events – due to large scale use/availability of fire-crackers, and/or decorative lights etc. Fire crackers pose a direct fire-risk, while, lighting adds to the risk due to overloading.

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Standard Operating Procedure of MFB in case of fire:

Standard Operating Procedure ESF – I – Communication

Lead Agency: Disaster Management Unit

	Before	During	After
	<ul style="list-style-type: none"> To form the Incident Management Team To form the Damage Assessment Team To organize orientation and training of responders including community in disaster management To coordinate with relevant departments regarding enforcement of Building Codes, Fire Safety Rules and Certification of Building etc. To follow-up with concerned agencies about the arrangements for putting up stop gap bridges on emergency basis & formation and training of the team for the erection of temporary bridges. To follow-up with MTNL about the arrangements for the restoration of communication system & act accordingly To follow-up with Health Department about facilities available, both in private & public sector, for health services in emergencies in vulnerable areas and act accordingly To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly To follow-up with Energy Department about arrangements for the restoration of power supply and providing for supply of power through alternative sources of energy & act accordingly To follow-up with Ward EOCs 	<ul style="list-style-type: none"> To coordinate the disaster response operation Activate Emergency Support Functions as per requirement To deploy SAR Teams to the incident site If required dispatch NDRF to the incident site To alert higher authorities Activate HAM Radio Operators To organize the restoration of communication, transportation Coordinate for relief distribution To hold meeting with donor agencies To organize disposal of dead bodies both human and livestock 	<ul style="list-style-type: none"> To select the sight for resettlement of victims To get the resettlement plan prepared To deactivate the response operation but continue with relief and other support service operations. Maintain records containing all relevant information relating to action points and contact points Conduct debriefing meetings with all agencies Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

<p>about the implementation of mitigation, preparedness and response measures and present status of the same & act accordingly</p> <ul style="list-style-type: none">• To follow-up with Fire Department about the reach and capacity of their fire-extinguishers, fire safety policy and plan to increase their spread and improve their capacity and policy to train security guards, habitants of high rise building, civil defence, Home Guards personnel and volunteers in fire safety measures & act accordingly• To follow-up with Armed Forces about the emergency support services available with them and keep in regular touch with them.		
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Disaster management Plan

ESF - 2 - Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none">• Conduct a mock drill for the law & order situation during fire emergency• Arrange First Responder Training for Police personnel• Keep rescue ropes & other lifesaving material ready• Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system• Identify alternative routes for traffic• Undertake any other activity considered necessary	<ul style="list-style-type: none">• On receipt of an emergency call, operationalize level activation based on nature and severity of incident• The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff.• Assess the available resources and determine the need for additional resources• Ensure law and order situation in affected area• Provide extra police personnel at traffic diversions• Protect life and property, control traffic and keep close watch on anti-social elements• Provide information about traffic flow to the public through media, public address system, sign boards and display boards• Transport / Shift stranded or affected persons through Police and other vehicles• Organise towing of stranded vehicles if any with the help of volunteers• Maintain a log of reports / action taken, needs and capabilities• Undertake any other activity as per site condition	<ul style="list-style-type: none">• Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters.• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 3 – Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none">• Train newly recruited officers and firemen• Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner• Repair and maintain ancillary equipment• Conduct Training and Refresher Courses for Rescue Teams• Keep fire stations and Regional Command Centers fully equipped with manpower and machinery• Keep communication devices in a state of readiness• Conduct mock drills, awareness programs etc.• Undertake any other activity as per site condition.	<ul style="list-style-type: none">• On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident.• Determine needs and available resources• Dispense resources required based on need and augment men and machinery if necessary.• Locate the incident command post and staging areas appropriately• Direct operations from a safe distance and ensure ability to escape.• Ensure safety from electrical installations or power supply at the disaster site.• If required establish communication from the incident site with other tactical operators• Monitor activities and regularly update support agencies• Organise rescue, evacuation and salvage operations.• Transport injured persons to hospitals.	<ul style="list-style-type: none">• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 4 – Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none">• Train newly recruited officers and firefighters in basic search & rescue operations.• Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner.• Repair and maintain rescue Equipment• Conduct Training and Refresher Courses for Search & Rescue Teams.• Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue.• Keep communication devices in a state of readiness.• Recce disaster prone areas along with other agencies.• Conduct mock drills, awareness programs etc.• Undertake any other activity required.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs.• Operationalize level of activation depending on the nature and severity of the incident• Determine needs and available resources.• Locate incident command post and staging areas appropriately• Direct operations from a safe distance, with capability of escape.• Augment men and machinery if necessary• Establish communications from the incident site with other tactical operations, and EOC• Monitor activities and update support agency staff.• Transport injured persons to hospitals.• Shift victims to temporary shelters as per requirement.	<ul style="list-style-type: none">• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none">• If required prepare alternate transport arrangement plan in consultation with Supporting Agencies.• Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai.• Provide and assign emergency transportation resources to the requesting organizations.• Update information of available transportation and resources owned in and around Mumbai.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff.• Monitor activities and update support agency staff.• Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas.• Determine transportation needs and available resources.• Establish and maintain public transportation and resources.• Disseminate updated information to passengers through Public Address System.• Organize transportation of sick or injured persons in need of medical attention.• Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities.	<ul style="list-style-type: none">• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 7 - Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • To follow-up with Road & Building Construction Department about the availability of heavy duty cutting, debris clearing machines, their specifications, placement, storage and their operators & upkeep of the same for ready use. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

Disaster management Plan

ESF - 8 - Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none">• Update list of public information media (print, radio and TV).• Participate in Mock Drills, Table Top exercises	<ul style="list-style-type: none">• The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation.• The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff.• Disseminate information about affected areas and actions taken by MCGM through media• Disseminate evacuation information to the affected people through media.• Provide mass notifications to the populace and provide periodic media updates.• Issue messages for public safety and mutual cooperation.• Organize a press briefing in EOC as appropriate.• Maintain a log of actions taken, reports of resources needs and capabilities.	<ul style="list-style-type: none">• Continue public information activities and update citizen on recovery efforts.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 9 – Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 10 – Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 11 - Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none">• Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts.• Monitor energy system likely to be damaged during a disaster and in need of repair work.• Provide separate lines and separate sources of power for critical substations.• Collect, assess, and provide information on energy supply and demand.• Identify resources needed to restore energy systems.• Train staff to attend to emergencies.• Ensure sufficient stocks of essential spares such as cables.• Conduct awareness programmes for consumers.• Undertake any other activity as per site condition.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster.• The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff.• Update Support Agency staff and monitor activities.• Determine needs and available communication means.• Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts.• Collect current information on damage and area affected.• Switch off power supply if necessary.• Officers at site to coordinate with fault engineers and mains engineers.• Maintain a log of actions taken, reports of communication resource needs and capabilities	<ul style="list-style-type: none">• Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system• Assess the requirements of restoration• Coordinate with supporting agencies for temporary arrangement of fuel, gas and power• Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 12 – Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none">• Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures.• Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency.• Appoint additional contractual labour as per requirement.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The Lead Agency representative will receive and give briefings and updates to the EOC staff• Update support agency staff and monitor activities• Determine needs and available resources.• Start responding to utilities shortages and disruptions and take care of public safety and health	<ul style="list-style-type: none">• Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 13 - Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

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ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritize equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination and decontamination activities; • Seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Provide area security and prohibit unauthorized personnel from area with assistance from ESF Public Safety and Law & Order. • Determine with the help of appropriate agencies guidelines for re-entry of emergency personnel & residents. • Make emergency plan to control and clean up hazardous materials. • Conclude clean-up operations when the area is declared safe by responsible personnel. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Disseminate safety information through media • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos & don'ts

- a) A person's clothing catches fire: You need to wrap the person in blankets (or, any other thick piece of clothing), and, roll the person on the ground. The fire will be extinguished as supply of oxygen is cut off.
- b) Sometimes, you may have to isolate the burning material from other combustible material. The fire would then simply die down, once the burning material is exhausted.
- c) In case of domestic fires, simply cover the utensil which contains the burning oil etc. Lack of oxygen supply will extinguish the fire. Also turn off the source of heat. This will help bring down the temperature..

What to do if you have fire training: If you are equipped to fight a fire – you need to decide, whether you want to fight it, or, flee away from it. , In a majority of cases of fire, timely action can help in containing the damage. Besides, more often than not, general fires (specially Class A fires) don't spread rapidly – unless, some chemical reaction is involved. What this means is if you can nip a fire in the bud, you should nip it at the source.

However always remember that human life is very valuable.. So, don't fight the fire, if any of the following conditions exist:

1. You don't have sufficient or the right material to fight the fire. The time spent in fighting could impact your ability to evacuate
2. You don't have backup. You should be able to get help, in case, there is a need
3. Fire seems to be blocking your exit path
4. You have no idea about the cause of the fire. For example - Class D fires would need specialized knowledge of metal, and, its reactions with different extinguishing agents – at high temperatures
5. Fire seems to be spreading too fast
6. There are explosives around
7. You don't feel comfortable and confident

During The Fire

- a) A plan of Evacuation should always be in place – this is a must for every establishment where there is a fire hazard.
- b) A good evacuation plan has two requisites: One is a clear command & control structure & the other is a clear line of communication. It is also important that this is widely displayed & that people are aware of it.
- c) In case of fire, one should never use escalators (irrespective of the height of the building which is being evacuated). Escalators cannot be relied on in an emergency situation like fire due to possible electrical or mechanical failure.

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- d) In case of lot of smoke, it is advisable to crawl on the floor. Because of smoke's tendency to go up, even during very dense conditions, at the ground level it will be relatively free of smoke.
- e) To reduce smoke inhalation, put a wet handkerchief & cover your nose. If there is no water available, use your own saliva to wet a small portion of the handkerchief, and, use that portion to cover your nostrils.
- f) If you can go to an open-area (for example uncovered terrace, open ground etc.), there will be no risk of smoke-inhalation. However, use your own judgment if you decide to go to the terrace of a high-rise building. While there will be no risk of smoke-inhalation, rescue efforts could become difficult and is dependent on the level of sophistication that the local fire department has (e.g. access to snorkel, very long ladders-capable of reaching high-rise buildings, rescue-helicopters etc.).
- g) Always evacuate in an orderly manner. A building housing 200 or so people (normal, healthy adults) across 3-4 floors with a single exit can easily be evacuated in less than 2-3 minutes if done in an orderly manner. If people push and shove, stampedes can occur, causing injury, and, in addition take much longer to evacuate. Worse: Backing up might be impossible. For eg say, while, people are evacuating towards an exit, and, it is found to be blocked, there might be a need to backup. If the evacuation is not orderly, it might not be possible to back-up; as people towards the end of the evacuation queue (who are not aware of the blockage at the exit) will try to push forward, while, those at the front of the queue (who are aware of the blockage) will back-up.
- h) Since, panic can easily set in, during a fire – thereby clouding people's judgement, it is highly likely that during a fire, people forget these simple tenets, and, in their attempt to rush out, actually create chaos. Thus, it is important that regular mock evacuation-drills are carried out to train people for such an eventuality..
- i) While evacuating, always keep an eye to see, who might need some assistance, e.g. the elderly or children or people with any form of disability etc. If possible, provide assistance to them. Even if you yourself are not in a position to provide assistance, you can always call for help.
- j) If an area is already clear, while, evacuating, close the door behind you. It will serve several purposes:
 - i. Will isolate the area, thereby, causing an impediment to the spread of the fire.
 - ii. Will save time for others, who might want to recede the area.
- k) While, you should close the door, lock it only if you are absolutely sure that there is nobody inside. Because, if there is even a single person inside the chances of that person being rescued is almost nil if the door is locked.
- l) If you are inside a closed door – with fire outside: Feel the inside of the door with your hand. If the door feels hot, many a times, it might be safer to stay inside. At such times, whether you should stay inside, or,

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venture out could be a judgment call, depending on: how long do you expect a rescue team to arrive and/or alternative avenues open for evacuation (e.g. jumping from the window). If you are on the higher floors having locked windows with grills and the local fire-department is not well-equipped/staffed, then, the time spent inside could work against you – as the fire outside may spread vigorously. If you do decide to stay inside the room, use wet towels, bed sheets etc. and put them below the doors to prevent smoke from entering the room.

When On Road

- a) Always give right of way to fire-engines.
- b) Even if you are not directly in the right of way of fire-engines, go to the extreme end of the road, and, stop your vehicle – to let the fire-engines pass.
- c) Do not rubber-neck/crowd the site of a fire mishap: as you could hamper movement of rescue teams/material

If You Want To Help

If you want to help in case of a fire-incident, you could help in any of the following ways:

1. direct help in fighting the fire (if you are able, and, are knowledgeable about fire-fighting)
2. providing background logistical support
3. informing the local fire station
4. helping in crowd-control, and, keeping curious onlookers at bay
5. helping in directing fire engines and rescue vehicles (particularly in crowded internal lanes / bylanes etc.)
6. clearing the way for the fire-fighting crew

Finally

- 1) DO NOT PANIC
- 2) Decide your strategy.
- 3) If you want to fight:
 1. With What
 2. How
 3. Which arm (of the fire triangle) to fight
 - 4.
- 4 Or, you might want to flee (evacuate)

If you discover a fire, explosion, or smell smoke in the building:

- **Immediately** call 1916 or 101 and give the following information:
 1. Your name.
 2. Location of fire.
 3. Size of the fire.
 4. Number of persons injured and there location.

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5. Number of people trapped and there location.

- When a fire alarm sounds, **COMPLETE EVACUATION IS REQUIRED.**

DO'S

1. Leave the immediate fire area and close doors and windows behind you to prevent the firespreading.
2. Use stairwells to evacuate the building.
3. If caught in heavy smoke, stay near the floor, take short breaths through your nose, and crawl to the exit .
4. If the nearest exit is blocked by fire, heat, or smoke, go to an alternate exit.
5. Assist disabled persons in exiting the building. If these persons are unable to use the stairs, assist them to a stairwell and call 108 / 101. Inform them of your location and emergency crews will respond to your plea to assist them.
6. Before opening a closed door, feel the door and/or doorknob, if either is hot, do not open the door. Find an alternate exit.
7. If you are trapped in a room, call 108 / 101 and give your location. Hang an object out of the window to draw attention.
8. If there is no window, stay near the floor where the air will be less dangerous. Shout at regular intervals to alert emergency crews of your location.
9. Once outside, move to a clear area away from the affected building. Keep streets, fire lanes, hydrants, and walkways clear for emergency vehicles and crews. If weather is inclement, move inside a non-affected building.

DON'T'S

1. **Do not use the elevators.**
2. **Do not** attempt to fight the fire.
3. **Do not** re-enter the building until authorization to do so is issued by campus security or the proper authorities

BE PREPARED

1. Know how to activate the fire alarm.
2. Know all building exit routes. Elevators should not be used forexit in the event of a fire. Keep all exit routes free of obstructions.
3. Have the emergency telephone numbers pasted near your phone.

Stampede

What is Stampede?

Stampede is an occurrence in which a large group of frightened or excited animals or people run together in a wild and uncontrolled way to escape from something, get out of a place, etc. or a situation in which a lot of people try to do the same thing at the same time.

Why Mumbai is vulnerable to Stampede?

Mumbai is a culturally vibrant district; it celebrates and hosts many national and regional festivals and fairs with huge enthusiasm. This attracts large number of people at one place. Apart from it, Mumbai attracts large number of religious and other tourists from across the world. This makes it prone to stampede like incidents if proper arrangements of crowd management are not put in place or in case of any rumour or any disaster.

On 18 January 2014, a stampede broke out in Mumbai near the Malabar Hill residence of Dawoodi Bohra spiritual leader Syedna Mohammed Burhanuddin, who had died on 17 January 2014. The stampede started around 1:30 a.m. when his supporters had assembled to pay their last respect after the gates were opened and the crowds burst in. According to the BBC, "reports suggest people were crushed after the gates of the house where the body of Syedna Mohammed Burhanuddin were kept were closed." Eighteen people were confirmed dead and around fifty-six injured.

Standard Operating Procedure

ESF – I – Communication

Lead Agency: Disaster Management Unit

	Before	During	After
	<ul style="list-style-type: none"> To form the Incident Management Team To form the Damage Assessment Team To organize orientation and training of responders including community in disaster management To follow-up with MTNL about the arrangements for the restoration of communication system & act accordingly To follow-up with Health Department about facilities available, both in private & public 	<ul style="list-style-type: none"> To coordinate the disaster response operation Activate Emergency Support Functions as per requirement To deploy SAR Teams to the incident site If required dispatch NDRF to the incident site To alert higher authorities Coordinate for 	<ul style="list-style-type: none"> To select the sight for resettlement of victims To get the resettlement plan prepared To deactivate the response operation but continue with relief and other support service operations. Maintain records containing all relevant

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<p>sector, for health services in emergencies in vulnerable areas and act accordingly</p> <ul style="list-style-type: none"> • To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly • To follow-up with Energy Department about arrangements for the restoration of power supply and providing for supply of power through alternative sources of energy & act accordingly • To follow-up with Ward EOCs about the implementation of mitigation, preparedness and response measures and present status of the same & act accordingly • To follow-up with Fire Department about the reach and capacity of their fire-extinguishers, fire safety policy and plan to increase their spread and improve their capacity and policy to train security guards, habitants of high rise building, civil defence, Home Guards personnel and volunteers in fire safety measures & act accordingly • To follow-up with Armed Forces about the emergency support services available with them and keep in regular touch with them. 	<p>relief distribution</p> <ul style="list-style-type: none"> • To hold meeting with donor agencies • To organize disposal of dead bodies both human and livestock 	<p>information relating to action points and contact points</p> <ul style="list-style-type: none"> • Conduct debriefing meetings with all agencies • Prepare an After Action Report to identify lessons learnt and improvements needed
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ESF - 2 - Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none">• Conduct a mock drill for the law & order situation during Stampede.• Arrange First Responder Training for Police personnel• Keep rescue ropes & other lifesaving material ready• Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system• Identify alternative routes for traffic• Undertake any other activity considered necessary	<ul style="list-style-type: none">• On receipt of an emergency call, operationalize level activation based on nature and severity of incident• The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff.• Assess the available resources and determine the need for additional resources• Ensure law and order situation in affected area• Provide extra police personnel at traffic diversions• Protect life and property, control traffic and keep close watch on anti-social elements• Provide information about traffic flow to the public through media, public address system, sign boards and display boards• Transport / Shift stranded or affected persons through Police and other vehicles• Organise towing of stranded vehicles if any• Maintain a log of reports / action taken, needs and capabilities• Undertake any other activity as per site condition	<ul style="list-style-type: none">• Help Relief agencies to evacuate stranded, trapped citizens at safer place.• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

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ESF – 4 – Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none">• Train newly recruited officers and firefighters in basic search & rescue operations.• Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner.• Repair and maintain rescue Equipment• Conduct Training and Refresher Courses for Search & Rescue Teams.• Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue.• Keep communication devices in a state of readiness.• Recce disaster prone areas along with other agencies.• Conduct mock drills, awareness programs etc.• Undertake any other activity required.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs.• Operationalize level of activation depending on the nature and severity of the incident• Determine needs and available resources.• Locate incident command post and staging areas appropriately• Direct operations from a safe distance, with capability of escape.• Augment men and machinery if necessary• Establish communications from the incident site with other tactical operations, and EOC• Monitor activities and update support agency staff.• Transport injured persons to hospitals.• Shift victims to temporary shelters as per requirement.	<ul style="list-style-type: none">• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

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ESF – 5 – Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none">• If required prepare alternate transport arrangement plan in consultation with Supporting Agencies.• Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai.• Provide and assign emergency transportation resources to the requesting organizations.• Update information of available transportation and resources owned in and around Mumbai.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff.• Monitor activities and update support agency staff.• Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas.• Determine transportation needs and available resources.• Establish and maintain public transportation and resources.• Organize transportation of sick or injured persons in need of medical attention.• Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities.	<ul style="list-style-type: none">• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • To follow-up with Road & Building Construction Department about the availability of heavy duty cutting, debris clearing machines, their specifications, placement, storage and their operators & upkeep of the same for ready use. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

Disaster management Plan

ESF – 8 – Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none">• Update list of public information media (print, radio and TV).• Participate in Mock Drills, Table Top exercises	<ul style="list-style-type: none">• The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation.• The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff.• Disseminate information about affected areas and actions taken by MCGM through media• Disseminate evacuation information to the affected people through media.• Provide mass notifications to the populace and provide periodic media updates.• Issue messages for public safety and cooperation.• Organize a press briefing in EOC as appropriate.• Maintain a log of actions taken, reports of resources needs and capabilities.	<ul style="list-style-type: none">• Continue public information activities and update citizen on recovery efforts.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 9 – Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 11 - Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none">• Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts.• Monitor energy system likely to be damaged during a disaster and in need of repair work.• Provide separate lines and separate sources of power for critical substations.• Collect, assess, and provide information on energy supply and demand.• Identify resources needed to restore energy systems.• Train staff to attend to emergencies.• Ensure sufficient stocks of essential spares such as cables.• Conduct awareness programmes for consumers.• Undertake any other activity as per site condition.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster.• The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff.• Update Support Agency staff and monitor activities.• Determine needs and available communication means.• Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts.• Collect current information on damage and area affected.• Switch off power supply if necessary.• Officers at site to coordinate with fault engineers and mains engineers.• Maintain a log of actions taken, reports of communication resource needs and capabilities	<ul style="list-style-type: none">• Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system• Assess the requirements of restoration• Coordinate with supporting agencies for temporary arrangement of fuel, gas and power• Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 12 – Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none">• Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures.• Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency.• Appoint additional contractual labour as per requirement.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The Lead Agency representative will receive and give briefings and updates to the EOC staff• Update support agency staff and monitor activities• Determine needs and available resources.• Start responding to utilities shortages and disruptions and take care of public safety and health	<ul style="list-style-type: none">• Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 13 - Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none">Organize mock drills, table top exercise for MARG group, fire personals & other staff.Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc.Prioritize equipment to be used during disasters.	<ul style="list-style-type: none">Lead Agency representative will establish operations at EOC immediately after notification of the disaster.Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff.Establish communication with other ESFs.Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process.Update support agency staff and monitor activities.Determine response needs and available resources.Coordinate with EOC for need of decontamination and decontamination activities;If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incidentMaintain log of actions taken, reports, resources needs and capabilities.	<ul style="list-style-type: none">Disseminate safety information through mediaPrepare an After-Action Report to identify lessons learnt and improvements needed.

Dos and Don'ts

Visitors

Dos and Don'ts

Dos	Don'ts
<ul style="list-style-type: none"> • Travel light. Carry medicines, if advised by doctors. • Register for the event • Get acquainted with the venue location and layout: entry / exist points, routes, stay / food / medical facilities • Follow rules and regulation. Where there is obstruction in the front don't push through or push back. Hold and alert the others behind to hold till the obstruction is removed. • Note emergency contact numbers. 	<ul style="list-style-type: none"> • Don't carry valuables, unnecessary food and clothing • Don't trust strangers. Don't stay / eat at unauthorized places. • Don't rest / sleep on roads, at entry / exist pints. Don't litter. • Don't jeopardise your own safety by pushing, fighting, provoking the peers. • Don't panic and spread rumours.

Organizers

Dos and Don'ts

Do's	Don'ts
<ul style="list-style-type: none"> • Know your visitors • Own up responsibility and accept obligation to provide safe, hassle free, and memorable experience to visitors. • Develop comprehensive crowd management plan <ul style="list-style-type: none"> ○ Identify the hazards and their likely impact ○ Decide whether arrangements are adequate or more needed • Work closely with various stakeholders. Have regular communication and meeting. • Comply with laws and regulations in place. 	<ul style="list-style-type: none"> • Don't rest on laurels from the past incident – free periods • Don't continue with the even if you yourselves are not sure about the venue arrangement. • Don't admit visitors beyond the holding and movement route capacities. • Don't compromise on safety and security agencies to save money. • Don't delay reporting of sign of build up of an emergency situation.

Security Agencies

Dos and Don'ts

Disaster management Plan

Do's	Don'ts
<ul style="list-style-type: none">• Do risk assessment and check venue suitability• Develop a system for restricting holding, regulating number of people arriving and entering the venue• Work closely with event organizers and other stakeholders. Coordinate actions.• Establish clear criteria for use of force, opening the exists, removing the barricades etc.• Monitor, monitor and monitor. Plan rehears and execute.	<ul style="list-style-type: none">• Don't allow the event to happen if crowd management preparedness is found wanting.• Don't use force, unless no other option left.• Don't get provoked. Don't act emotionally• Don't ignore the thousands of peaceful visitors, in dealing with a handful of rowdy ones.• Don't consider other security agencies deployed as competitors.

Disaster management Plan

Local Administration

Dos and Don'ts

Do's	Don'ts
<ul style="list-style-type: none">• Assess venue to determine intention, motive of the gathering• Help venue / event manager develop crowd management plan• Have regular internal / external communication with stakeholders• Develop dedicated resource teams of NGOs and civil defence for various crowd management activities• Run crowd hazard awareness campaigns.	<ul style="list-style-type: none">• Don't allow the event to happen if crowd management preparedness is found wanting in either of the areas of fire prevention, adherence to structural safety, electricity, hygiene, medical, traffic etc.• Don't ignore the local economic activities around the venue and possible impact of displacement.• Don't forget the power of random inspections and mock drills.• Don't forget that places of mass gatherings have the potential to act as a showcase for harmonious balance between human activity, resources use and minimum environmental impact as opposed to typical resource guzzler and garbage producing place.• Don't discriminate against anyone in rescue and relief.

Media

Dos and Don'ts

Do's	Don'ts
<ul style="list-style-type: none">• Do raise alarms if crowd management preparedness is found wanting• Play a constructive role for the smooth crowd movements at the venue / event• To give wide publicity to Dos and Don'ts and potential mitigation plans and their likely benefits well in advance.• Provide timely, factual and unbiased information before / during / after a disaster• Review rescue, relief, and rehabilitation work by the government machinery.	<ul style="list-style-type: none">• Don't infringe upon privacy of the victims.• Don't sensationalise the incidence on the basis of incomplete information for gaining commercial mileage.• Don't act emotionally. Don't provoke and get provoked.• Don't make value judgement• Don't interfere and obstruct rescue operations.

Bomb Blast

What is Bomb?

A **bomb** is any of a range of explosive weapons that only rely on the exothermic reaction of an explosive material to provide an extremely sudden and violent release of energy (**an explosive device**). Detonations inflict damage principally through ground- and atmosphere-transmitted mechanical stress, the impact and penetration of pressure-driven projectiles, pressure damage, and explosion-generated effects. A nuclear weapon employs chemical-based explosives to initiate a much larger nuclear-based explosion.

The term bomb is not usually applied to explosive devices used for civilian purposes such as construction or mining, although the people using the devices may sometimes refer to them as "bomb". The military use of the term "bomb", or more specifically aerial bomb action, typically refers to airdropped, unpowered explosive weapons most commonly used by air forces and naval aviation. Other military explosive weapons not classified as "bombs" include grenades, shells, depth charges (used in water), warheads when in missiles, or land mines. In unconventional warfare, "bomb" can refer to a range of offensive weaponry. For instance, in recent conflicts, "bombs" known as improvised explosive devices (IEDS) have been employed by insurgent fighters to great effectiveness.

What is a Bomb?

Bombs are explosive devices. They can be constructed to look like almost anything and can be placed or delivered in any number of ways. (How we wish they all looked like the ones shown in movies, with fancy switches, colourful wires and a big watch hanging with the whole paraphernalia!) The only common denominator that exists among bombs is that they are designed to explode.

Most bombs or as we call them IEDs (Improvised Explosive Devices) are hand made and are limited in their design only by the imagination of, and resources available to, the bomber. Remember, when looking for a bomb, suspect anything that looks unusual and out of place. The thumb-rule is, any thing, unless it belongs to you or you know (not presume) about, may be a bomb. Simple? Leave it to the trained bomb technician to determine whether it is a bomb or not.

Bomb Blast can be define as follows:

- An explosive weapon detonated by impact, proximity to an object, a timing mechanism, or other means.
- An explosive device fused to explode under specific conditions
- The explosion of a bomb
- A bomb is a device which explodes and damages or destroys a large area.

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Type of Bombs:

1. **A-bomb:** An A-bomb is an atomic bomb
2. **Atomic Bomb:** An atomic bomb or an atom bomb is a bomb that causes an explosion by a sudden release of energy that results from splitting atoms
3. **Car bomb:** A car bomb is a bomb which is inside a car, van, or truck.
4. **Cluster bomb:** A cluster bomb is a type of bomb which is dropped from an aircraft. It contains a large number of smaller bombs that spread out before they hit the ground
5. **Dirty bomb:** A dirty bomb is a nuclear bomb that uses explosives to release radioactive material over a wide area.
6. **Dive-bomb:** If a plane dive-bombs an area, it suddenly flies down low over it to drop bombs onto it.
7. **H-bomb:** An H-bomb is a bomb in which energy is released from hydrogen atoms.
8. **Hydrogen bomb:** A hydrogen bomb is a nuclear bomb in which energy is released from hydrogen atoms.
9. **Letter bomb:** A letter bomb is a small bomb which is disguised as a letter or parcel and sent to someone through the post. It is designed to explode when it is opened.
10. **Logic bomb:** A logic bomb is an unauthorized program that is inserted into a computer system so that when it is started it affects the operation of the computer.
11. **Nail bomb:** A nail bomb is a bomb which contains nails that are intended to cause a lot of damage and injury when the bomb goes off.
12. **Neutron bomb:** A neutron bomb is a nuclear weapon that is designed to kill people and animals without a large explosion and without destroying buildings or causing serious radioactive pollution.
13. **Parcel bomb:** A parcel bomb is a small bomb which is sent in a parcel through the post and which is designed to explode when the parcel is opened.
14. **Petrol bomb:** A petrol bomb is a simple bomb consisting of a bottle full of petrol with a cloth in it that is lit just before the bottle is thrown.
15. **Pipe bomb:** A pipe bomb is a small bomb in a narrow tube made by someone such as a terrorist.
16. **Smoke bomb:** A smoke bomb is a bomb that produces clouds of smoke when it explodes
17. **Time bomb:** A time bomb is a bomb with a mechanism that causes it to explode at a particular time.

Why Mumbai is vulnerable to Bomb Blast:

- Mumbai is the capital city of the Indian state of Maharashtra. It is the most populous city in India, and the fourth most populous city in the world.
- Mumbai is the commercial and entertainment capital of India, it is also one of the world's top 10 centres of commerce in terms of global financial flow, generating 5% of India's GDP, and accounting for 25% of industrial output, 70% of maritime trade in India (Mumbai Port Trust & JNPT), and 70% of capital transactions to India's economy.

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- Mumbai is the 3rd most expensive office market in the world. Mumbai was ranked among the fastest cities in the country for business start-up.
- The city houses important financial institutions such as the Reserve Bank of India, the Bombay Stock Exchange, the National Stock Exchange of India, the SEBI and the corporate headquarters of numerous Indian companies and multinational corporations.
- Mumbai is home to some of India's premier scientific and nuclear institutes like BARC, NPCL, IREL, TIFR, AERB, AECL, and the Department of Atomic Energy.
- Most of India's major television and satellite networks, as well as its major publishing houses, are headquartered in Mumbai. The city also houses India's Hindi (Bollywood) and Marathi film and television industry. Mumbai's business opportunities, as well as its potential to offer a higher standard of living, attract migrants from all over India and, in turn, make the city a melting pot of many communities and cultures.
- Mumbai also has a large unskilled and semi-skilled self-employed population, who primarily earn their livelihood as hawkers, taxi drivers, mechanics and other such blue collar professions.
- The port and shipping industry is well established, with Mumbai Port being one of the oldest and most significant ports in India.
- Public transport systems in Mumbai include the Mumbai Suburban Railway, Brihanmumbai Electric Supply and Transport (BEST) buses, black-and-yellow meter taxis, auto rickshaws and ferries. Suburban railway and BEST bus services together accounted for about 88% of the passenger traffic.
- The Mumbai Suburban Railway, popularly known as Locals forms the backbone of the city's transport system. It consists of three rail networks: Central, Western, and Harbour Line, running the length of the city, in the north-south direction.
- Mumbai is the headquarters of two of Indian Railways' zones: the Central Railway (CR) headquartered at Chhatrapati Shivaji Terminus (formerly Victoria Terminus), and the Western Railway (WR) headquartered at Churchgate. Mumbai is also well connected to most parts of India by the Indian railways. Long-distance trains originate from Chhatrapati Shivaji Terminus, Dadar Station, Lokmanya Tilak Terminus, Mumbai Central Station, Bandra Terminus, Andheri and Borivali.
- The Chhatrapati Shivaji International Airport (formerly Sahar International Airport) is the main aviation hub in the city and the busiest airport in India in terms of passenger traffic.
- Mumbai is served by two major ports, Mumbai Port Trust and Jawaharlal Nehru Port Trust, which lies just across the creek in Navi Mumbai. Mumbai Port has one of the best natural harbours in the world, and has extensive wet and dry dock accommodation facilities. The city is also the headquarters of the Western Naval Command, and also an important base for the Indian Navy.
- Under colonial rule, tanks were the only source of water in Mumbai. Many localities have been named after them. The BMC supplies potable water to the city

Disaster management Plan

from six lakes, most of which comes from the Tulsi and Vihar lakes. The Tansa lake supplies water to the western suburbs and parts of the island city along the Western Railway. The water is filtered at Bhandup, which is Asia's largest water filtration plant. India's first underground water tunnel is being built in Mumbai.

- Mumbai's culture is a blend of traditional festivals, food, music and theatres. The city offers a cosmopolitan and diverse lifestyle with a variety of food, entertainment and night life, available in a form and abundance comparable to that in other world capitals. Mumbai's history as a major trading centre has led to a diverse range of cultures, religions and cuisines coexisting in the city. This unique blend of cultures is due to the migration of people from all over India since the British period.
- Mumbai has numerous newspaper publications, television and radio stations.

Some past bomb blasts incidents in Mumbai:

1. **March 12, 1993:** A series of 13 bomb explosions that took place in Mumbai on Friday, 12 March 1993. The coordinated attacks were the most destructive bomb explosions in Indian history. The single-day attacks resulted in over 250 fatalities and 700 injuries.
2. **December 2, 2002** - Two persons were killed and 31 injured in a powerful explosion in a bus outside the crowded Ghatkopar railway station. The blast ripped through the bus damaging its rear portion.
3. **December 6, 2002:** Twenty-five persons were injured in a bomb blast at McDonalds fast food restaurant at Mumbai Central suburban railway station. The bomb was planted in the air-conditioned duct. It was suspected to be a crude bomb.
4. **January 27, 2003:** At least 30 persons were injured when a bomb planted on a bicycle went off throwing splinters of sharp nails outside Vile Parle railway station. The explosion occurred near a shopping complex in the evening hours. On the ill-fated day, all the shops in the area were closed for a weekly holiday. Later a woman succumbed to injuries.
5. **March 13, 2003:** A powerful bomb blast shattered a bogie of a local train at Mulund railway station in the peak hours killing 11 persons and injuring more than 65. This was the most powerful serial explosion.
6. **July 11, 2006:** Seven blasts rocked suburban trains in Mumbai. 174 passengers have been killed and more than 300 injured. The blasts took place in a span of 30 minutes in first class compartments of suburban trains.

Disaster management Plan

Standard Operating Procedure

ESF – I – Communication

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • To form the Incident Management Team • To form the Damage Assessment Team • To organize orientation and training of responders including community in disaster management • To coordinate with relevant departments regarding enforcement of Building Codes, Fire Safety Rules and Certification of Building etc. • To follow-up with concerned agencies about the arrangements for putting up stop gap bridges on emergency basis & formation and training of the team for the erection of temporary bridges. • To follow-up with MTNL about the arrangements for the restoration of communication system & act accordingly • To follow-up with Health Department about facilities available, both in private & public sector, for health services in emergencies in vulnerable areas and act accordingly • To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly • To follow-up with Energy Department about arrangements for the restoration of power supply and providing for supply of power through alternative sources of energy & act accordingly • To follow-up with Ward EOCs about the implementation of mitigation, preparedness and 	<ul style="list-style-type: none"> • To coordinate the disaster response operation • Activate Emergency Support Functions as per requirement • To deploy SAR Teams to the incident site • If required dispatch NDRF to the incident site • Inform the military and paramilitary forces to get ready for emergency response • To alert higher authorities • Activate HAM Radio Operators • To organize the restoration of communication, transportation • Coordinate for relief distribution • To hold meeting with donor agencies • To organize disposal of dead bodies both human and livestock 	<ul style="list-style-type: none"> • To select the sight for resettlement of victims • To get the resettlement plan prepared • To deactivate the response operation but continue with relief and other support service operations. • Maintain records containing all relevant information relating to action points and contact points • Conduct debriefing meetings with all agencies • Prepare an After Action Report to identify lessons learnt and improvements needed

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<p>response measures and present status of the same & act accordingly</p> <ul style="list-style-type: none">• To organize the orientation and training undertake earthquake resistance constructions and retrofitting on a large scale• To follow-up with Fire Department about the reach and capacity of their fire-extinguishers, fire safety policy and plan to increase their spread and improve their capacity and policy to train security guards, habitants of high rise building, civil defence, Home Guards personnel and volunteers in fire safety measures & act accordingly• To follow-up with Armed Forces about the emergency support services available with them and keep in regular touch with them.		
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Disaster management Plan

ESF - 2 - Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none">• Conduct a mock drill for the law & order situation during Aircraft emergency• Arrange First Responder Training for Police personnel• Keep rescue ropes & other lifesaving material ready• Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system• Identify alternative routes for traffic• Undertake any other activity considered necessary	<ul style="list-style-type: none">• On receipt of an emergency call, operationalize level activation based on nature and severity of incident• The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff.• Assess the available resources and determine the need for additional resources• Ensure law and order situation in affected area• Provide extra police personnel at traffic diversions• Protect life and property, control traffic and keep close watch on anti-social elements• Provide information about traffic flow to the public through media, public address system, sign boards and display boards• Transport / Shift stranded or affected persons through Police and other vehicles• Organise towing of stranded vehicles if any with the help of volunteers• Maintain a log of reports / action taken, needs and capabilities• Undertake any other activity as per site condition	<ul style="list-style-type: none">• Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters.• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 3 – Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none">• Train newly recruited officers and firemen• Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner• Repair and maintain ancillary equipment• Conduct Training and Refresher Courses for Rescue Teams• Keep fire stations and Regional Command Centers fully equipped with manpower and machinery• Keep communication devices in a state of readiness• Conduct mock drills, awareness programs etc.• Undertake any other activity as per site condition.	<ul style="list-style-type: none">• On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident.• Determine needs and available resources• Dispense resources required based on need and augment men and machinery if necessary.• Locate the incident command post and staging areas appropriately• Direct operations from a safe distance and ensure ability to escape.• Ensure safety from electrical installations or power supply at the disaster site.• If required establish communication from the incident site with other tactical operators• Monitor activities and regularly update support agencies• Organise rescue, evacuation and salvage operations.• Transport injured persons to hospitals.	<ul style="list-style-type: none">• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 4 – Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none">• Train newly recruited officers and firefighters in basic search & rescue operations.• Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner.• Repair and maintain rescue Equipment• Conduct Training and Refresher Courses for Search & Rescue Teams.• Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue.• Keep communication devices in a state of readiness.• Recce disaster prone areas along with other agencies.• Conduct mock drills, awareness programs etc.• Undertake any other activity required.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs.• Operationalize level of activation depending on the nature and severity of the incident• Determine needs and available resources.• Locate incident command post and staging areas appropriately• Direct operations from a safe distance, with capability of escape.• Augment men and machinery if necessary• Establish communications from the incident site with other tactical operations, and EOC• Monitor activities and update support agency staff.• Transport injured persons to hospitals.• Shift victims to temporary shelters as per requirement.	<ul style="list-style-type: none">• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none">• If required prepare alternate transport arrangement plan in consultation with Supporting Agencies.• Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai.• Provide and assign emergency transportation resources to the requesting organizations.• Update information of available transportation and resources owned in and around Mumbai.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff.• Monitor activities and update support agency staff.• Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas.• Determine transportation needs and available resources.• Establish and maintain public transportation and resources.• Disseminate updated information to passengers through Public Address System.• Organize transportation of sick or injured persons in need of medical attention.• Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities.	<ul style="list-style-type: none">• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 7 - Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • To follow-up with Road & Building Construction Department about the availability of heavy duty cutting, debris clearing machines, their specifications, placement, storage and their operators & upkeep of the same for ready use. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

Disaster management Plan

ESF – 8 – Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none">• Update list of public information media (print, radio and TV).• Participate in Mock Drills, Table Top exercises	<ul style="list-style-type: none">• The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation.• The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff.• Disseminate information about earthquake affected areas and actions taken by government through media• Disseminate evacuation information to the affected people through media.• Provide mass notifications to the populace and provide periodic media updates.• Issue messages for public safety and mutual cooperation.• Organize a press briefing in EOC as appropriate.• Maintain a log of actions taken, reports of resources needs and capabilities.	<ul style="list-style-type: none">• Continue public information activities and update citizen on recovery efforts.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 9 – Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 11 – Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none">• Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts.• Monitor energy system likely to be damaged during a disaster and in need of repair work.• Provide separate lines and separate sources of power for critical substations.• Collect, assess, and provide information on energy supply and demand.• Identify resources needed to restore energy systems.• Train staff to attend to emergencies.• Ensure sufficient stocks of essential spares such as cables.• Conduct awareness programmes for consumers.• Undertake any other activity as per site condition.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster.• The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff.• Update Support Agency staff and monitor activities.• Determine needs and available communication means.• Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts.• Collect current information on damage and area affected.• Switch off power supply if necessary.• Officers at site to coordinate with fault engineers and mains engineers.• Maintain a log of actions taken, reports of communication resource needs and capabilities	<ul style="list-style-type: none">• Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system• Assess the requirements of restoration• Coordinate with supporting agencies for temporary arrangement of fuel, gas and power• Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 12 – Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none">• Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures.• Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency.• Appoint additional contractual labour as per requirement.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The Lead Agency representative will receive and give briefings and updates to the EOC staff• Update support agency staff and monitor activities• Determine needs and available resources.• Start responding to utilities shortages and disruptions and take care of public safety and health	<ul style="list-style-type: none">• Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 13 - Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritize equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination and decontamination activities; • Seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Provide area security and prohibit unauthorized personnel from area with assistance from ESF Public Safety and Law & Order. • Determine with the help of appropriate agencies guidelines for re-entry of emergency personnel & residents. • Make emergency plan to control and clean up hazardous materials. • Conclude clean-up operations when the area is declared safe by responsible personnel. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Disseminate safety information through media • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos & Donts

Dos

- Always keep an eye for suspicious objects.
- Recognize an improvised explosive device (IED). Never handle an unclaimed object.
- Notice your surroundings for anything out of place.
- Evacuate all the people immediately to a safe distance
- Open all windows and doors.
- Remove all valuable and unstable articles like fuel and electronic items.
- Place sand bags around the suspected object. The height of sand bags should be three times the height of the suspected object.
- Inform the Bomb Disposal Squad.
- Inform the Fire Brigade, hospitals and ambulance service.
- Do handle the package alone if you are duty bound to handle it.

DON'TS

- Do not spread rumours.
- Do not touch, disturb and approach the suspected object.
- Do not try to submerge the suspicious object in water.
- Do not try to open or puncture the suspicious object.
- Do not try to be a dead hero.

Nuclear and Radiological Emergencies

What is Nuclear and Radiological Emergency?

Any radiation incident resulting in or having a potential to result in exposure and/or contamination of the workers or the public in excess of the respective permissible limits can lead to a nuclear/radiological emergency.

After due consideration of the nature and consequences of all the possible scenarios, these emergencies have been broadly classified into the following five categories:

1. An accident taking place in any nuclear facility of the nuclear fuel cycle including the nuclear reactor, or in a facility using radioactive sources, leading to a largescale release of radioactivity in the environment.
2. A 'criticality' accident in a nuclear fuel cycle facility where an uncontrolled nuclear chain reaction takes place inadvertently, leading to bursts of neutrons and gamma radiations.
3. An accident during the transportation of radioactive material.
4. The malevolent use of radioactive material as a Radiological Dispersal Device by terrorists for dispersing radioactive material in the environment.
5. A large-scale nuclear disaster, resulting from a nuclear weapon attack (as had happened at Hiroshima and Nagasaki) which would lead to mass casualties and destruction of large areas and property.

Why Mumbai is vulnerable for Nuclear /Radiological emergencies?

Mumbai is the capital city of the Indian state of Maharashtra. It is the most populous city in India, and the fourth most populous city in the world. Mumbai is home to some of India's premier scientific and nuclear institutes like BARC, NPCL, IREL, TIFR, AERB, AECI, and the Department of Atomic Energy.

Standard Operating Procedure

ESF - I - Communication

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none">• To form the Incident Management Team• To form the Damage Assessment Team• To organize orientation and training of responders including community in disaster management• To coordinate with relevant	<ul style="list-style-type: none">• To coordinate the disaster response operation• Activate Emergency Support Functions as per requirement• To deploy SAR Teams to the incident site	<ul style="list-style-type: none">• To select the sight for resettlement of victims• To get the resettlement plan prepared• To deactivate the response operation but continue with

Disaster management Plan

<p>departments regarding enforcement of Building Codes, Fire Safety Rules and Certification of Building etc.</p> <ul style="list-style-type: none"> • To follow-up with concerned agencies about the arrangements for putting up stop gap bridges on emergency basis & formation and training of the team for the erection of temporary bridges. • To follow-up with MTNL about the arrangements for the restoration of communication system & act accordingly • To follow-up with Health Department about facilities available, both in private & public sector, for health services in emergencies in vulnerable areas and act accordingly • To follow-up with PHED about the drinking water facilities created in the vulnerable areas and Department's readiness to provide the same in emergencies & act accordingly • To follow-up with Energy Department about arrangements for the restoration of power supply and providing for supply of power through alternative sources of energy & act accordingly • To follow-up with Ward EOCs about the implementation of mitigation, preparedness and response measures and present status of the same & act accordingly • To organize the orientation and training undertake earthquake resistance constructions and retrofitting on a large scale • To follow-up with Fire Department about the reach and capacity of their fire-extinguishers, fire safety policy and plan to increase their spread and improve their capacity and policy to train security guards, habitants of high 	<ul style="list-style-type: none"> • If required dispatch NDRF to the incident site • Inform the military and paramilitary forces to get ready for emergency response • To alert higher authorities • Activate HAM Radio Operators • To organize the restoration of communication, transportation • Coordinate for relief distribution • To hold meeting with donor agencies • To organize disposal of dead bodies both human and livestock 	<p>relief and other support service operations.</p> <ul style="list-style-type: none"> • Maintain records containing all relevant information relating to action points and contact points • Conduct debriefing meetings with all agencies • Prepare an After Action Report to identify lessons learnt and improvements needed
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Disaster management Plan

	<p>rise building, civil defence, Home Guards personnel and volunteers in fire safety measures & act accordingly</p> <ul style="list-style-type: none">• To follow-up with Armed Forces about the emergency support services available with them and keep in regular touch with them.		
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Disaster management Plan

ESF - 2 - Public Safety Law & Order

Lead Agency: Mumbai Police

Before	During	After
<ul style="list-style-type: none"> • Conduct a mock drill for the law & order situation during Aircraft emergency • Arrange First Responder Training for Police personnel • Keep rescue ropes & other lifesaving material ready • Coordinate with public and private sector establishment for protecting critical infrastructure and telecommunication system • Identify alternative routes for traffic • Undertake any other activity considered necessary 	<ul style="list-style-type: none"> • On receipt of an emergency call, operationalize level activation based on nature and severity of incident • The Lead agency representative will reach the EOC at the earliest and take briefings and updates about the incident from the EOC staff. • Assess the available resources and determine the need for additional resources • Ensure law and order situation in affected area • Provide extra police personnel at traffic diversions • Protect life and property, control traffic and keep close watch on anti-social elements • Provide information about traffic flow to the public through media, public address system, sign boards and display boards • Transport / Shift stranded or affected persons through Police and other vehicles • Organise towing of stranded vehicles if any with the help of volunteers • Maintain a log of reports / action taken, needs and capabilities • Undertake any other activity as per site condition 	<ul style="list-style-type: none"> • Help Relief agencies to evacuate stranded, trapped citizens into temporary shelters. • Maintain records containing all relevant information relating to action points and contact points • Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 3 – Fire Fighting

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none">• Train newly recruited officers and firemen• Prepare plans for the utilization of resources, personnel, equipment and supplies in the most effective manner• Repair and maintain ancillary equipment• Conduct Training and Refresher Courses for Rescue Teams• Keep fire stations and Regional Command Centers fully equipped with manpower and machinery• Keep communication devices in a state of readiness• Conduct mock drills, awareness programs etc.• Undertake any other activity as per site condition.	<ul style="list-style-type: none">• On receipt of emergency call, operationalize level of activation depending on the nature and severity of the incident.• Determine needs and available resources• Dispense resources required based on need and augment men and machinery if necessary.• Locate the incident command post and staging areas appropriately• Direct operations from a safe distance and ensure ability to escape.• Ensure safety from electrical installations or power supply at the disaster site.• If required establish communication from the incident site with other tactical operators• Monitor activities and regularly update support agencies• Organise rescue, evacuation and salvage operations.• Transport injured persons to hospitals.	<ul style="list-style-type: none">• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 4 – Search & Rescue

Lead Agency: Mumbai Fire Brigade

Before	During	After
<ul style="list-style-type: none">• Train newly recruited officers and firefighters in basic search & rescue operations.• Prepare a plan to utilize resources of personnel, equipment, and supplies in the most effective manner.• Repair and maintain rescue Equipment• Conduct Training and Refresher Courses for Search & Rescue Teams.• Keep fire stations and Regional Command Centers fully equipped with manpower and machinery for Search & Rescue.• Keep communication devices in a state of readiness.• Recce disaster prone areas along with other agencies.• Conduct mock drills, awareness programs etc.• Undertake any other activity required.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster and implement existing SOPs.• Operationalize level of activation depending on the nature and severity of the incident• Determine needs and available resources.• Locate incident command post and staging areas appropriately• Direct operations from a safe distance, with capability of escape.• Augment men and machinery if necessary• Establish communications from the incident site with other tactical operations, and EOC• Monitor activities and update support agency staff.• Transport injured persons to hospitals.• Shift victims to temporary shelters as per requirement.	<ul style="list-style-type: none">• Maintain records containing all relevant information relating to action points and contact points• Prepare an After Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF - 5 - Transport

Lead Agency: Transport Commissioner

Before	During	After
<ul style="list-style-type: none">• If required prepare alternate transport arrangement plan in consultation with Supporting Agencies.• Coordinate operations as directed by the MCGM EOC for the maintenance and repair of primary transportation Infrastructure throughout Mumbai.• Provide and assign emergency transportation resources to the requesting organizations.• Update information of available transportation and resources owned in and around Mumbai.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The lead agency representative reaches EOC he will take briefings and updates about the incident from the EOC staff.• Monitor activities and update support agency staff.• Ensure transportation facilities for search and rescue teams, medical teams, supply of rescue equipment and water, food and accommodation materials to affected areas.• Determine transportation needs and available resources.• Establish and maintain public transportation and resources.• Disseminate updated information to passengers through Public Address System.• Organize transportation of sick or injured persons in need of medical attention.• Maintain a log of actions taken, reports, and transportation resources needed along with the capacity and capabilities.	<ul style="list-style-type: none">• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 6 – Public Health & Sanitation

Lead Agency: Executive Health Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Arrange training programmes for Doctors, Paramedical Staff to handle mass casualty. • Conduct coordination meetings with private & public sector hospitals, dispensaries, medical institutions, blood banks, ambulance services etc. • Assess need for additional clinical services and staff. • Stock emergency drugs, surgical equipment, potable water, food packets, insecticides etc. • Reserve beds in hospitals. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at EOC on notification of the disaster and take briefings. • Assess the situation, forecast public health & sanitation response needs. • Deploy medical teams on site for emergency medical support. • Provide technical assistance to the EOC and validate requests for medical services. • Establish communication with other ESFs and provide technical assistance on public health and sanitation. • Validate requests from affected areas for public health and sanitation resources. • Provide reports to the EOC & anticipate future public health & sanitation requirements. • Deploy emergency medical teams where people cannot be shifted from the site. • Provide medicines, water and food in temporary shelters. • Liaise with secondary & tertiary medical institutions for care of critically wounded. • Liaise with local blood banks and ambulance services. • Arrange dead body disposal, victim identification, mass fatality management and decontaminating the remains. • Safety and security of medicines and medical devices. • Establish temporary morgue facilities & coordinate with police for early disposal of dead. 	<ul style="list-style-type: none"> • Compile information about injured & deaths • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 7 – Resource Management

Lead Agency: Disaster Management Unit

Before	During	After
<ul style="list-style-type: none"> • Locate, procure, and issue resources to other support agencies for use in emergency operations necessary to support the emergency response or to promote public safety. • Locate the required resources in the community • Locate and coordinate the use of available space disaster management activities. • Procure required stocks from vendors or suppliers when items are not readily available. • Coordinate the procurement of various equipment in coordination with respective ESF. • Identify resources that are not available locally and find their nearest location. • Participate in exercises and drills to train personnel in the proper allocation of resources, and procedural arrangements. • Analyze the potential of the emergency to know what types of resources would be needed. • To follow-up with Road & Building Construction Department about the availability of heavy duty cutting, debris clearing machines, their specifications, placement, storage and their operators & upkeep of the same for ready use. • Coordinate activities with other response agencies to ensure a coordinated and efficient allocation of resources. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident from the EOC staff. • To organize receiving of relief materials • To send reinforcements at the incident site if required • Update Support Agency staff and monitor activities. • Assess the impact of the disaster on the community. • Determine needs and available resources. • Establish priorities and allocate resources after activation. • Report on status and actions taken, to the EOC staff. • Protect resources from possible damage resulting from the disaster. • Secure a workable location for the storage and distribution of goods and services required during the disaster. • Develop lists of resources not available locally. • Coordinate resource requirements and requests of other ESF. • Work closely with other ESF's to minimize duplication of efforts. • Commit all local resources assistance requesting from neighboring jurisdictions or upper levels of government. • Maintain complete log of actions taken and report on needed resources along with their capacities and capabilities. 	<ul style="list-style-type: none"> • To firm up resources • To start rehabilitation • To dismantle relief camp and support service in a phased manner. • Review damage assessment and make an estimate of resources needed for recovery. • Prepare an After-Action Report to identify learnt and improvements

Disaster management Plan

ESF – 8 – Information Management

Lead Agency: Public Relations Officer

Before	During	After
<ul style="list-style-type: none">• Update list of public information media (print, radio and TV).• Participate in Mock Drills, Table Top exercises	<ul style="list-style-type: none">• The representative of the Lead Agency will establish operations at the EOC as soon as possible after notification and activation.• The Lead Agency representative will give and receive briefings and updates about the incident from the EOC staff.• Disseminate information about earthquake affected areas and actions taken by government through media• Disseminate evacuation information to the affected people through media.• Provide mass notifications to the populace and provide periodic media updates.• Issue messages for public safety and mutual cooperation.• Organize a press briefing in EOC as appropriate.• Maintain a log of actions taken, reports of resources needs and capabilities.	<ul style="list-style-type: none">• Continue public information activities and update citizen on recovery efforts.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF – 9 – Mass Care, Housing and Human Services

Lead Agency: Education Officer, MCGM

Before	During	After
<ul style="list-style-type: none"> • Identify adequate and appropriate shelters in each ward. • Ensure functionality & stability of shelters. • Identify clear open spaces close to traffic and transport links for setting up relief camps. • Enter into a contract with the Civil Suppliers for immediate arrangement of food and relief materials during a crisis. • Ensure coordination of activities related to emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims, disaster managers and relief workers. • Develop alternate arrangements of shelter for population living in structures that might be affected after the disaster. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC immediately after notification of the disaster. • The Lead Agency representative will take briefings and updates about the incident. • Provide technical assistance to the EOC and validate requests for mass care resources. • Assess the disaster situation and determine mass care response needs. • Coordinate disaster response operations through identified nodal officer in respective wards. • Locate adequate relief camps based on damage assessment. • Coordinate shifting of population from affected sites to safe sites. • Alert schools for shelter readiness. • Provide adequate and appropriate shelter to the affected population. • Make emergency food supplies available to the affected population. • Assess the disaster situation and determine the adequacy of mass care response activities. • Provide reports to the EOC response structure and anticipate future mass care requirements. • Provide technical assistance to the other agencies providing mass care. 	<ul style="list-style-type: none"> • Set up community kitchens in temporary shelters and open spaces and ensure nutritious food for victims. • Provide separate toilets, baby foods, sanitary towels etc for women and children and take care of pregnant women, adult girls, babies, disabled and old person in the camp • Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF - 10 - Relief Supplies

Lead Agency: Collector

Before	During	After
<ul style="list-style-type: none"> • Review and revise the plan on an annual basis or as needed. • Identify suppliers of relief materials. • Coordinate procurement and allocation of relief supply. • Coordinate and liaise with the Support Agencies. 	<ul style="list-style-type: none"> • The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster. • The Lead Agency representative will receive and give briefings and updates about the incident to the EOC staff. • Update Support Agency staff and monitor activities. • Assess relief supply needs and available resources. • Coordinate to receive stock and distribute relief supplies within the laid down guidelines. • Coordinate relief supplies for mass care and medical facilities. • Appeal to the public to cooperate with emergency relief supply measures. • Requisition to organizations for required personnel and support to achieve the required level of response. • Deploy of personnel and resources within the framework of EOC direction and decision making process. • Oversee distribution of relief supply of food and other essential supplies. • Maintain a log of actions taken, reports, and transportation resources needs and capabilities. 	<ul style="list-style-type: none"> • Prepare briefings on status of response operations. • Compile and maintain the information of relief supply and submit these to ESF Resource Management upon request. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 11 - Energy (Power, Fuel & Gas)

Lead Agency: Brihanmumbai Electric Supply & Transport Undertaken

Before	During	After
<ul style="list-style-type: none">• Serve as the focal point for issues and policy decisions related to energy in all response and restoration efforts.• Monitor energy system likely to be damaged during a disaster and in need of repair work.• Provide separate lines and separate sources of power for critical substations.• Collect, assess, and provide information on energy supply and demand.• Identify resources needed to restore energy systems.• Train staff to attend to emergencies.• Ensure sufficient stocks of essential spares such as cables.• Conduct awareness programmes for consumers.• Undertake any other activity as per site condition.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after the notification of the disaster.• The Lead Agency representative reaches EOC, will receive and give briefings and updates to EOC staff.• Update Support Agency staff and monitor activities.• Determine needs and available communication means.• Deploy emergency response teams as needed to affected area(s) to assist in response and restoration efforts.• Collect current information on damage and area affected.• Switch off power supply if necessary.• Officers at site to coordinate with fault engineers and mains engineers.• Maintain a log of actions taken, reports of communication resource needs and capabilities	<ul style="list-style-type: none">• Check transmission and distribution lines and coordinate with line agencies to repair damaged energy system• Assess the requirements of restoration• Coordinate with supporting agencies for temporary arrangement of fuel, gas and power• Prepare an After-Action Report to identify lessons learnt and improvements needed

Disaster management Plan

ESF – 12 – Utility Services

Lead Agency: Deputy Municipal Commissioner (Special Engineering), MCGM

Before	During	After
<ul style="list-style-type: none">• Maintain liaison with local utilities and provide 24-hour emergency contact information including critical personnel, emergency chain of command, and notification procedures.• Identify the needs and appropriate responses and facilitate interactions between different utilities during an emergency.• Appoint additional contractual labour as per requirement.	<ul style="list-style-type: none">• The Lead Agency representative will establish operations at the EOC as soon as possible after notification of the disaster.• The Lead Agency representative will receive and give briefings and updates to the EOC staff• Update support agency staff and monitor activities• Determine needs and available resources.• Start responding to utilities shortages and disruptions and take care of public safety and health	<ul style="list-style-type: none">• Follow the instructions of EOC and work closely with supporting agencies for temporary recovery of their services.• Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 13 - Public Works & Infrastructure

Lead Agency: Director, Engineering Services & Special Project, MCGM

Before	During	After
<ul style="list-style-type: none"> • Assess gaps in equipment support before any disaster. • Prioritise equipment to be used during disasters. • Keep a log of safety of buildings and structures. • Coordinate training of engineers on damage assessment and restoration. • Maintain flyovers, subways, bridges and allied structures. • Keep tools in working condition. • Appoint staff & vehicles to attend the emergency • Provide names & contact numbers of officers to EOC who deployed on emergency vehicles. • Conduct awareness programmes for the population resides near refineries. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Provide communication facility at disaster site. • Assess disaster situation and determine public works & infrastructure response needs. • Validate requests for public works and infrastructure resources from affected area through EOC. • Provide technical assistance to EOC and public works and infrastructure agencies • Provide reports to the EOC on response structure and anticipate future public works and infrastructure requirements. • Provide for emergency clearance of debris to enable reconnaissance. • Provide alternative routes if necessary. • Restore infrastructure like health centers, schools, important buildings, roads, drainage etc. 	<ul style="list-style-type: none"> • Restore all damaged infrastructure. • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Disaster management Plan

ESF - 14 - Oil & Hazardous Materials

Lead Agency: Director, Industrial Safety & Health

Before	During	After
<ul style="list-style-type: none"> • Organize mock drills, table top exercise for MARG group, fire personals & other staff. • Prepare & update inventory of resources available with government as well pvt agencies like HPCL, BPCL, IOL etc. • Prioritize equipment to be used during disasters. 	<ul style="list-style-type: none"> • Lead Agency representative will establish operations at EOC immediately after notification of the disaster. • Lead Agency representative reaches EOC, will receive and give briefings and updates about the incident from to EOC staff. • Establish communication with other ESFs. • Deployment of personnel and resources will take place within the framework of the EOC direction and control decision-making process. • Update support agency staff and monitor activities. • Determine response needs and available resources. • Coordinate with EOC for need of decontamination and decontamination activities; • Seek cooperation of response teams, owner/shipper and environmental personnel during clean-up operations. • Provide area security and prohibit unauthorized personnel from area with assistance from ESF Public Safety and Law & Order. • Determine with the help of appropriate agencies guidelines for re-entry of emergency personnel & residents. • Make emergency plan to control and clean up hazardous materials. • Conclude clean-up operations when the area is declared safe by responsible personnel. • If necessary communicate directly with media/public on tactical operations and matters affecting public health and safety from the scene of an incident • Maintain log of actions taken, reports, resources needs and capabilities. 	<ul style="list-style-type: none"> • Disseminate safety information through media • Prepare an After-Action Report to identify lessons learnt and improvements needed.

Dos and Don'ts

Dos

1. Go indoors. Stay inside.
2. Switch on the radio/television and look out for public announcements from your local authority.
3. Close doors/windows.
4. Cover all food, water and consume only such covered items.
5. If in the open, cover your face and body with a wet handkerchief, towel, dhoti or sari. Return home, change/remove clothes. Have a complete wash and use fresh clothing.
6. Extend full cooperation to local authorities and obey their instructions completely -- be it for taking medication, evacuation, etc.
7. You must be aware of nuclear radiation hazard. Discuss on Nuclear radiation safety among children and family members, to reduce their fear of radiation.

Dont's

1. Do not panic.
2. Do not believe in rumours passed on by word of mouth from one person to another.
3. Do not stay outside/or go outside.
4. As far as possible, AVOID water from open wells/ponds; exposed crops and vegetables; food, water or milk from outside.
5. Do not disobey any instruction of the district or civil defence authorities who would be doing their best to ensure the safety of you, your family and your property.

Annexure

Disaster management Plan**Rescue Equipment available with NDRF**

SL. NO.	NAME OF EQUIPMENT	QTY.
I	CSSR EQUIPMENTS	-
1.	Pliers 8"	72 Nos
2.	Grip Vise 10"	36 "
3.	Bolt cutter 14 "	72
4.	Bolt cutter 30 "	72
5.	Chisel for Concrete ½"	72 "
6.	Chisel for Concrete ½" to 1"	72 "
7.	Framing Squire	144 Nos
8.	Screw Driver Set	72 "
9.	Hacksaw 12" Tubular	72 "
10.	Hacksaw Replacement Blade 12"	72 "
11.	Tin snip 12"	72 Nos
12.	Claw Hammer	144 "
13.	Sledge Hammer 7 Kg	144 "
14.	Sledge Hammer 10 Kg	144 "
15.	Carpenter Hammer	144 "
16.	Level 12"	90 "
17.	File Flat 12"	72 Nos
18.	Carpenter Pencil Pkt	36 "
19.	Paints Brush ¾"	216 Nos
20.	Shovel Round 8"	72 Nos
21.	Spades Shovels 12 "	180 Nos
22.	Spades	180 Nos
23.	Fire axe 2 ½ '	72 Nos
24.	Crow Bar 2'	144 Nos
25.	Crow Bar 3'	144 Nos
26.	Pick Mattock	72 Nos
27.	Pry Bar 6 '	144 Nos
28.	Axe mate kit	36 Nos
29.	Hand Saw	72 "
30.	Brick Hammer	4 Nos
31.	8 Penny Nails Kgs 2/3 Kgs	36 Pkts
32.	16 Penny Nails 2 Kgs	36 "
33.	Electric drill	72
34.	Electric drill bit set	72 SETS
II	INDIVIDUAL KIT	-
1.	Reflective jacket water proof	822 Nos
2.	Safety Helmets	822 Nos
3.	Boots Hard Toe Steel Shank	822 prs
4.	Safety Torches	822 Nos
5.	Water Bottle Light Wight with Protective Carrier	822 Nos

Disaster management Plan

III	DETECTION AND LOCATION EQUIPMENT	
1.	Life detector	02 Nos
2.	Victim location camera with breaching system	06 Nos
IV	EXTRACTION & ACCESS EQUIPMENTS	
1.	Angle Cutter(Electric)	18 Nos
2.	Replacement Diamond Tipped Blade For Angle Cutter	18 Nos
3.	Replacement composite Blade For Angle Cutter	180 Nos
4.	Combination cutter and spreader	06
5.	Circular saw (Electric) 16'	18 Nos
6.	Replacement Carbide tipped blade for Circular saw	54 Nos
7.	Air lifting bag set with cylinder	06 Sets
8.	Multi Cable winch	06
V	FIRE FIGHTING EQUIPMENTS	-
1	Fire extinguisher portable	72
2	Breathing apparatus set with cylinder	36
3	Leak tester for testing respiratory equipment	01 No
4	Distress signal unit	216
5	Water Jell Blankets	12 Nos
6	Exhaust Fan 12"	72 Nos
7	Ventilator & Air Tube 7 mtrs long	36 Nos
VI	LIGHTING & POWER EQUIPMENTS	-
1.	Extension Cord 8mm Dia 100 Mtrs Long	72 Nos
2.	Working Lamps with 50 M Lead	72 Nos
3.	Fuel containers 20 ltrs	144 Nos
4.	Portable generator 2.5 KVA	78
5.	Inflatable lighting tower	18
VII	MEDICAL FIRST RESPONSE KIT	-
1.	Bite Stick Plastic 6"	90 "
2.	Blood Pressure Cup	90 Nos
3.	Case Stiff Neck Collar	18 Nos
4.	Collars Stiff Neck Short	144 Nos
5.	Collars Stiff Neck Regular	144 "
6.	Collars Stiff Neck No Neck	144 "
7.	Collars Stiff Neck Pediatric	144 "
8.	Collar Stiff Neck Tall	144 "
9.	Pocket Mask (CPR)	90 Nos
10.	Dressing Abdominal 7 ½"	720 "
11.	Gauze Dressing Vaseline 10x10CM	216 Nos
12.	Glasses Eye Protective	900 "
13.	Dressing Multi Trauma 12" X3"	180 "
14.	Obstetrical Kit disposable	72 "
15.	Pen Light	108 Nos

Disaster management Plan

16.	Regular Oxygen LSP# 170-020 with light weight Oxygen Cylinder	90 Nos
17.	Restraint Patient 1 PC-8" Strap	144 Nos
18.	Restraint Patient -2 PC Strap	144 Nos
19.	Scissor- Paramedical	90 Nos
20.	Stethoscope	90 "
21.	Sponge sterile 4" X 4"	10,800 "
22.	Tape Dermical Cloth 1"	432 "
23.	Tape Dermical cloth 2"	648 "
24.	Wooden Splint board full & half with Velcro	90 Nos
25.	Kit carrying bag Nylon	90 "
26.	Full Kit bag Hard	18 "
27.	Band aid 1"X3" Pockets	180 "
28.	Bandage Kling 6" (5 M Roll)	864 "
29.	Bandage Kling 3" (5M Roll)	864 "
30.	Bandage Triangular 40X40"	864 "
31.	Cup Paper Hot & Cold 8OZ	360 "
32.	Depressor Tongue	90 "
33.	Gloves sterile Latex Medium	1800 "
34.	Gloves Sterile Latex Large	5400 "
35.	Gloves Sterile Latex (XL) Large	5400 "
36.	Mask Oxygen Adult Non Rebreather Universal Size	180"
37.	Mask Oxygen Pediatric Non breather\Universal Size	180"
38.	Mask Universal Size	1800 "
39.	Oxygen cannula Nasal	90 "
40.	Triage Ribbon Green 50 M Roll	72 Nos
41.	Triage Ribbon Red	72 "
42.	Triage Ribbon Black 50 M Roll	72 Nos
43.	Triage Ribbon Yellow	72 "
44.	Bandage Elastic 3" Ace	648Nos
45.	Bandage Elastic 6" ACE	648 Nos
46.	Padded board Splint (Wooden) short	180 Nos
47.	Padded board Splint (Wooden) Medium	180 Nos
48.	Padded board Splint (Wooden) Large	180 Nos
49.	Mannequin Face shield(100 Pcs per packet)	-
50.	Air way Oral Set	90 "
51.	Bag Valve Mask Adult	90 "
52.	Bag Value Mask Child (Disposable)	90 "
53.	Flexible Splints	216 Nos
54.	Pneumatic Splint set	36
55.	Emergency Rescue Stretcher	18
56.	Emergency Accident Kit	72 "
57.	Torchlight Styiet Handle	02
58.	Torchlight Wand Disposable 10 per pack Adult	01
59.	Trachea Light wand Disposable 10 per Pack Infant	01 No
60.	Trachea Light Wand Disposable 10 per pack child	01 No

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61.	Infantry Pack (CPR Mannequin) 5 Pieces pack with Lungs Bag	01 No
62.	Squadron Plus (CPR Mannequin) 5 Pieces pack with Lungs Bag	01 "
63.	Deluxe OB Mannequin	01 "

VIII	EQUIPMENT FOR AMBULENCE	-
1.	Manual Suction Unit	-
2.	Stethoscope (Liftman/Tykes / Welchan	25 Nos
3.	B.P. Apparatus Digital	19 Nos
4.	B.P. Apparatus Mercury	25 Nos
5.	Oxygen Cylinder 680 L (Ox dose)Light weight with Accessories	19 Nos
6.	Thermometer Digital	78 Nos
7.	Otoscope & Nasals Speculum	19 Nos
8.	Autoclave	19 Nos
9.	Suction Unit with accessories (MANUAL)	19 Nos
10.	Bag Valve Mask Adult (Silicon Steam Autoclavable)	19 Nos
11.	Bag Valve Mask Child (Silicon)	19 Nos
12.	Bag Valve Mask infant (Silicon)	19 Nos
13.	Sterilizing Drum	19 Nos
14.	Torch	78 Nos
15.	Glucometer	19 Nos
16.	Delivery Set	19 Nos
17.	Emergency Tray with Lid SS	19 Nos
18.	Tray with lid	38 Nos
19.	Scissor Sharp	38 Nos
20.	Scissor tissue cutting	19 Nos
21.	Scissors suture cutting	76 Nos
22.	Artery Forceps Straight	76 Nos
23.	Artery Forceps Curved	114 Nos
24.	Tissue Holding	114 Nos
25.	Sponge Holding Forceps	76 Nos
26.	Cheatles Forceps	19 Nos
27.	Sinus Forceps	19 Nos
28.	Basin Stainless Steel (Large)	19 Nos
29.	Basin Stainless Steel (Medium)	38 Nos
30.	Kidney Tray SS	38 Nos
31.	Urine Can SS	38 Nos
32.	Bowl SS small	19 Nos
33.	B.P. Handle	57 Nos
34.	Stretcher /spine board	57 Nos
35.	Laryngoscope	38 nos
36.	Reflex Hammer	19 Nos
37.	Expendable medicines/surgical/lab items	02 Sets

Disaster management Plan

IX	MISCELLANEOUS UTILITY EQUIPMENTS	-
1.	Disaster Management Kit	36 Nos
2.	MFR Box 48"	1 No
3.	Tarpaulin 4m x4m	144 Nos
4.	Tarpaulin 6 x 6	144 Nos
5.	Megaphone	72 Nos
6.	Small Bucket 15 ltr Cap.	72 "
7.	Bucket Large 25 Ltr Cap	72 Nos
8.	Rack plastic	-
9.	Spray Bottle 1 Ltr	72 "
10.	Spray Paint Orange 400 CC	144 Nos
11.	Scene Tape 100 m rolls	72 Nos
12.	Rope Manila 100 m rolls	18 Nos
13.	Rope Nylon 100m Rolls	18 Nos
14.	Traffic Cone	90 "
15.	Wooden Planks various size in Cubic feet	900 Nos
16.	Galvanized Metal Tubes	360 Nos
17.	Full Body Hermes	36 Nos
18.	Eveready Batteries 1.5V	144 Nos
19.	Steel Pipe 6'/2" Dia	72 Nos

CBRN EMERGENCY RESCUE EQUIPMENTS

SL. NO.	NAME OF EQUIPMENT	QTY.
I	NBC EQUIPMENTS	
1.	Teletector	36 Nos
2.	GM Survey Meter	108 Nos
3.	Contamination Monitor	108 Nos
4.	Mini Red Meter	36 Nos
5.	Portable Alpha Contamination Monitor	18 Nos
6.	Electronic Dosimeter	827 Nos
7.	Beta Gama Counting System	06 Nos
8.	Alpha Counting System	01
9.	Battery Operated Air Sampler with fitter paper	36
10.	Micro R Survey Meter	36 Nos
11.	Breathing Apparatus Set with spare cylinder	36 Nos
12.	Iodate Tablets	1,500
13.	Naps Tablets (60mg/20 Tablet pack)	600 TAB
14.	Plastic Sheets (Meters)	9000 Nos
15.	Plastic suit with comfo respirator	40 Nos
16.	Plastic Bags 2'x3'	1800 Nos
17.	Cordoning Tape 100 mtr Roll	10,000 Nos
18.	Latex Gloves(Pairs)	1296 Prs
19.	Tongs (2')	108 Nos

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20.	Medical Triage (50M Sets)	48 Nos
21.	Bleaching Powder (Kgs)	600 Kgs
22.	Chlorine neutralization kit	36 Nos
23.	Integrated Hood Mask	55 Nos
24.	Respirator (gas mask) with 2 canisters	810 Nos
25.	NBC Over boots	810 "
26.	NBC Decontamination suit	55
II	MEDICAL FIRST RESPONSE KIT	-
1.	Bite Stick Plastic 6"	90 "
2.	Blood Pressure Cup	90 Nos
3.	Case Stiff Neck Collar	18 Nos
4.	Collars Stiff Neck Short	144 Nos
5.	Collars Stiff Neck Regular	144 "
6.	Collars Stiff Neck No Neck	144 "
7.	Collars Stiff Neck Pediatric	144 "
8.	Collar Stiff Neck Tall	144 "
9.	Pocket Mask (CPR)	90 Nos
10.	Dressing Abdominal 7 ½"	720 "
11.	Gauze Dressing Vaseline 10x10CM	216 Nos
12.	Glasses Eye Protective	900 "
13.	Dressing Multi Trauma 12" X3"	180 "
14.	Obstetrical Kit disposable	72 "
15.	Pen Light	108 Nos
16.	Regular Oxygen LSP# 170-020 with light weight Oxygen Cylinder	90 Nos
17.	Restraint Patient 1 PC-8" Strap	144 Nos
18.	Restraint Patient -2 PC Strap	144 Nos
19.	Scissor- Paramedical	90 Nos
20.	Stethoscope	90 "
21.	Sponge sterile 4" X 4"	10,800 "
22.	Tape Dermical Cloth 1"	432 "
23.	Tape Dermical cloth 2"	648 "
24.	Wooden Splint board full & half with Velcro	90 Nos
25.	Kit carrying bag Nylon	90 "
26.	Full Kit bag Hard	18 "
27.	Band aid 1"X3" Pockets	180 "
28.	Bandage Kling 6" (5 M Roll)	864 "
29.	Bandage Kling 3" (5M Roll)	864 "
30.	Bandage Triangular 40X40"	864 "
31.	Cup Paper Hot & Cold 8OZ	360 "
32.	Depressor Tongue	90 "
33.	Gloves sterile Latex Medium	1800 "
34.	Gloves Sterile Latex Large	5400 "
35.	Gloves Sterile Latex (XL) Large	5400 "
36.	Mask Oxygen Adult Non Rebreather Universal Size	180"
37.	Mask Oxygen Pediatric Non breather\Universal Size	180"

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38.	Mask Universal Size	1800 "
39.	Oxygen cannula Nasal	90 "
40.	Triage Ribbon Green 50 M Roll	72 Nos
41.	Triage Ribbon Red	72 "
42.	Triage Ribbon Black 50 M Roll	72 Nos
43.	Triage Ribbon Yellow	72 "
44.	Bandage Elastic 3" Ace	648Nos
45.	Bandage Elastic 6" ACE	648 Nos
46.	Padded board Splint (Wooden) short	180 Nos
47.	Padded board Splint (Wooden) Medium	180 Nos
48.	Padded board Splint (Wooden) Large	180 Nos
49.	Mannequin Face shield(100 Pcs per packet)	-
50.	Air way Oral Set	90 "
51.	Bag Valve Mask Adult (Disposable)	90 "
52.	Bag Value Mask Child (Disposable)	90 "
53.	Flexible Splints	216 Nos
54.	Pneumatic Splint set	36
55.	Emergency Rescue Stretcher	18
56.	Emergency Accident Kit	72 "
57.	Torchlight Styiet Handle	02
58.	Torchlight Wand Disposable 10 per pack Adult	01

59.	Trachea Light wand Disposable 10 per Pack Infant	01 No
60.	Trachea Light Wand Disposable 10 per pack child	01 No
61.	Infantry Pack (CPR Mannequin) 5 Pieces pack with Lungs Bag	01 No
62.	Squadron Plus (CPR Mannequin) 5 Pieces pack with Lungs Bag	01"
63.	Deluxe OB Mannequin	01 "
III	EQUIPMENT FOR AMBULANCE	-
1.	Manual Suction Unit	-
2.	Stethoscope (Liftman/Tykes / Welch an	25 Nos
3.	B.P. Apparatus Digital	19 Nos
4.	B.P. Apparatus Mercury	25 Nos
5.	Oxygen Cylinder 680 L (Ox dose)Light weight with Accessories	19 Nos
6.	Thermometer Digital	78 Nos
7.	Otoscope & Nasals Speculum	19 Nos
8.	Autoclave	19 Nos
9.	Suction Unit with accessories (MANUAL)	19 Nos
10.	Bag Valve Mask Adult (Silicon Steam Autoclavable)	19 Nos
11.	Bag Valve Mask Child (Silicon)	19 Nos
12.	Bag Valve Mask infant (Silicon)	19 Nos

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13.	Sterilizing Drum	19 Nos
14.	Torch	78 Nos
15.	Glucometer	19 Nos
16.	Delivery Set	19 Nos
17.	Emergency Tray with Lid SS	19 Nos
18.	Tray with lid	38 Nos
19.	Scissor Sharp	38 Nos
20.	Scissor tissue cutting	19 Nos
21.	Scissors suture cutting	76 Nos
22.	Artery Forceps Straight	76 Nos
23.	Artery Forceps Curved	114 Nos
24.	Tissue Holding	114 Nos
25.	Sponge Holding Forceps	76 Nos
26.	Cheatles Forceps	19 Nos
27.	Sinus Forceps	19 Nos
28.	Basin Stainless Steel (Large)	19 Nos
29.	Basin Stainless Steel (Medium)	38 Nos
30.	Kidney Tray SS	38 Nos
31.	Urine Can SS	38 Nos
32.	Bowl SS small	19 Nos
33.	B.P. Handle	57 Nos
34.	Stretcher /spine board	57 Nos
35.	Laryngoscope	38 nos
36.	Reflex Hammer	19 Nos
37.	Expendable medicines/surgical/lab items	02 Sets

IV	LIGHTING & POWER EQUIPMENTS	-
1.	Extension Cord 8mm Dia 100 Mtrs Long	72 Nos
2.	Working Lamps with 50 M Lead	72 Nos
3.	Fuel containers 20 ltrs	144 Nos
4.	Portable generator 2.5 KVA	78
5.	Inflatable lighting tower	18
V	MISCELLANEOUS UTILITY EQUIPMENTS	
1.	Disaster Management Kit	36 Nos
2.	MFR Box 48"	1 No
3.	Tarpaulin 4m x4m	144 Nos
4.	Tarpaulin 6 x 6	144 Nos
5.	Megaphone	72 Nos
6.	Small Bucket 15 ltr Cap.	72 "
7.	Bucket Large 25 Ltr Cap	72 Nos
8.	Rack plastic	-
9.	Spray Bottle 1 Ltr	72 "
10.	Spray Paint Orange 400 CC	144 Nos
11.	Scene Tape 100 m rolls	72 Nos
12.	Rope Manila 100 m rolls	18 Nos

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13.	Rope Nylon 100m Rolls	18 Nos
14.	Traffic Cone	90 "
15.	Wooden Planks various size in Cubic feet	900 Nos
16.	Galvanized Metal Tubes	360 Nos
17.	Full Body Hermes	36 Nos
18.	Eveready Batteries 1.5V	144 Nos
19.	Steel Pipe 6'/2" Dia	72 Nos

FLOOD RESCUE EQUIPMENTS

SL. NO.	NAME OF EQUIPMENT	QTY.
I	FLOOD RESCUE EQUIPMENTS	-
1.	Inflatable boat with OBM (FRP)	06
2.	Inflatable motor Rescue Boat	72 Nos
3.	Life Buoys	2080 Nos
4.	Floating Pump	06
II	DEEP DIVING EQUIPMENTS	-
1.	Personal diving kit (Diving suit breathing apparatus Diving suit & boot , Gloves, weight belt Diving fins)	12 Sets
2.	High pressure breathing air compressor	02
III	MEDICAL FIRST RESPONSE KIT	
1.	Bite Stick Plastic 6"	90 "
2.	Blood Pressure Cup	90 Nos
3.	Case Stiff Neck Collar	18 Nos
4.	Collars Stiff Neck Short	144 Nos
5.	Collars Stiff Neck Regular	144 "
6.	Collars Stiff Neck No Neck	144 "
7.	Collars Stiff Neck Pediatric	144 "
8.	Collar Stiff Neck Tall	144 "
9.	Pocket Mask (CPR)	90 Nos
10.	Dressing Abdominal 7 ½"	720 "
11.	Gauze Dressing Vaseline 10x10CM	216 Nos
12.	Glasses Eye Protective	900 "
13.	Dressing Multi Trauma 12" X3"	180 "
14.	Obstetrical Kit disposable	72 "
15.	Pen Light	108 Nos
16.	Regular Oxygen LSP# 170-020 with light weight Oxygen Cylinder	90 Nos
17.	Restraint Patient 1 PC-8" Strap	144 Nos
18.	Restraint Patient -2 PC Strap	144 Nos
19.	Scissor- Paramedical	90 Nos
20.	Stethoscope	90 "
21.	Sponge sterile 4" X 4"	10,800 "

Disaster management Plan

22.	Tape Dermal Cloth 1"	432 "
23.	Tape Dermal cloth 2"	648 "
24.	Wooden Splint board full & half with Velcro	90 Nos
25.	Kit carrying bag Nylon	90 "
26.	Full Kit bag Hard	18 "
27.	Band aid 1"X3" Pockets	180 "
28.	Bandage Kling 6"(5 M Roll)	864 "
29.	Bandage Kling 3" (5M Roll)	864 "
30.	Bandage Triangular 40X40"	864 "
31.	Cup Paper Hot & Cold 8OZ	360 "
32.	Depressor Tongue	90 "
33.	Gloves sterile Latex Medium	1800 "
34.	Gloves Sterile Latex Large	5400 "
35.	Gloves Sterile Latex (XL) Large	5400 "
36.	Mask Oxygen Adult Non Rebreather Universal Size	180"
37.	Mask Oxygen Pediatric Non breather\Universal Size	180"
38.	Mask Universal Size	1800 "
39.	Oxygen cannula Nasal	90 "
40.	Triage Ribbon Green 50 M Roll	72 Nos
41.	Triage Ribbon Red	72 "
42.	Triage Ribbon Black 50 M Roll	72 Nos
43.	Triage Ribbon Yellow	72 "
44.	Bandage Elastic 3" Ace	648Nos
45.	Bandage Elastic 6" ACE	648 Nos
46.	Padded board Splint (Wooden) short	180 Nos
47.	Padded board Splint (Wooden) Medium	180 Nos
48.	Padded board Splint (Wooden) Large	180 Nos
49.	Mannequin Face shield(100 Pcs per packet)	-
50.	Air way Oral Set	90 "
51.	Bag Valve Mask Adult (Disposable)	90 "
52.	Bag Value Mask Child (Disposable)	90 "
53.	Flexible Splints	216 Nos
54.	Pneumatic Splint set	36
55.	Emergency Rescue Stretcher	18
56.	Emergency Accident Kit	72 "
57.	Torchlight Styiet Handle	02
58.	Torchlight Wand Disposable 10 per pack Adult	01
59.	Trachea Light wand Disposable 10 per Pack Infant	01 No
60.	Trachea Light Wand Disposable 10 per pack child	01 No
61.	Infantry Pack (CPR Mannequin) 5 Pieces pack with Lungs Bag	01 No
62.	Squadron Plus (CPR Mannequin)5 Pieces pack with Lungs Bag	01"
63.	Deluxe OB Mannequin	01 "
IV	EQUIPMENT FOR AMBULENCE	-
1.	Manual Suction Unit	-

Disaster management Plan

2.	Stethoscope (Liftman/Tykes / Welch an	25 Nos
3.	B.P. Apparatus Digital	19 Nos
4.	B.P. Apparatus Mercury	25 Nos
5.	Oxygen Cylinder 680 L (Ox dose)Light weight with Accessories	19 Nos
6.	Thermometer Digital	78 Nos

7.	Otoscope & Nasals Speculum	19 Nos
8.	Autoclave	19 Nos
9.	Suction Unit with accessories (MANUAL)	19 Nos
10.	Bag Valve Mask Adult (Silicon Steam Autoclavable)	19 Nos
11.	Bag Valve Mask Child (Silicon)	19 Nos
12.	Bag Valve Mask infant (Silicon)	19 Nos
13.	Sterilizing Drum	19 Nos
14.	Torch	78 Nos
15.	Glucometer	19 Nos
16.	Delivery Set	19 Nos
17.	Emergency Tray with Lid SS	19 Nos
18.	Tray with lid	38 Nos
19.	Scissor Sharp	38 Nos
20.	Scissor tissue cutting	19 Nos
21.	Scissors suture cutting	76 Nos
22.	Artery Forceps Straight	76 Nos
23.	Artery Forceps Curved	114 Nos
24.	Tissue Holding	114 Nos
25.	Sponge Holding Forceps	76 Nos
26.	Cheatles Forceps	19 Nos
27.	Sinus Forceps	19 Nos
28.	Basin Stainless Steel (Large)	19 Nos
29.	Basin Stainless Steel (Medium)	38 Nos
30.	Kidney Tray SS	38 Nos
31.	Urine Can SS	38 Nos
32.	Bowl SS small	19 Nos
33.	B.P. Handle	57 Nos
34.	Stretcher /spine board	57 Nos
35.	Laryngoscope	38 nos
36.	Reflex Hammer	19 Nos
37.	Expendable medicines/surgical/lab items	02 Sets
V	LIGHTING & POWER EQUIPMENTS	-
1.	Extension Cord 8mm Dia 100 Mtrs Long	72 Nos
2.	Working Lamps with 50 M Lead	72 Nos
3.	Fuel containers 20 ltrs	144 Nos
4.	Portable generator 2.5 KVA	78
5.	Inflatable lighting tower	18

HIGH RISE BUILDING RESCUE EQUIPMENTS

SL. NO.	NAME OF EQUIPMENT	QTY.
I	HIGH RISE BUILDING RESCUE EQUIPMENTS	
1.	Helmets	822 Nos
2.	Mittons	100
3.	Ropes	700 Meter
4.	Carriebinner	
5.	Ascender	
6.	Descender	
7.	Heavy Duty Work Gloves	144 Nos
II	POWER TOOLS	
1.	Electric drill	72
2.	Electric drill bit set	72 SETS
III	FIRE FIGHTING EQUIPMENTS	-
1.	Fire extinguisher portable	72
2.	Breathing apparatus set with cylinder	36
3.	Leak tester for testing respiratory equipment	01 No
4.	Distress signal unit	216
5.	Water Jell Blankets	12 Nos
6.	Exhaust Fan 12"	72 Nos
7.	Ventilator & Air Tube 7 mtrs long	36 Nos
IV	MEDICAL FIRST RESPONSE KIT	-
1.	Bite Stick Plastic 6"	90 "
2.	Blood Pressure Cup	90 Nos
3.	Case Stiff Neck Collar	18 Nos
4.	Collars Stiff Neck Short	144 Nos
5.	Collars Stiff Neck Regular	144 "
6.	Collars Stiff Neck No Neck	144 "
7.	Collars Stiff Neck Pediatric	144 "
8.	Collar Stiff Neck Tall	144 "
9.	Pocket Mask (CPR)	90 Nos
10.	Dressing Abdominal 7 ½"	720 "
11.	Gauze Dressing Vaseline 10x10CM	216 Nos
12.	Glasses Eye Protective	900 "
13.	Dressing Multi Trauma 12" X3"	180 "
14.	Obstetrical Kit disposable	72 "
15.	Pen Light	108 Nos
16.	Regular Oxygen LSP# 170-020 with light weight Oxygen Cylinder	90 Nos
17.	Restraint Patient 1 PC-8" Strap	144 Nos
18.	Restraint Patient -2 PC Strap	144 Nos
19.	Scissor- Paramedical	90 Nos

Disaster management Plan

20.	Stethoscope	90 “
21.	Sponge sterile 4” X 4”	10,800 “
22.	Tape Dermical Cloth 1”	432 “
23.	Tape Dermical cloth 2”	648 “
24.	Wooden Splint board full & half with Velcro	90 Nos
25.	Kit carrying bag Nylon	90 “
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29.	Bandage Kling 3” (5M Roll)	864 “
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61.	Infantry Pack (CPR Mannequin) 5 Pieces pack with Lungs Bag	01 No
62.	Squadron Plus (CPR Mannequin) 5 Pieces pack with Lungs Bag	01“
63.	Deluxe OB Mannequin	01 “

Disaster management Plan

V	EQUIPMENT FOR AMBULANCE	-
1.	Manual Suction Unit	-
2.	Stethoscope (Liftman/Tykes / Welch an	25 Nos
3.	B.P. Apparatus Digital	19 Nos
4.	B.P. Apparatus Mercury	25 Nos
5.	Oxygen Cylinder 680 L (Ox dose)Light weight with Accessories	19 Nos
6.	Thermometer Digital	78 Nos
7.	Otoscope & Nasals Speculum	19 Nos
8.	Autoclave	19 Nos
9.	Suction Unit with accessories (MANUAL)	19 Nos
10.	Bag Valve Mask Adult (Silicon Steam Autoclavable)	19 Nos
11.	Bag Valve Mask Child (Silicon)	19 Nos
12.	Bag Valve Mask infant (Silicon)	19 Nos
13.	Sterilizing Drum	19 Nos
14.	Torch	78 Nos
15.	Glucometer	19 Nos
16.	Delivery Set	19 Nos
17.	Emergency Tray with Lid SS	19 Nos
18.	Tray with lid	38 Nos
19.	Scissor Sharp	38 Nos
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22.	Artery Forceps Straight	76 Nos
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24.	Tissue Holding	114 Nos
25.	Sponge Holding Forceps	76 Nos
26.	Cheatles Forceps	19 Nos
27.	Sinus Forceps	19 Nos
28.	Basin Stainless Steel (Large)	19 Nos
29.	Basin Stainless Steel (Medium)	38 Nos
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31.	Urine Can SS	38 Nos
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33.	B.P. Handle	57 Nos
34.	Stretcher /spine board	57 Nos
35.	Laryngoscope	38 nos
36.	Reflex Hammer	19 Nos
37.	Expendable medicines/surgical/lab items	02 Sets
VI	LIGHTING & POWER EQUIPMENTS	-
1.	Extension Cord 8mm Dia 100 Mtrs Long	72 Nos
2.	Working Lamps with 50 M Lead	72 Nos
3.	Fuel containers 20 ltrs	144 Nos
4.	Portable generator 2.5 KVA	78
5.	Inflatable lighting tower	18

Disaster management Plan

VII	INDIVIDUAL KIT	18
1.	Reflective jacket water proof	822 Nos
2.	Safety Helmets	822 Nos
3.	Boots Hard Toe Steel Shank	822 prs
4.	Safety Torches	822 Nos
5.	Water Bottle Light Wight with Protective Carrier	822 Nos
VIII	MEDICAL TRAINING KIT	
6.	Manual suction unit	19 Nos
7.	Pulse oxymeter	01
8.	Nebulizer	01
9.	Portable Anesthesia apparatus kit	01
10.	Portable ultra sound machine	01
11.	Automatic blood analyzer	01
IX	MISCELLANEOUS UTILITY EQUIPMENTS	-
1.	Disaster Management Kit	36 Nos
2.	MFR Box 48"	1 No
3.	Tarpaulin 4m x4m	144 Nos
4.	Tarpaulin 6 x 6	144 Nos
5.	Megaphone	72 Nos
6.	Small Bucket 15 ltr Cap.	72 "
7.	Bucket Large 25 Ltr Cap	72 Nos
8.	Rack plastic	-
9.	Spray Bottle 1 Ltr	72 "
10.	Spray Paint Orange 400 CC	144 Nos
11.	Scene Tape 100 m rolls	72 Nos
12.	Rope Manila 100 m rolls	18 Nos
13.	Rope Nylon 100m Rolls	18 Nos
14.	Traffic Cone	90 "
15.	Wooden Planks various size in Cubic feet	900 Nos
16.	Galvanized Metal Tubes	360 Nos
17.	Full Body Hermes	36 Nos
18.	Eveready Batteries 1.5V	144 Nos
19.	Steel Pipe 6'/2" Dia	72 Nos

MUMBAI FIRE BRIGADE**LOGISTIC IN MFB FOR FIREFIGHTING & RESCUE OPERATIONS**

Sr. No.	Type of Vehicle	Number of vehicles
1	Fire engine	56
2	Water tankers/Jumbo tankers	32
3	HPLV	04
4	Turn Table Ladder	06
5	Aerial Ladder Platform	10
6	Hydraulic Platform	03
7	Ambulance	22
8	EMS Van	06
9	SA 1 Ambulance(stationed at LTMG Hospital)	00
10	Control Post	01
11	Rescue Van	05
12	Breathing Apparatus Van	05
13	House Collapse Van	01
14	Foam Tender	03

Disaster management Plan

Flood & Life Saving Equipment

Sr. No.	Name of Equipment	No of equipment
1.	Inflatable Rescue Boat with O B Machine and accessories	1-6
2.	Inflatable Kayak	2-12
3.	Water Kite	1-6
4.	Wet Suit	5-10
5.	Water Proof Torch	2-12
6.	Life Jackets Foam Type	7-42
7.	Life Jackets Inflatable Type	7-42
8.	Ring Boys with 30 mtrs Rope line	5-30
9.	Rescue Tube	5-10
10.	Floating Stretchers	1-6
11.	Hand Throw Bag inflatable Type	3-18
12.	Polypropylene Rope	4-12
13.	Driver Knife	2-12
14.	Jeep with Trolley	1-6

Beach Safety Equipment

	Girgaon Chowpatty	Dadar Chowpatty	Juhu Beach	Varsova Beach	Aksa Beach	Gorai Beach
Name of Articles	Gowalia Tank	Shivaji Park	Goregao n	Chincholi	Malad	Dahisar
Jet Ski	1	1	2	1	1	1
Semi Inflatable Boat	1	1	1	1	1	1
P F D	3	3	3	3	3	3
Ring Buoy	4	4	6	4	4	5
Surf Rescue Boat	1	1	3	1	1	2
Spine Boat	1	1	3	1	1	2
Rescue Tube	3	3	3	3	3	3
Rechargeable Battery	1	1	3	1	1	2
Ropes	3	3	3	3	3	3

Disaster management Plan**Emergency Support Functions – Lead Agencies**

Sr. No.	Agency	Name	Designation	Contact	Fax	Mobile
ESF - 1	Communication	Mahesh Narvekar	Director, Disaster Management	22694725 22694727	22634719	9820702525
ESF - 2	Public Safety and Law and Order	Sanjay Barve	Commissioner Of Police	22620826 22613552	22621835	9136032777
ESF - 3	Fire Fighting	Prabhat Rahangdale	Chief Fire Officer	23016111 23016181	23086182	9930464820
ESF - 4	Search and Rescue	Prabhat Rahangdale	Chief Fire Officer	23016111 23016181	23086182	9930464820
ESF - 5	Transport	Shekhar Channe	Transport Commissioner	26516336	26414901	9833620113
ESF - 6	Public Health and Sanitation	Padmaja Kesarkar	Ex Health Officer	24134560	24135467	9833898691
ESF - 7	Resource Management	Mahesh Narvekar	Chief Officer DMU	22694725 22694727	22634719	9820702525
ESF - 8	Information Management	Vijay Khabale-Patil	Public Relation Officer	22620251	22620101	9930998844 9869466786
ESF - 9	Mass Care Housing and Human Services	Mahesh Palkar	Education Officer	24145922	24145922	9421211887
ESF - 10	Relief Supplies	Shivaji Jondhale	Collector, City	22662440 22665233	22664232 22661239	9820131307
ESF - 11	Energy (Power , Fuel & Gas)	Dr Sunil Kumar Bagde	GM, BEST	22840601 22873961	22840601	9820285569
ESF - 12	Utility Services	A S Tawadia	DMC (SE)	22620993	22700532	9930260377
ESF - 13	Public Works and Infrastructure	Vinod Chitore	Director, ES&SP	22621387	22620736	9930990152
ESF - 14	Oil & Hazardous Material	S P Rathod	Director, Industrial Safety & Health	26572509		9930943410

Disaster management Plan

Emergency Support Function - Supporting Agencies		
Sr. No.	Agency	Contact
1	All India Radio	22029853
2	Association of Medical Consultant	26844639
3	Autorickshaw Union	28791819
4	Bhaba Atomic Research Centre	25594222
5	Bharat Petroleum Corporation Ltd	22714000; 22713000
6	Brihanmumbai Electricity Supply & Transport	22873961 22840601
7	Bureau of Civil Aviation Security	022-26256899 (O)
8	Central Pulic Works Department	22054936 22058308
9	Central Reserve Police Force	24360971
10	City Engineer, MCGM	22620251
11	Civil Defence	22843667
12	Collector (City)	22661231 22662440
13	Controller of Rationing	22821419, 22852814, 43446215
14	Department of Telecommunication	23719898
15	Deputy Municipal Commissioner (Special Engineering)	24958001 Ext. 2386/2014
16	Director General of Civil Aviation	26157338 26157007
17	Director Medical Education & Major Hospitals,	23082714, 23097078
18	Director of Fire Service (GOM)	26677555
19	Director of Health Services (GOM)	22620292 22621006
20	Director of Medical Education & Research (GOM)	22620361-65
21	Director, Engineering Services & Projects,	22621387
22	Disaster Management Unit, MCGM	22694727/25
23	Education Officer (MCGM)	24142341/42
24	Executive Health Officer, MCGM	24134560 Ext. 338/325
25	FM Radio	26696100 Ext 239
26	Food And Drug Administration	26592363/ 65 (O)
27	Food Corporation of India	30687010 (O)
28	General Administration Department, Protocol (GOM)	22024438
29	Hindustan Petroleum Corporation Ltd	22863583
30	Home Guard	22842423
31	Housing & Urban Development Corporation Ltd	22690080/ 84(O)

Disaster management Plan

32	Hydraulic Engineer MCGM	25153249/ 25341905, 25966154
33	Indian Army	22157202
34	Indian Coast Guard	24301393, 24301564
35	Indian Medical Association	26254368, 26206517
36	Indian Meteorological Department	25150517, (O) 22150431
37	Indian Navy	22751149, 22751022
38	Indian Oil Corporation Ltd	24814000, 24814300
39	Indian Railway	22674556/02 (CR) 22037395 (WR)
40	Kalyan Dombivali Municipal Corporation	0251-2204065
41	Mahanagar Gas Limited	24045785
42	Mahanagar Telephone Nigam Ltd	24301080
43	Maharashtra Maritime Board	22612413/5457/1734/2269 2409, 22658375
44	Maharashtra Housing and Area Development Authority MHADA	24113674/ 23531454, 66405000
45	Maharashtra Industrial Development Corporation	26870835
46	Maharashtra State Electricity Distribution Corporation Ltd	26474211 EXT. 2402, control room 26474211 Ext 3753
47	Maharashtra State Electricity Transmission Corporation Ltd	26474211 Ext 2402, Control room 26474211 Ext 3753
48	Maharashtra State Power Generation Corporation Ltd	26474211 EXT. 2402, control room 26474211 Ext 3753
49	Maharashtra State Road Development Corporation	23686112, 23691609 3671/73
50	Maharashtra State Road Transport Corporation	23085979, 23023977/76
51	Mobile Operator	24323777
52	Mumbai Doordarshan	9122 24938484/ 24940357/ 24965800
53	chief Fire Officer, Mumbai Fire Brigade	23001393, 93,94, 95, 23076111/ 23016181
54	Metropolitan Commissioner, MMRDA	26594169, 26595938, 26597446
55	Police Commissioner, Mumbai Police	22641440
56	Mumbai Port Trust	66565067, 23482742
57	Mumbai University	22656789
58	(a)Mutual Aid Response Group (a) Chembur Trombay MARG, (b) Worli Dahisar MARG	

Disaster management Plan

59	National Cadet Corps	22842781, 22069268
60	National Disaster Response Force	02114 231509
61	National Social Service	9420574704
62	Navi Mumbai Municipal Corporation	27577070/5700
63	Non Governmental Organization (AADM, AHAR, etc.) (a) Director, Aniruddha's Academy of Disaster Management (b)AHAR	24301010/2424 2417818
64	Oil and Natural Gas Corporation	26599932
65	Pay and Account (GOM)	24305508
66	Petroleum and Explosive Safety Organization (GOI)	27564941/ 27575946/ 27573881
67	Practicing Engineers, Architects, and Town Planners	28069310, 28052701
68	Press Information Bureau	22069413, 22062989
69	Private Hospitals	
70	A)Bombay Hosp.	22067676, 22007309
71	B) St. goreg Hosp.	22620361/5, 22620735
72	C) Hinduja Hosp. & Medical Research Center	24447182
73	Public Relation Officer (MCGM)	22621601, 22694302
74	Public Works Department	22072510 / 22018285
75	Rashtriya Chemical Fertilizers	25522265
76	Red Cross	22693956
77	Reliance Energy	30099999 Ext 9501
78	Reliance Infrastructure	30099999, 30303030
79	Road Safety Patrol	24954443
80	Sewerage Operation MCGM	2495 8001/1495 8101 EXT.3001
81	Solid Waste Management MCGM	24922138, 24935681 24955337, 24945186
82	St. John Ambulance	22662059
83	Superintendent of Gardens MCGM	23725799/51
84	Tata Power Company	66657521/67172481/12/11
85	Taxi men Union	23078414 / 23078409
86	Thane Fire Service	25440797/98/99
87	Thane Munivpal Corporation	25336523, 25331155
88	Transort Commissioner	26516336
89	Truck Association	25782568
90	Videsh Sanchar Nigam Limited	66082857/ 66578765
91	Water Tanker Association	26508711

Disaster management Plan