

VOLUME I

MAHARASHTRA DISASTER MANAGEMENT PLAN

**GREATER MUMBAI
DISASTER MANAGEMENT ACTION PLAN**

RISK ASSESSMENT AND RESPONSE PLAN

Vol I

MAHARASHTRA EMERGENCY EARTHQUAKE REHABILITATION PROGRAMME
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INTRODUCTION

1.1 LOCATION

Greater Mumbai Metropolitan area or Municipal Corporation of Greater Mumbai (MCGM) area is divided in two revenue districts viz Mumbai city District and Mumbai suburban District. Greater Mumbai of Maharashtra is entirely urban. It extends between 18° and 19.20° northern latitude and between 72° and 73.00° eastern longitude. It has an east to west extend of about 12 km. where it is broadest, and a north - south extend of about 40 km.

Geographically speaking, Greater Mumbai is an island outside the mainland of Kokan in Maharashtra separated from the mainland by the narrow Thane Creek and a somewhat wider Harbour Bay. At present, it covers the original island group of Mumbai, and most of the island of Salsette, with the former Trombay Island appended to it in its Southeast. A small part in the north the Salsette Island however, lies in Thane District. The Salsette-Mumbai island creek and the Thane creek together separate it from the mainland. Thus the area of Greater Mumbai is surrounded on three sides by the seas: by the Arabian Sea to the west and the south, the Harbour Bay and the Thane Creek in the east - but in the north, the district of Thane stretches along its boundary across the northern parts of Salsette. The BMC limit extends upto Mulund, Mankhurd and Dahisar.

Its height is hardly 10 to 15 meters above sea level. At some places the height is just above the sea level. Part of Mumbai City district is a reclaimed land on Arabian sea coast. Mumbai City is one of the first four metropolitan areas in India.

It is the capital city of Maharashtra State. It has global importance since Mumbai is an international sea port and the international Sahar airport. Because of these, many multinational companies have set up their commercial base in Mumbai. It is also well connected with other parts of India by Western Express Highway and Eastern Express Highway. Mumbai has strategic importance from the defence point of view, with headquarters of Western Naval Command and important offices of Army, Air force and Coast guard.

1.2 Area and Divisions

Greater Mumbai covers an area of 437.71 sq. km. that constitutes 0.14 per cent of the total area of the State of Maharashtra. The importance of Greater Mumbai is also apparent from the fact that it supports a population of about 11.9 million sharing 8.07 per cent of the population of the State (as per 2001 census) with sizeable day-time floating population from places like Thane, Nashik, Raigad and Pune districts, including the population from municipal corporations of Thane, Navi Mumbai, Kalyan-Dombivili, Ulhasnagar in Thane district and Panvel in Raigad district.

The Mumbai City District is covered by area of only 67.79 sq. kms. This district has no revenue tahsils but land record administration is being done according to Revenue Divisions and there are as such 19 revenue divisions in the District. All other administrative work is being done according to the municipal administrative wards and there are 9 municipal wards in the district; A to E wards, F/South and F/North, G/South and G/North wards.

The Mumbai Suburban District covers an area of 370 sqkm. The District consists of one administrative sub-division comprising three Tahsils (that is, Kurla, Borivali and Andheri). The district covers 15 municipal wards of MCGM, and is also referred as Eastern Suburbs and Western Suburbs.

Each ward is under the administrative control of a Assistant Commissioner. There is a Municipal Commissioner along with the various committees to oversee the activities of the MCGM. There is a police commissionerate for the entire MCGM area headed by the Police Commissioner with the headquarters at Crawford Market. The MCGM area is further divided into seven police zones. The traffic commissionerate headquarters is located at Crawford Market and there are seventeen traffic divisions in Mumbai.

The fire brigade is established under the BMC act, and has its headquarters at Byculla. There are in all 31 fire stations in Mumbai. The Fire Brigade is administratively divided into six Regions, each under the charge of a Deputy Chief Fire Officer. Each Region is further divided into Sub-Divisions, comprising a certain number of fire stations under the charge of Assistant Divisional Officer.

1.3 Salient Physical Features and Land Use Patterns**1.3.1 Soil**

The predominant soil cover in Mumbai city is sandy whereas in the suburban district, the soil cover is alluvial and loamy.

Land Use	Mumbai city district (area in sq. km and percentage)	Mumbai suburban district (area in sq. km and percentage)
Inhabited area	53.84, 79.45 %	277.5, 75 %
Agricultural area	Nil	18.5, 5 %
Industrial area	13.5, 19.9 %	41.0, 11.69 %
Forest Cover	0.4543, 0.7 %	33.0, 8.31 %
Wastelands	Nil	Nil
Total	67.79 square kilometres	370 square kilometres

Backbay and Bandra reclamation are the major reclamation areas of Mumbai in the Arabian sea.

1.3.2 Geology and Geomorphology

The entire Greater Mumbai area is occupied by Deccan basalt flows and their acid and basic variants, poured out between the late Cretaceous and early Eocene times. The basaltic flows are horizontally bedded and are more or less uniform in character over wide areas. Certain extrusive and intrusive mafic types are associated with basalt's and are found in the Mumbai Islands and its vicinity. This is in contrast to the monotonous uniformity displayed by the Deccan basalt's in general. Furthermore, some fossiliferous sediment, mainly of tuffaceous origin and partly of fresh water origin, rich in fauna, is also found in Mumbai area.

The stratigraphic succession of rocks in Mumbai area is given below: -

Recent	: Alluvium, Sand and recent Conglomerate
Cretaceous to Eocene	: Laterite Trap dykes Volcanic agglomerate and breccia Basalt flows with Interbedded ash beds and fossiliferous fresh water shakes.

1.3.2.1 Mumbai Island

Mumbai Island has ridges along its western and eastern side. The city of Mumbai is built on the centrally-lying part of the island. The western ridge comprises stratified ash beds overlain by hard, massive andesitic lava flows, both formations showing gentle tilt towards the west. The stratified ash which display variegated colours and variable textures attain a total thickness of about 45m. The varieties are, from bottom to top : i) coarse grained acid tuffs of variegated colours noticed to the east of Worli fort, ii) Yellowish brown ash exposed near Chowpatty beach, along the embankment of Walkeshwar road, Malabar Cumballa ridge, Haji Ali tombs and the Worli fort hills. The exposures at Worli contain fossil tortoise and frogs (*Rana Pussilla*) and iii) coarse grained carbonaceous ash covered by yellowish brown tuffaceous ash devoid of fossils.

The ash beds are capped by massive lava flows which attain a thickness of about 16 m. The rocks are aphanitic, have a conchoidal fracture and exhibit conspicuous hexagonal columnar jointing. They are exposed on the Malabar, Cumballa, Worli hills and extend on to the Salsette Island. Dark coloured fossiliferous shales attaining a thickness of about 2m. are exposed at the foot of the Worli hills. Being deposited during a period of quiescence and overlain by a later flow, these beds are known as Intertrapean Beds. They are very significant as the fossils in them are helpful in fixing the possible age of the associated lava flows.

The eastern ridge represents a different suite of rocks. They are, from bottom to top:

i) basalt, greenish amygdaloidal basalt exposed at Bhoiwada, Mazagaon and Koliwada hills, ii) red ash breccia noticed in the exposures at Sion, iii) highly chilled basic lavas of Sewri fort and Antophills described as Melaphre in the older literature, iv) stratified ashes of Sewri and Cotton Green, the exposures described by earlier students of the geology of Mumbai are now covered by building, but are exposed in some road cuttings.

The geology of the intervening low lands is more or less obscured by the development of the city of Mumbai. but some of the recent excavations near Flora Fountain, Old Custom House and Dader have revealed the presence of either the greenish- grey basalt or the yellowish brown ash.

1.3.2.2 Salsette Island

The central portions of Salsette island comprise a range of hills trending north-south merging into the tidal swamps towards the east, while towards the west these hills pass into wide plains with a few isolated hillocks. Basalt is the major rock unit constituting the main ridge extending from Ghatkopar, east of Jogeshwari, Aarey Milk Colony to Kanheri and beyond. At places, there are ash beds intervening between successive flows, these may be seen in the cuttings of the Western Express High-way passing through Jogeshwari. The isolated hills near Andheri, Jogeshwari railway station, Chincholi and Mandapeshwar are also largely composed of basaltic types. Acid to sub-acid types are associated with the basalts at Dongri, Manori, Madh, Karodiwadi, Malad and Kurla. The basalts in the quarries at Gilbert hill, Andheri, exhibit perfect columnar jointing with spectacular pentagonal columns, over 40m. in height.

Another interesting geological feature is the occurrence of a vast thickness of volcanic agglomerate near Tulsi lake and Kanheri caves, indicating a possible volcanic focus from which much of the pyroclastic rocks in the Mumbai and Salsette islands may have extruded. These agglomerates are largely made up of elongated sub-angular vesicular bombs, blocks of brown chert, trachyte, volcanic ejectment and small pieces of yellow to reddish brown limonitic matter, varying in size from a few centimetres to as much as one metre, set in a matrix of dense, dull light grey amorphous material. At places this matrix resembles bauxite. Some of these agglomerates show fine banding and layers with alternate siliceous and tuffaceous matter, at places with beautiful and intricate applications and contortions. Some of the horizons of the agglomerates and breccias, particularly those which are bauxitised, are quite soft. Differential weathering has resulted in the siliceous bands which stand out as fine minute ribs in some places, simulating fossil wood. This feature may be observed in caves no 84, 85, 86 and 87 at Kanheri. The basalts are intersected by sills and dykes of olivine dolerite, tachylyte etc. The dykes have a general north - south trend and appear to be limited to the eastern margin of the main ridge from west of Mulund, and the eastern banks of the Vihar lake to Vikhroli. Some of these dykes extend further south towards Mankhurd, Chembur and Nanole in the Trombay Island.

Volcanic breccias and ashes interbedded with basalts are noticed at several places near Ghod Bunder, around Tulsi and Vihar lakes, Santacruz, Kurla and Sion. The plains to the west of the main ridge extending from north of Bandra to Borivali and beyond are clothed by marine alluvium represented by saline marine muds, recent shell - limestones, calcareous sand stones, etc. A fair stretch of shore sands with occasional dunes extends from Juhu in the south to Varsova, Marve and Manori in the north.

1.3.2.3 Trombay Island

This island is separated from Mumbai and Salsette by intensive tidal flats with a series of low hills extending north-south in the centre. Facies of amygdaloidal olivine basalt dipping gently towards west, with ramified layers and dykes of rock types described variously as oceanite, ankaramite and monchiquite etc. are prevalent in this area.

Laterite: Small plateaus east of Kanheri caves and south-west of Tulsi lake are covered by laterite with bauxite pockets at 5000m. Elevation above sea level.

1.3.2.4 Structure

Faults: A well marked fault is seen near Antop hill. Sukheswala (1958) has given evidence for two north-south running faults in Mumbai Island, one to the east of Western ridge and other running along the western ridges. The faults extend into Salsette Island and have maximum throw of 75' and 40' respectively.

1.4 Climate and Rainfall

BrihanMumbai receive rains from south-west monsoons, which commence usually in the first fortnight of June and last till the end of September. Pre-monsoon showers are received in May. Occasionally, north-east monsoon showers occur in October and November, but rarely more than twice in the entire rainy season.

In Mumbai city district, the average maximum temperature is 31.2 degree Celsius, while the average minimum temperature is 23.7 degree Celsius. The average total annual rainfall is 2146.6 mm. The maximum annual rainfall was recorded in 1954 at 3451.6 mm.

The details about climates and rainfall in Mumbai Suburban District as recorded at Santacruz rain gauge station of India Meteorological Department are as under :-

The climate of the Mumbai Suburban District is tropical maritime. The daily maximum temperature (mean) range from 29.1 c in August to 33.3 c in May the month of April. Daily minimum temperature (Mean) range from 16.3 c in January to 26.2 c in May. The average annual rainfall of this District based on last 30 years data is 2457.0 mtrs. The District receives an average seasonal rainfall of 2363.0 mm during June- September. The average monthly rainfall is highest in the month of July (945.4 mm) followed by August (660.4 mm) The monthly rainfall in June is 647.5 m.m. and 309.2 m.m. in September.

Unprecedented rainfall recorded in year 2005 i.e. 74.6 mm in Colaba and 944.2 mm in Santacrtuze in 24 hours.

1.5 Socio-Economic Features

During last 35 years there has been a continuing shift of population from Mumbai city District to Mumbai Suburban District and now further to part of Thane District.

1.5.1 Demographic Features

According to the 2001 census, the demographic features observed in Greater Mumbai are as follows:

Total number of households	:	2,515,589
Total Population	:	11,978,450
Total Male Population	:	6,619,966
Total Female Population	:	5,358,484
Sex Ratio	:	809
Urban Population	:	11,978,450
Population density	:	
Literacy Rate	:	76.87 %
Male Literacy rate	:	81.40 %
Female Literacy rate	:	71.28 %

SC/ST

[Scheduled Castes/Scheduled Tribes are socially handicapped groups listed in the Schedule of the Indian Constitution]

SC percentage	:	4.88 %
ST percentage	:	0.76 %
Slum Population percentage	:	54.1 per cent

1.5.2 Historical, religious and tourist centres

There are many historical religious tourist places in Mumbai. The main centres of importance in Mumbai are:

1.5.2.1 Government and semi-government establishments

Mantralaya of the state, Assembly hall, Reserve Bank, India Government Mint, Mumbai University, Municipal Corporation of Greater Mumbai Headquarter, Tata Institute of Fundamental Research International Port, Western Naval Command Headquarters, Bhabha Atomic Research Centre, I. I. T. Powai, NITIE, LIC

1.5.2.2 Religious centres

Haji Ali, Mount Mary Church, Babulnath temple, Mahalaxmi, Siddhi-Vinayak, ISKCON, Dr. Saidhna's Mosque, Chaitanya Bhoomi

1.5.2.3 Entertainment centres

Taraporewala Aquarium, Nehru Science Centre, Jahangir Art Galley, Prince of Wales Museum, Hanging Garden, Chowpatty Beach, Juhu Beach, Madh-Manori-Gorai-Aksa beaches, Film city, Sanjay Gandhi National Park, Esselword Entertainment Park, Powai, Tulsi and Vihar lakes

1.5.2.4 Archaeological and Historical locations

Gateway of India, Elephanta, Kanheri caves, CST Railway station, BMC building, Western Railway headquarters, Rajabhai Towers at University of Mumbai, High Court, Taj Mahal Hotel, Mahim Sanctuary

1.5.2.5 Places of mass congregation

Shivaji Park, Wankhede Stadium, Andheri Sports Complex, Brabourne stadium, SNTD grounds, Race course

1.6 Power stations/Electrical installations (receiving station)

The electricity requirements of Greater Mumbai are met by the Tata Hydro-Electric system through three distribution agencies; namely the Brihan Mumbai Electric Supply and Transport Undertaking (BEST) in the island of Mumbai, the Brihinmumbai Suburban Reliance Energy covering areas of the western suburbs and southern parts of eastern suburbs and the Maharashtra State Electricity Board (MSEB) covering the Northern areas of the eastern suburbs.

The BEST is supplying electricity in Mumbai City area from Colaba to Sion/Mahim over the area of 60 sq.kms. The BEST Undertaking is purchasing the electricity from Tata Electric Companies (TEC) and distributing the same in Mumbai City. They are purchasing electricity from TEC at four points located in Mumbai City area. These points are

- Carnac Receiving Station: - Sant Tukaram Marg, off Lokmanya Tilak Road, Carnac Bunder, Mumbai.
- Parel Receiving Station: - Parel Tank Road, Parel.
- Mahalaxmi Receiving Station: - Senapati Bapat Marg, Near Ambica Mill, opp. Todi Indl. Estate, Lower parel.
- Dharavi Receiving Station: - Andhra Valley Road, Near Shalimar Indl. Estate, opp. Andhra valley Colony, Dharavi.

They receive the power at their 42 receiving stations and distribute the same through the network of 1927 substations and HV & LV underground cables. The substations are located at different locations in the entire area of their supply. There are two control centres, one at Vidyut Bldg, Pathakwadi opposite G.T. Hospital and another at Transportation House, Tilak Road, Dadar. All these 42 receiving stations, 1927 substations and two control centres are very important installations from point of view for distribution and supply of the electrical energy. The list of these 42 receiving stations and two control centres along with their address is enclosed separately in Annexure I.

The four receiving stations of TEC mentioned above are fed from their generating stations through overhead high voltage transmission lines. These generating stations are also connected to the Maharashtra grid. TEC is also having their high voltage consumers in Mumbai City area.

At present electricity generation and transmission is being done in Mumbai by the Tata Hydro-Electric Power Supply Company. The Company has generation stations at Trombay and Khopoli. It has its receiving stations at Mumbai and surrounding areas. The Andhra Valley Power Supply Company has also a generation station at Trombay and another at Bhivpuri. It has also receiving stations in Mumbai and the surrounding areas. A list of power stations in Mumbai Corporation area and their locations is also enclosed.

In addition to this, direct supplies are also made from the Tata Hydro-Electric system to consumers with huge load demand like the railways, textile mills and a few other industries.

1.7 Water Supply and Sanitation

There are two rivers in Greater Mumbai, Dahiser River and Mithi River

The Dahiser River originates at Kanheri caves and meets Gorai creek. Similarly the Mithi River originates at Vihar and meets Mahim creek. Overflow of Vihar, Tulshi and Powai lakes goes to Mithi River. There are no rivers in Mumbai City District.

There are three dams in Mumbai Suburban District.

Name, location, capacity and catchment area

Name of the Dam	Tulsi	Vihar	Powai
Location of the Dam	National Park area between Mulund & Borivali i.	Near NITIE Bhandup	Between Vikroli and Bhandup Near I. I. T. Powai
Capacity of the Dam in M C M	10.415 MCM	41.766 MCM	5.46 MCM
Catchment area in sq. km.	6.70 sq.km.	18.90 sq.k.m.	6.68 sq. k.m.

All the above three dams are impoundage on lakes. Mumbai receives its water supply through these dams and other dams located in Thane district.

Solid waste dumping sites are located at Deonar, Mulund, Malad and Gorai.

1.8 Slums

Around 54.1 per cent of the total population in Greater Mumbai is staying in hutment or slum colonies. Due to escalating costs of land and materials and increasing population, it has become almost impossible to acquire residential property on ownership or even rental basis for a very large proportion of households.

BMC has focused its efforts to provide the basic amenities like water, toilets and electricity in authorised slum colonies but still large proportion of population is staying in unauthorised slums and these basic amenities are very rare in such slums. All the slum colonies whether authorised or unauthorised are vulnerable to floods, health hazards, fires and cyclones.

1.9 Economy and Industrialisation

The employment count for Greater Mumbai was 44.64 lakhs in 2001 and this level of economic activity is higher than remaining part of the Maharashtra. As regards the pattern of employment in the primary, secondary and tertiary sectors, the primary sector is not important in Greater Mumbai since only about 2 in 1000 workers are working in primary sector as their main activity whereas 41.21 percent of the workers are working in secondary sector and 58.12 percent workers are working in tertiary sector.

The proportion of women workers is much lower in primary and secondary sectors. The geographical distribution of the main workers according to their residence shows that the workers are concentrated in F/S and G/S wards of Mumbai city and P/S, P/N, R/S and R/N wards of suburban area. As for trade workers, the workers come from all the wards of Mumbai city as well as H/W, K/W, R/S, R/C and R/N, M/W and T wards in Mumbai suburban area.

The extent of industrialisation gets reflected by the member of industrial estate and industrial activity and in terms of movement of cargo.

Extent of Industrialisation	City	MSD	MIDC
Number of Industrial Estates:	77	336	470
Number of Chemical Industries / tank farms	41	338	—
Total work force in Industries	1, 77,779	2, 82,062	50,000
Number of pipelines carrying chemicals.	1	29	—
Number of potentially hazardous locations.	8	21	—
Number of vehicles carrying hazardous: Raw materials for industries (during a month).	334	502	—
Number of vehicles carrying hazardous: Finished products from industries (During a month)	33099	24599	—
Number of container terminals:	11	2	
Types of Industries : Engineering, Printing, Garments, Plastic, Textiles, Chemical Installation etc.			Oil

It is reported by the Director of Industrial Safety & Health, Mumbai that the major types of hazardous chemicals and hazardous finished products transported are:

- (1) Chlorine, (2) Ethylene Oxide, (3) L.P.G., (4) Motor Spirit, (5) Superior Kerosene Oil, (6) Methanol, (7) Ammonia, (8) Hexene, (9) Naptha, (10) Propylane, (11) Butadience (12) Styrene.

1.10 Transport and Communication Network

Mumbai has three entry and exit points at Mankhurd, Dahisar and Mulund with octroi check posts at each point. The main road stretches are the Eastern Express Highway from Sion to Mulund leading to NH-3, Western Express Highway from Bandra to Borivali leading to NH-8, and Sion-Panvel road leading to NH-4 and NH-17.

1.10.1 Surface Transport

The main modes of transport are through the mass transport provided by Central Railway (from CST to Khopoli and Kasara on the main line and Panvel on the harbour line), Western Railway (from Churchgate to Virar) and BEST buses within MCGM limits and upto Navi Mumbai and Mira Road which are outside BMC limits.

Mode of Transport	Daily Number of trips (daily)	Total number of passengers passengers (daily)	Average peak time
Central Railway (Main line)	658	1.31 million	0.081 million
Central Railway (Harbour line)	414	0.828 million	0.045 million
Western Railway	923 trains	1.4 million	0.118 million
BEST		4.120 million	1.8 million

1.10.2 Outstation travel

For outstation traffic, Central Railway, Western Railway and Konkan Railway operate from CST, Mumbai Central, Dadar, Bandra, and Kurla terminus while MSRTC operates buses from Mumbai Central, Parel, Dadar, Borivali and Kurla depots. In addition, there are many private transporters who operate luxury and semi-luxury buses to outstation locations.

1.10.3 Waterways

Recently, hovercraft services and ferry services have started operating during the non-monsoon period from Gateway of India to Navi Mumbai, Uran, Alibag, Rewas and Juhu.

1.10.4 Air Travel

The international airport is at Sahar, which on an average has 4 million passengers alighting and departing in a day.

The domestic airport is located at Santacruz which on an average has 4.2 million passengers alighting and departing in a day.

1.10.5 Details of transport network

	City	MSD
Number of National Highways	NIL	NIL
Length (in Kms) of National Highways :	NIL	NIL
State Highways (in Kms)		
Western Express Highways	NIL	23.33 Kms.
Eastern Express Highways.	NIL	25.50 Kms.
B. M. C. Roads (in Kms.)	1350 Kms.	1660 Kms.
Number of bridges on rivers	NIL	3
Number of S.T. depots/BEST	2/7	2/17
Number of Jetties	2	14
Number of Boats licensed in Greater Mumbai	2027 (Common)	
Number of railway stations with mail/ express halts.	6	3
Number of Railway bridges		
W/R	13	7
C/R	17	10
Electrified railway routes (in Kms)	44 Kms.	42.56 Kms
All Broad Gauge, Single		
1. Churchgate - Mahim	14 Kms	—
2. C.S.T. - Sion	13 Kms	—
3. C.S.T. - Mahim	14 Kms.	—
4. Wadala - Chunabhatti	3 Kms.	—
5. Bandra - Dahisar	—	21.68 Kms
6. Kurla - Mankhurd	—	5.72 Kms.
7. Kurla - Mulund	—	15.16 Kms.
Number of unmanned railway crossings	NIL	NIL
Number of Airports	NIL	2
Number of Helipads	Nil	1

List of Jetties (Minor landing Centre) :

Bandra Port, Worli, Mahim, Sewree, Sasoon Dock, Apollo Bunder, Chimbai,
 Mahul, Turbhe, Manori Port, Gorai, Manori Marve, Malvni, Yerangle, Bhati, Juhu Tara, Danda (East), Danda
 (West), Versova Port, Madh/Patwadi , Versova (W), Versova (E).

RISK ASSESSMENT AND VULNERABILITY ANALYSIS

2.1 Vulnerable settlements

There are in all 2335 slum settlements as per 1985 data in Mumbai.

These slums are considered as vulnerable settlements due to their location and access to infrastructure. The locations include hilltops, slopes, nallahs, low-lying areas (with tendency to flood during high tides), coastal locations, under high tension wires, along highways, along railway lines, within industrial zones, pavements, along water mains, along open drainage

The major wards having a concentration of more than 100 slums are given below:

Name of ward	Number of slums
F-S	105
G-N	131
G-S	111
H-E	252
K-E	106
K-W	120
L	167
M-E and M-W	296
N	158
P-N	202
R	180
S	149
T	182

These slums are located on the lands of state government (25 %), BMC (20 %), Housing Board and central government (5 %), private lands (50 %). The ownership of these lands has implications for intervention strategies.

2.2 Floods

There a number of flooding points which result in disruption of traffic and flooding of settlements.

List of Chronic Flooding Spots: City	
1	S.V.P. Low level
2	Sandhurst Road
3	Burhni College
4	Mumbai Central
5	Slatter Road
6	King Circle
7	Hindmata
8	Sakhubai Mohite Marg
9	Wadala Station
10	Maratha Mandir

List of Chronic Flooding Spots: Eastern Suburb

1.	Kurla Station (W), Near Rickshaw Stand
2.	L.B.S. Marg, C.S.T. Junction to Sheetal Cinema, Kurla (w)
3.	From Premier Road up to Milind Nagar Nalla, Kurla (W)
4.	Shanti Nagar, Baigan Wadi
5.	Sindhi Society, Chembur (W),
6.	Between 21 st Road and Subhash Nagar Road, Jeevan Bahar Society, Chembur (W)
7.	Shanta Jog Marg, Tilak Nagar, Chembur (W)
8.	Savan Bazar, N.G. Acharya Marg, Chembur (W)
9.	Kirol Road, Near Fatima High School, Ghatkopar (W)
10.	New Pant Nagar from Vallabh Baug Extension, Lane upto Railway Police Quarters, Ghatkopar (E)
11.	Naval Dockyar at L.B.S. Marg, Jn. Chirag Nagar Raod, Ghatkopar (W)
12.	Bhandup Village Road, Near Progressive Steel Co. Bhandup (W)

List of Chronic Flooding Spots: Western Suburb

1.	Juhu Tara Road & S.V. Road Junction, Santacruz (W)
2.	Milan Subway – Santacruz (W)
3.	Andheri Subway, Andheri (W)
4.	Marol Market, Andheri Kurla Road, Andheri (W)
5.	Vidyanidhi Complex, JVPD North, Vileparle (W)
6.	Gazdar Bundh, Santacruz (W)
7.	Bhogale Chowk, Vileparle (E)
8.	Junction of M.G. Road, Subhash Road Vileparle (E)
9.	Veera Desai Road, Last Bus Stop, Andheri (W)
10.	Kotkar nalla, Goregaron (E)
11.	Piramal Nagar Nalla, Goregaon (W)
12.	Rani Sati Marg, Makrani Pada, Malad (E)
13.	Valnai Hutment Colonies, Kandivali (W)
14.	Link Road, Guria Pada, Malad (w)
15.	Malad Subway, Malad (E) & (W)
16.	Opp. Kandivali Fire Station, S.V. Road, Kandivali (W)
17.	Sambhaji Nagar, Dahisar (E)
18.	Dahisar Subway, Dahisar (E) & (W)

The number of flooding points in each ward is given below

The ward wise number of flooding points is given below:

Ward	Number of slums which get affected	Number of flooding points
1. A	9	09
2. B	Nil	03
3. C	Nil	08
4. D	5	15
5. E	12	15

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5. E	12	15
6. F/South	13	09
7. F/North	Nil	12
8. G/South	3	09
9. G/North	5	02
10. H/East	7	20
11. H/West	8	04
12. K/East	Nil	12
13. K/West	10	13
14. L	12	21
15. M/East	3	2
16. M/West	6	03
17. N	3	10
18. P/South	4	32
19. P/North	6	02
20. R/South	7	23
21. R/North	15	5
22. R/Central	-	07
23. S	3	05
24. T	4	04

A ward wise detail of all the flooding locations is given in Annexure II.

Most of these flooding points have been listed in the ward plans and have a localised impact. However, some of these flooding points have a tendency to disrupt the traffic and paralyse city life.

Length of nallas and drains (K.M.)

	City	Eastern Sub.	Western Sub.	Total
Long Nallas (Length -1.5 mtr.)	8.545	90.200	101.509	200.254
Small Nallas (Length -1.5 mtr.)	20.762	66.400	42.104	129.266
Arch / Box culverts	59.20	40.00	51.93	151.13
Road sides drains	20.00	669.48	1297.50	1986.98
Water entrance number	27893	609	1706	30208
Underground pipes	443.180	36.200	86.031	565.411

List of Major Nalls in City (Total No. of Nalls: 15)

Sr. No.	Name of the Nalla	Length (Rm)
	J.K. Chemical Nalla	1650
	Prem Nagar Outfall	175
	Naik Nagar Nalla	365
	Pratiksha Nagar Nalla	800
	Raoli Low Level Nalla	490
	Korba Mithagar Nalla	430
	Korba School Nalla	160

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	Anna Indira Nalla	170
	Shetwadi Nalla	180
	Kuttiwadi Nalla	50
	Race Course Nalla	250
	Nehru Science Centre Nalla	600
	LGP Nalla & Outfall	150
	Cleaveland Bunder outfall	170
	Textile Mill Nalla	400

List of Major Nalls in Western Suburb (Total No. of Nallas: 63)

Sr. No.	Name of the Nalla	Length (Rm)
1	Chamdawadi Nalla	1200
2	Beharmapada Nalla	900
3	Golibar Nalla	1050
4	Vakola river	3850
5	S.N.D.T. Nalla	1525
6	North Avenue Nalla	160
7	South Avenue Nalla	540
8	Boran Nalla	1350
9	P&T Nalla	1225
10	Malpa Dongri Nalla	500
11	Meghwadi Nalla	500
12	Krishna Nagar Nalla	2300
13	Kole Dongri Nalla	1830
14	Lela wadi Nalla	2290
15	Kondivita Nalla	1100
16	Shradhanand Nalla	1920
17	Cargo Complex Nalla	3060
18	Oshiwara River	4800
19	Fairdeal Nalla	1230
20	Indian Nagar Nalla	2150
21	Deewan Centre Nalla	225
22	Walbhat River	11769
23	Motilal Nagar System Nalla	305
24	Shastri Nagar Nalla	1690
25	Piramal Nagar Nalla	3517
26	Madina Manzil Nalla	1075
27	Chincholi Nalla	1430
28	Vijaykarwadi Nalla	368
29	Kurar Village Nalla	345
30	Ramchandra Lane Nalla	4395
31	Dhanjiwadi Nalla	1967
32	Malvani Nalla	1060
33	Poiser River	11431
34	Samta Nagar Nalla	324
35	Thakur Complex Nalla	170

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36	Asha Nagar Nalla	456
37	Charkop Nalla	666
38	Kamla Nehru Road Nalla	2429
39	Joglekar Nalla	2790
40	Majithia Nalla	817
41	Vickers Sprey Nalla	2258
42	Housing Board Nalla	453
43	Indi Housing Nalla	620
44	Sahyadri Nalla	320
45	Rajendra Nagar Nalla	3502
46	Mhatre Nalla	3390
47	Chandavarkar Nalla	3242
48	Dahisar River	4100
49	Dahisar River Brance A	718
50	Dahisar Nalla	1686
51	Ashokvan Kajupada Nalla	2516
52	Dhasakwadi Nalla Branch A	1520
53	Dhasakwadi Nalla	1976
54	Mogra Nalla	6220
55	Avinash Bldg. Nalla	450
56	MHADA Nalla Model Town	780
57	Milan Subway	500
58	Airport Nalla	1100
59	Rasraj Nalla	900
60	Nehru Nagar Slum Nalla	400
61	Irla Nalla	2500
62	Abhishek Nalla	850
63	Gilbert Hill Nalla and Wireless Plot	1050

List of Major Nalls in Eastern Suburb (Total No. of Nallas: 16)

Sr. No.	Name of the Nalla	Length (Rm)
1	Lions Garden Out Fall	400
2	Parikh Khadi Out Fall	400
3	Nalla No. 11 (Josh Nagar)	920
4	Patelwadi Nalla	413
5	Subhash Nagar Nalla	4021
6	Demographic Nalla	1128
7	Vallabhbaug Nalla	1160
8	Laxmibaug Nalla	1885
9	Laxmi Nagar Nalla	293
10	Damodarpark Nalla	632
11	Barve Nagar Nalla	928
12	Sommaiyya Nalla	5950
13	Mohan Nagar Nalla	5950
14	Usha Nagar Nalla	3280
15	Temhepada Nalla	1500
16	Boundary Nalla	4070

A number of steps such as de-silting of drainage and clearing of nallahs are taken by BMC and Railways to avoid such flooding. However, a combination of heavy precipitation and high tide may make such flooding unavoidable.

2.3 Fires

Greater Mumbai is greatly diversified and practically has every type of fire risk. The fire risk can arise from the following sources :

- large number of closely built old timber framed buildings in Ward A, B and C
- high-rise buildings with inadequate fire-fighting facilities
- commercial activities in Kalbadevi, Mumbadevi, Bhuleshwar, Vadgadi, Bhandi Bazar, C.P.Tank
- small, medium and heavy hazardous industries in suburban areas
- widespread docks area
- oil refineries in M-W ward
- petrochemical industries
- large slum settlements.

There are 3500 officers and men spread over 31 stations, to fight the fires.

2.4 Earthquakes and house crashes

Mumbai city falls in seismic zone III which is Moderate Damage Risk Zone (MSK VII).The major earthquakes that have occurred in Mumbai region in the last 400 years are given below :

Year	Intensity (MMI)
1594	IV
1618	IX
1678	IV
1832	VI
1854	IV
1877	IV
1906	VI
1926	V
1933	V
1951	VIII
1963	IV
1966	V

As per the 2001 census, Greater Mumbai has 2,768,910 dwellings, including residential, commercial and industrial establishments. Of these, only 9.08 % of the dwellings were made of re-inforced concrete while 31.35 % were engineered masonry constructions. Thus, 59.57 % of all constructions were non-engineered. This can partly be attributed to the large percentage of population living in the slums.

Therefore, the major risk category of structures is that of the engineered masonry constructions. Many of these are essentially load-bearing structures.

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
	<hr/>
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 today is around 18,580. Many of these buildings have been repaired several times in the past from the permissible cost ceiling limit of Rs.75/m². This has now been revised to Rs. 750/m².

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.

2.5 Landslides

Greater Mumbai also faces the risk of Landslides With pressure on land, many vacant sites on hill slopes or bottoms of hills have turned into inhabited area and thereby become vulnerable to landslides. Most cases of landslides occur during heavy rain associated with high velocity winds. It sometimes results in loss of human lives and damage to structure.

The sites vulnerable to landslides in Mumbai city district are as follows :

Sr.No	Ward	Landslide Location	Approximate Population
1	D ward (Nana chowk)	Asha Nagar, Jaldarshan Apartment, Near Nephency Road,	700
2	D ward (Nana chowk)	Simla Nagar, L.D. Ruparel Marg,	300
3	D ward (Nana chowk)	Sham Kunj, Walkeshwar Road, Behand Sahyadri.	250
4	D ward (Nana chowk)	M.P.Mill Compound, Janata Nagar, Tardeo.	800
5	E Ward (Byculla)	Mazgaon,Bhandar wada Hill, Dr.Nath Pai Road,	1000
6	F/S ward (Parel)	2 Octombar Colony	5000
7	F/S ward (Parel)	2 Octombar Colony (Extention)	5000
8	F/S ward (Parel)	Bhim Nagar colony	700
9	F/S ward (Parel)	Parmanand Wadi Colony	200
10	F/S ward (Parel)	Turner Sanaterioum Colony	200
11	F/S ward (Parel)	Ambedkar Colony.	700
12	F/S ward (Parel)	New Shivaji Nagar, Acharya Dhonde Marg,	500
13	F/S ward (Parel)	Ganesh Nagar	1000
14	F/S ward (Parel)	Marwadi wadi	1000
15	F/S ward (Parel)	Golanji Hill	300
16	F/S ward (Shivadi)	Ram Laxman Hill Colony	300
17	F/S Ward (Shivadi)	Hanuman Tekdi Colony	300
18	F/S Ward (Shivadi)	Bara Devi Colony	300
19	F/S Ward (Shivadi)	Wagheshwari Colony	400
20	F/S ward (Kalachowky)	Dabholkar Adda	300
21	F/S ward (Kalachowky)	Extention Turner Sanatrioum	200
22	F/S ward (Kalachowky)	Jijamata Nagar	700
23	F/N ward (Dadar-Matunga/East)	Salamati Hill (M.A road, H.M. road)	300
24	F/N ward (Dadar-Matunga/East)	Rawali camp hill, (Reservoir)	250
25	F/N ward (Dadar-Matunga/East)	Walchand Bunglow Hill (Indira Nagar, Near Antop Hill Post Office)	500
26	F/N ward (Dadar-Matunga/East)	Barkat Ali Hill,	200
27	G/S ward (Worli)	Prem Nagar, B.G. Kher Marg,	700
28	G/S ward (Worli)	Maya Nagar, B.G. Kher Marg,	500
29	G/S ward (Worli)	Siddharth Nagar, Dr.Ambedkar Marg	700
30	G/S ward (Worli)	Anand Nagar, Dr. Ambedkar Marg	1000
31	G/S ward (Worli)	Shivaji Nagar, Dr. Ambedkar Marg	800

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32	G/S ward (Worli)	Amar Nagar , Dr. Ambedkar Marg	300
33	G/S ward (Worli)	Jaikar wadi, Wadala	350
34	H/West(Bandra West)	Kadeshwari Mandir,Kadeshwari road, Bandra (West)	400
35	H/West(Bandra West)	Jafarbaba colony, Jafar Baba road, Near Mount Merry,Bandra(W)	300
36	K/West(Andheri,Jogeshwari)	Girbert Hill, Andheri (West)	300
37	K/West(Andheri,Jogeshwari)	Gaondevi Dongri,Andheri(West)	450
38	K/West(Andheri,Jogeshwari)	Bnandivali Hill, Jogeshwari (west)	200
39	P/South (Goregaon)	Koyana Colony, Goregaon Mulund link road, Goregaon(East)	1000
40	P/South (Goregaon)	Flyover Society,Goregaon Mulund link road, Goregaon(East)	700
41	P/North Malad(East)	Tanaji nagar, Kurar village, Malad (East)	200
42	P/North Malad(East)	Gupta compound, Near Anand nagar, Appa Pada,Malad (East)	700
43	P/North Malad(East)	Agarwal Compound, Khadan , Malad (East)	500
44	P/North Malad(East)	Giri Compound, Ban Dongri,Malad (East)	200
45	P/North Malad(East)	Shivaji Nagar, Pathan Wadi road, Malad(East)	200
46	P/North Malad(East)	Dhanji wadi, Western Express Highway,	150
47	P/North Malad(East)	Opp. Jagruti Bus depot, Western Express , Malad (East)	200
48	P/North Malad(East)	Tadiwala Compound, Kokani Pada, Pathan Wadi, Malad (East)	300
49	R/South (Kandivali)	Gautam nagar, Kandivali (East)	500
50	R/South (Kandivali)	Shree Ram Nagar, Kandivali (East)	300
51	R/North (Dahisar)	Bhim Nagar, Kandarpada, Link road, Dahisar (West)	700
52	R/North (Dahisar)	Near N.G. Park , Shiv Vallabh Cross road, Dahisar (East)	150
53	R/Central(Borivali)	Western Express highway ,Masjid Kulupwadi, Borivali (East)	700
54	R/Central(Borivali)	Western Exprerss highway,Devi Pada(Tekdi), Near Boot Bunglow	200
55	L/Ward (Kurla)	Jay Ambika nagar,Sunder Baug Lane, Ghatkopar (West)	700
56	L/Ward (Kurla)	Gurunanak Nagar Society, Behind Narayan nagar, Ghatkopar(W)	400
57	L/Ward (Kurla)	Himalaya Society, Behind Shankar Mandir, Ghatkopar (West)	500
58	L/Ward (Kurla)	Ramkrishna Society, Sunder Baug lane, Ghatkopar (West)	450
59	L/Ward (Kurla)	Bhuddha Parna Kutir , Devi Charan chawl, Kajupada, Kurla (West)	700
60	L/Ward (Kurla)	Nanshi Munshi Compound, Chandivali, Kurla (West)	400

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61	L/Ward (Kurla)	Ganesh Nagar,Pareira Wadi Hill	500
62	L/Ward (Kurla)	Vijay Nagar Hill, Near Air Port, Jari mari Andheri Kurla road,	800
63	L/Ward (Kurla)	Garib Mohalla ,Dr.Ambedkar nagar	500
64	L/Ward (Kurla)	Devi Charan Chawl, kajupada, Kurla (West)	400
65	L/Ward (Kurla)	Goyenka Estate, Roshan Compound, Ganesh Gully, J.M.road	600
66	L/Ward (Kurla)	Hindi Bal Vidhya Mandir, Mohili Village, Ghatkopar (West)	300
67	L/Ward (Kurla)	Ashapura Compound, Ghatkopar (West)	200
68	L/Ward (Kurla)	Khadi No.3, G.A. Link road, Saki naka Mumbai -72	700
69	M/East(Mankhurd ,Gowandi)	Sayadri Nagar A, Panjara Pol, V.N.Purav Marg	300
70	M/East(Mankhurd ,Gowandi)	Om Ganesh Nagar,Sayadri Nagar B, Bharat Nagar, Opp.R.C.Marg	500
71	M/East(Mankhurd ,Gowandi)	Vishnu nagar, L.K. Gadkari Marg,	200
72	M/East(Mankhurd ,Gowandi)	Gautam nagar, Dean Query road	700
73	M/East(Mankhurd ,Gowandi)	Ashok Nagar, R.C. Marg, Vashi naka	300
74	M/East(Mankhurd ,Gowandi)	Bharat nagar, R.C. Marg, Vashi Naka	700
75	M/East(Mankhurd ,Gowandi)	Rahul Nagar, R.C.Marg, Vashi Naka	800
76	M/West (Chembur)	Lal Dongar Siddi Society, S.T. road.	700
77	M/West (Chembur)	Bhai Bhai nagar, D.K. Sadue marg,	200
78	M/West (Chembur)	Postal colony	200
79	M/West (Chembur)	Swastik park, Extern Express Highway	300
80	M/West (Chembur)	Shell Colony	400
81	N/Ward (Ghatkopar)	Narayan Nagar Hill No.2, Marathwadi Chawl, Ghatkopar (West)	200
82	N/Ward (Ghatkopar)	Dattatraya Nagar, Zopadpatti, Ghatkopar (West)	500
83	N/Ward (Ghatkopar)	Bhaktidham Sevashram Bhim Nagar, Ghatkopar (West)	300
84	N/Ward (Ghatkopar)	Narayan Nagar, Home guard ,N.S. road, Ghatkopar (West)	400
85	N/Ward (Ghatkopar)	Chandpura Momimpura,Kokanpada, Narayan Nagar	700
86	N/Ward (Ghatkopar)	Ashatvinayak society, Pandhsheel nagar, Ghatkopar (West)	300
87	N/Ward (Ghatkopar)	Sai Prerna Soc., Jay Bhavani So, Sayadri Soc.Panchsheel nagar.	250
88	N/Ward (Ghatkopar)	Rahul nagar, Vikroli (West), Near Suryavanshi House	300
89	N/Ward (Ghatkopar)	Shantidoot Society, Rahul nagar, Vikroli parksite	400
90	N/Ward (Ghatkopar)	Sanjay Gandhi nagar, Vikroli Park site.	300

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91	N/Ward (Ghatkopar)	Chatrapati Shivaji Society, Ram nagar, Vikroli Park site.	400
92	N/Ward (Ghatkopar)	Ram Nagar, Vikroli.	500
93	N/Ward (Ghatkopar)	Lokmanya Society, Varsha nagar, Vikroli.	300
94	N/Ward (Ghatkopar)	Sant Krupa society, Varsh Nagar, Vikroli.	400
95	N/Ward (Ghatkopar)	Kranti Soceity, Vikroli	250
96	S/Ward (Bhandup)	Mata Ramabai Ambedkar nagar No.1 & 2, Water Tank road, Near Bhandup Reservoir	300
97	S/Ward (Bhandup)	Sai Hill Tembi pada, Zara Line, Bhandup (West)	250
98	S/Ward (Bhandup)	Sai Hill Tembipada road,Bhandup(West)	300
99	S/Ward (Bhandup)	Rawate Compound No.1,2,3 Ram Nagar, Tembipada, Bhandup(W)	400
100	S/Ward (Bhandup)	Khindipada, Khadan ,Sonapur road, Bhandup (West)	200
101	S/Ward (Bhandup)	Duck Line, near Rajaram Maha Vidhyalaya, Khindipada	250
102	S/Ward (Bhandup)	Ambhyachi Bharni, Ambedkar Nagtar, Tulshet pada, Bhandup(W)	350
103	S/Ward (Bhandup)	Patkar Compound,Tulshet pada, Bhandup (West)	400
104	S/Ward (Bhandup)	Gaondevi Nagar, Milind Nagar, Bhandup (West)	200
105	S/Ward (Bhandup)	Gaondevi road, Gaondevi Tekdi, West side Huts,Bhandup(West)	300
106	S/Ward (Bhandup)	Gurkha Chawl and Sarvodaya Nagar, Jangal Mangal road,Bhandup(West)	250
107	S/Ward (Bhandup)	Radha Krishna Mandir, Surya Nagar, Vikroli (west)	300
108	S/Ward (Bhandup)	Chaitanya Nagar, Pawai, Bhanudup (West)	400
109	S/Ward (Bhandup)	Mirashi Nagar, Arey Colony road, Pawai , Bhandup (West)	450
110	S/Ward (Bhandup)	Ramabai Nagar, Filterpada, Pawai, Bhandup (West)	250
111	S/Ward (Bhandup)	Surya Nagar, L.B.S. Marg, Bhandup (West)	360
112	T/Ward(Mulund)	Amar Nagar, Mulund (West)	400
113	T/Ward(Mulund)	Shankar Hill,Mulund (West)	350
114	T/Ward(Mulund)	Shankar Hill,Mulund (West)	300
115	T/Ward(Mulund)	New Rahul Nagar, Mulund (West)	350
116	T/Ward(Mulund)	Ganeshpada, Mulund (West)	250
117	T/Ward(Mulund)	Hanuman Pada, Mulund (west)	350

The many sites vulnerable to landslides in Mumbai suburban district are essentially located on or near the abandoned quarries and hill ranges. These hillside lands are mainly owned by different authorities like the State/Central Government, BMC or the Maharashtra Housing Board.

Maharashtra Government has enacted the Maharashtra Slum (Improvement, Abolition and Rehabilitation) Act, 1971 under which slums in specified areas are notified as regularised slums and given protection. Since 1991, under the slum improvement programme, these slums are being improved by Slum Improvement Board, a unit of Maharashtra Housing Area Development Authority (MHADA). These slums are being provided with basic amenities. To avoid the damages due to landslides, a programme of constructing retaining wall is being carried out by the Slum Improvement Board

2.6 Road Accidents

The major road sections in Mumbai which are accident prone in Mumbai city along with details of fatal and serious injuries from 1993 to 1995 are given below :

Table 21: Vehicles Registered in Greater Mumbai:

Sl.	Class of Vehicle	2001	2002	2003	CAGR
1.	Motor Cycle (Including Scooters)	440,517	475,352	527,108	9%
2.	Motor Cars, Jeeps & Station Wagons	344,870	353,417	366,805	3%
3.	Taxi Cabs	62,447	63,679	54,809	-6%
4.	Auto Rickshaws	101,914	101,829	98,527	-2%
5.	Stage Carriers	5,394	5,258	5,382	0%
6.	Contract Carriers	6,710	4,294	4,373	-19%
7.	Trucks & Lorries (including Delivery Vans)	56,626	55,412	56,130	0
8.	Ambulances	1,358	1,305	1,336	-1%
9.	School Buses	707	558	563	-11%
10.	Private Service Vehicle	1,713	1,353	1,494	-7%
11.	Trailers	1,163	2,200	1,392	9%
12.	Tractors	1,361	1,382	1,392	1%
13.	Others	4,783	4,560	4,578	-2%
	Total	1,029,563	1,069,499	1,123,562	4%

b. Accidents:

Table 22: Accident Statistics in Mumbai

Sl.	Year	Fatal	Serious	Slight	Minor	Total
1.	1999	411	1,177	5,412	18,945	25,945
2.	2000	411	1,392	5,403	1,214	26,940
3.	2001	523	1,794	4,799	19,213	26,329
4.	2002	462	1,409	4,886	18,713	25,470
5.	2003	377	1,391	4,471	18,923	25,162

Traffic density is highest at the following locations :

- Nariman Point
- Flora Fountain
- CST
- Nana Chowk
- Haji Ali
- Mahim-Bandra junction
- Andheri Flyover

- Crawford Market
- J.J junction
- Dadar T.T
- Sion junction

2.7 Industrial and Chemical Accidents

There are approximately 900 industries either involved in the manufacture or processing of hazardous goods or in the storage of hazardous goods. A comprehensive list of these industries along with fact sheets are given in a separate volume. Many of these godowns are in the close proximity of the residential areas or other storages, thereby increasing the risk of fires and chemical explosions in residential as well as industrial estates.

The major concentration of the hazardous industries is seen in the Chembur-Trombay belt, spread over an area of about 10 square kilometres, having major chemical complexes, refineries, fertiliser plants, atomic energy establishment and thermal power station. Clustering of various operating units make them highly vulnerable.

BARC, HPCL, BPCL, RCF, Tata Thermal Generating Station and Oswal Petrochemicals are some of the hazardous industries operating in this belt. This area is also in close proximity to the port activities of Mumbai Port Trust which handles hazardous cargo. MPT has identified 32 hazardous chemicals which are loaded and unloaded requiring handling and storage. The list of these chemicals along with the handling capability and necessary actions required to be taken in case of emergency is given in the volume on "Hazardous industries including fact sheets". MPT also has its independent fire service and a disaster management plan.

The atomic energy establishment, with its residential colonies, has taken adequate measures to reduce the risk. It also has a comprehensive on-site hazard management plan with necessary know-how and equipments. However, due to its close proximity with hazardous industries, namely the refineries, a close on-going co-ordination of these units and BARC is required, so as to restrict any potential damage.

The mutual aid schme in this area encompasses over 15 industrial units. The combined resources of these industries provide a highly enhanced degree of insurance to minimise loss by fire/emergency.

HPCL, BPCL, RCF and Tata Thermal Generating Station, all have their on-site plans, with manpower and equipment. Industries in the Chembur-Trombay region, though handling flammable and toxic liquids and gases, are equipped to take care of minor to moderate emergencies the settlements, which are in the vicinity of the units increase the risk and require off-site disaster management activities. None of these organisations have the capacity to manage an off-site impact of the emergencies. Therefore, the nature of emergency that can develop may require re-inforcement from Mumbai Fire Brigade and municipal authorities. The detailed fact sheets of these industries in given in the volume on "Hazardous industries including fact sheets".

These fact sheets highlight the specific threat of the hazardous chemicals in terms of the physical consequences and the resources available with these industries to tackle the emergencies. The fact sheet identifies the individual responsible for co-ordinating the activities with other organisations. In view of the fact that the ward officer is responsible for co-ordinating disaster response at the ward level, it may be necessary that these units establish a direct contact with the ward officer in all emergency situations, even when on-site emergencies occur, and keep him posted with the status of the emergency. This will improve the co-ordination and allow for timely reinforcement from fire

2.8 Cyclones

Being an island city, the coastal wards (facing the Arabian Sea) are prone to gusty winds and cyclonic impacts. Originally, most of the fishing villages were located along the coast. These include Machimar Nagar in Colaba, Worli village, Mahim village, etc. Additionally, in most of these wards, a number of slums have also mushroomed along the coast. Given the quality of housing material used, these settlements are highly vulnerable and the possibility of their capacity to withstand the cyclonic storm is limited. A ward wise list of such settlements and dilapidated buildings prone to cyclonic impact are given below and have also been identified in each ward plan. These areas may require evacuation to temporary shelters or identified safe sites.

Ward	Settlement vulnerable to cyclones
A	<ol style="list-style-type: none"> 1. Ambedkar Nagar 2. Geeta Nagar 3. Sunder Nagar 4. Sudam Nagar 5. Ganesh Murty Nagar Part I & II 6. Machhimar Nagar 7. Shivashakti Nagar 8. Dhobighat 9. Azad Nagar
B	B.P.T. Coastal area
C	<p>Old buildings on</p> <ol style="list-style-type: none"> 1. Mahadevi Shankar Seth Lane 2. Ist Marine Crose Lane 3. S.S. Gaikwad Marg 4. Dhobi Talao 5. Sant Sena Maharaj Marg 6. Ist Kumbhar Wada, Bhandari Stt. 7. Wanka Mohalla 8. Bara Imam Road 9. Chimna Butcher Stt. 10. Chira Bazar 11. Baniyan Stt. 12. Ghoghari Mohalla 13. Ebrahim Rahimtulla Road 14. Kika Stt. 15. J.S.S. Road 16. Chira Bazar 17. Bhai Jivanji Lane 18. Bapu Khote Stt. 19. Ist Pathan Stt. 20. Sant Sena Maharaj Marg 21. Maulana Azad Road 22. Nazarali Bldg., Dharmsi Stt. 23. Ebrahim Rahimtulla Marg 24. Islampura Stt. 25. Dr. Mitrasen Mahimtura Marg 26. Zaobawadi

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	<ol style="list-style-type: none"> 27. B J.S.S. Road 28. Sonapura Lane 29. Sonapur Lane 30. Ardeshir Dady Seth 31. Ali Umer Street 32. Choghari Mohalla 33. Ist Marine Stt. 34. Ist Carpenter Stt. 35. Pathan Stt. 36. Mitrasen Mahimtura Marg 37. Duncan Road (Maulana Azad Road).
Ward	Settlement vulnerable to cyclones
D	<ol style="list-style-type: none"> 1. Tulsiwadi 2. Khetwadi 3. Old buildings in Girgaum
F-North	<ol style="list-style-type: none"> 1. Korba 2. Mithagar 3. Wadala 4. Antop Hill 5. Sangam Nagar 6. Chandani Agar
G-North	<ol style="list-style-type: none"> 1. Mahim Slope Slum Near Creek 2. Sagar Sanidhya Slum
G-South	<ol style="list-style-type: none"> 1. Worli Koliwada 2. Worli Sea face 3. Golfadevi slum 4. Janata Colony 5. Nariman Bhat Nagar 6. Madraswadi Slum 7. Mahatma Phule nagar
H-West	<ol style="list-style-type: none"> 1. Costal Zone of Khar Danda and Chimbar 2. Gazardarbandh 3. Nargis Dutt Nagar 4. Colony 5. Huts along pipe line at Mahim Creek 6. Huts at Sea Rock Hotel
K-West	<ol style="list-style-type: none"> 1. Juhu Koliwada 2. Versova Koliwada.
M-East	<ol style="list-style-type: none"> 1. Cheeta Camp/Trombay Village 2. Shivaji Nagar
N	<ol style="list-style-type: none"> 1. Hanuman Nagar, Ghatkopar (W) 2. Ram Nagar, Ghatkopar (W) 3. Sidharth Nagar, Ghatkopar (W) 4. Ramji Pitamah Nagar, Ghatkopar (W) 5. Ram Nagar, near duct line, Ghatkopar

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P-North	<ol style="list-style-type: none">1. Madh2. Manori
R-North	Bank of Dahisar River at Ambawadi, Dahisar (East).
S	<ol style="list-style-type: none">1. Hanuman Nagar, Bhandup (w)2. Ramabai Nagar, Bhandup (w)3. Kanjur Village, Kanjur (E)4. Bhandup Village, Bhandup (E)
	<ol style="list-style-type: none">5. Kannamwar Nagar & Tagore Nagar, Vikhroli (E)
T	<ol style="list-style-type: none">1. Amar Nagar, Mulund (W)2. Shankar Tekdi, Mulund Colony\3. Hanumanpada, Mulund Colony.

MITIGATION STRATEGY

The assessment of extent of vulnerability of the area, people and property to a hazard or the probability of its occurrence has been undertaken in the earlier chapters on Vulnerability analysis and risk assessment. These are essential forerunners for evolving appropriate preventive measures and mitigation strategies.

The analysis shows that various locations in Mumbai are vulnerable to different disasters in varied degrees. Preparedness and mitigation plans, therefore, will have to be evolved and implementation monitored locally at the ward level to reduce the impact of the disasters. While evolving such area specific preparedness and mitigation plans, types of vulnerabilities will essentially define the levels of preparedness and mitigation strategies. These strategies will have to be concentrated more towards the social and economically backward communities, as against the vulnerability of the overall system.

While devising the mitigation strategy it is necessary to differentiate between disaster preparedness and disaster mitigation.

3.1 Disaster Preparedness

Preparedness focuses on plans to respond to a disaster threat or occurrence. It takes into account an estimation of emergency needs and identifies the resources to meet these needs. It also involves preparation of well-designed plans to structure the entire post-disaster response, and familiarising the stakeholders, particularly the communities through training and simulation exercises.

The best examples of preparedness activities are the development of local warning and community evacuation plans through community education, evolving local response structures and administrative preparedness by way of stockpiling of supplies; developing emergency plans for rescue and relief.

3.2 Disaster Mitigation

Pre-disaster planning consists of activities such as disaster mitigation and disaster preparedness. Disaster mitigation focuses on the hazard that causes the disaster and tries to eliminate or drastically reduce its direct effects. Examples include strengthening buildings to make them cyclone or earthquake resistant, controlling land-use patterns to restrict development in high-risk areas and diversification of economic activities to act as insurance to offset losses in different sectors.

Structural measures such as the construction of protective works or alterations designed to diminish the vulnerability of the elements at risk, and non-structural measures, such as regulating land use and building codes, and equipping line departments for damage reduction, can all reduce the impact of a disaster on a region or a population. Everything that is done to reduce or prevent the damages that a disaster may cause is called "mitigation of risks." Such mitigation measures can be integrated with normal inter-departmental coordination.

Mitigation distinguishes actions that have a long-term impact from those that are more closely associated with preparedness for, immediate response to, and short-term recovery from a specific disaster, recognizing that the boundaries are not absolute. Mitigation efforts must not only be a priority for the repair, reconstruction, and rehabilitation of developed areas, but must become a prerequisite for growth in areas that have not been developed.

3.3 Goals of Mitigation Strategy

- To substantially increase public awareness of disaster risk so that the public demands safer communities in which to live and work; and
- To significantly reduce the risks of loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from disasters.

4. DISASTER MANAGEMENT ACT-SUMMARY

4. The Government decided to enact a law on disaster management to provide for requisite institutional mechanism for drawing up and monitoring the implementation of the disaster management plans, ensuring measures by various wings of Government for prevention and mitigating effects of disasters and for undertaking a holistic, coordinated and prompt response to any disaster situation. The Disaster Management Act, 2005 was enacted and notified on December 26, 2005.

The salient features of the Act include setting up of a National Disaster Management Authority under the Chairmanship of the Prime Minister; State Disaster Management Authorities in the States/Union Territories under the chairmanship of Chief Minister or Lt. Governor or Administrator, as the case may be; and the District Disaster Management Authority under the District Magistrate in each district.

The National and State Authorities shall be responsible for laying down the policies, plans and guidelines for disaster management. The District Authority shall act as the district planning, coordination and implementing body for all disaster management related functions. These functions include mitigation and preparedness measures also besides response, relief and rehabilitation.

A key role has been assigned to the local authority for ensuring training of its officers and employees; maintenance of resources so that these are readily available for use in the event of a disaster and ensuring that all construction projects in their area of jurisdiction conform to the prescribed standards and specifications. The local authority shall also carry out relief, rehabilitation and re-construction activities in the affected areas.

The Act seeks to constitute Disaster Response Fund and Disaster Mitigation Fund at the National, State and District level. It mandates that there shall be no discrimination on the ground of sex, caste, community, descent or religion while providing compensation and relief to the victims. The powers to issue directions to the Government authorities, organization and statutory bodies to facilitate and assist in disaster management have been vested in the Central Government. The Act seeks to make provision for punishment for obstructing response, making false claims, mis-appropriation of money or materials and issue of false warning. However, it provides immunity to Government organizations and officers for action taken in good faith.

With the enactment of the Disaster Management Act, 2005, the Government have now put in place requisite institutional mechanism for drawing up and monitoring the implementation of the disaster management plans at all levels, ensuring measures by various wings of Government at National, State and District level for prevention and mitigating effects of disasters and for undertaking a holistic, coordinated and prompt response to any disaster situation. The Act will facilitate effective steps for mitigation of disasters, prepare for and coordinate a more effective response to handle disaster situations. The Act seeks to put in place Government's resolve to bring about change in orientation from relief-centric approach to a holistic multi-disciplinary and multi-sectoral approach with greater involvement of Panchayati Raj Institutions and Municipalities.

Keeping in view the federal polity, the DM Act has been enacted under the Entry "Social Security and Social Insurance" in the Concurrent List of the Constitution of India since it will have advantage to allow the State Governments also to have their own legislation.

Salient Features of the Act

- Setting up of a National Disaster Management Authority under the Chairmanship of the Prime Minister (PM) with such other Ministers not exceeding nine, as may be nominated by PM
- One of the Members may be designated as Vice-Chairpersons of NDMA by the Prime Minister
- The Authority shall be assisted by an Executive Committee of Secretaries to be constituted by the Central Government
- The National Authority may set up all Advisory Committee of Experts
- The National Authority shall have the responsibility for laying down the policies, plans and guidelines for disaster management
- There shall be a State Disaster Management Authority in each State/UT under the Chairmanship of Chief Minister/Lt. Governor, Administrator, as the case may be
- The Vice-Chairperson and Members, of the State Disaster Management Authority will be nominated by the Chief Minister/Lt. Governor/ Administrator, as the case may be
- The State Authority shall be responsible for laying down the policies and plans for disaster management in the State
- It shall be assisted by a State Executive Committee. The State Authority may constitute an Advisory Committee of Experts as and when it considers necessary
- It will be mandatory for relevant Ministries /Department to draw up department wise plans in accordance with the National Disaster Management Plan
- The State Government shall constitute District Disaster Management Authority with District Magistrate as Chairperson and President, Zila Parishad or Chief Executive Member, District Autonomous Council as the case may be, as Co-Chairperson
- The District Authority shall act as the District planning, coordinating and implementing body for disaster management
- Appropriate provisions will be made for taking mitigation and preparedness measures in accordance with the National, State and District Plans at National State and District levels.
- The Central Government shall be responsible for coordinating action by Ministries/Departments of the Central Government, National Authority and State Authority, Governmental and non governmental organizations.
- The local authority shall ensure training of its officers and employees and maintaining all resources so as to be readily available for use in the event of a disaster.
- The local authority shall also ensure that construction projects under them conform to the standards and specifications laid down
- The local authority shall carry out relief, rehabilitation and reconstruction activities in the affected area within its jurisdiction
- The Central Government shall constitute the National Institute of Disaster Management (NIDM).
- NIDM shall plan and promote training and research in disaster management, documentation and development of National level information base relating to disaster management policies, prevention mechanism and mitigation measures
- A National Disaster Response Force shall be constituted for specialist response.
- The Central Government shall constitute a National Disaster Response Fund for emergency response.
- The Central Government may constitute a National Disaster Mitigation Fund for mitigation projects
- The State Government shall establish Disaster Response Fund and Disaster Mitigation Fund at State and District Level
- Every Ministry/Department of Central and State Governments shall make provision in its annual budget for funds to carry out the activities set out in its Disaster Management Plan

- There is provision in the Bill for punishment for obstructing response, false claims, mis-appropriation of money or materials, issue of false warning
- No prosecution for offences shall be instituted except with the previous sanction of the Central Government or State Government
- There shall be no discrimination on the ground of sex, caste, community, descent or religion while providing compensation on relief to the victims
- The Central Government has the power to issue directions to the Government Authorities/Organizations/statutory bodies to facilitate or assist in disaster management
- Action taken in good faith by any officer or employee of the Central Government, National Authority, State Government, State Authority, District Authority and Local authority shall be protected and no prosecution or suit will lie in any Court.
- The Officers shall be immune from legal process in regard to any warning communicated or disseminated in their official capacity
- The Central Government and the State Government may make rules to carry out the provision of the Act
- NIDM may make regulations to carry out its objectives as laid down in the Act.

MITIGATION MEASURES FOR GREATER MUMBAI

5. In view of the risk and the vulnerabilities identified in the earlier sections, the mitigation measures proposed have been categorised into three major headings:

- Infrastructure improvement
- Communication and Public Information Systems
- Land use policies and planning

Based on these, additional requirements for the line agencies will have to be identified keeping in view their future growth requirements as well as specific demands put on them as a result of disaster management plan exercise. It is expected that special procurements and inputs will enhance the capabilities and the quality of service and rationalise efficient contributions of the limited manpower resources available with these agencies. The mitigation strategy also envisages the possibilities of upgrading the quality of human resources, through training, in the long run.

5.1 Infrastructure improvement

Infrastructure improvement for Greater Mumbai has been examined in terms of transport, services and housing infrastructures. These include road and rail networks, sanitation and sewer disposal system, storm water drainage systems, slum improvement and housing repairs and retrofitting programmes. The dependent lifelines of Mumbai which include water supply, electric supply, telecom services, fuel, health, food supply etc, depend very much upon the effective functioning of these infrastructural facilities.

The overall mitigation strategy aimed at. Vulnerability reduction should address issues with respect to institutional arrangements and implementing strategies for these infrastructural improvements. The current effort in detailing the MUTP-II and MURP is a relevant step in the direction of vulnerability reduction.

5.1.1 Transport Infrastructure

The requirements of projected passenger traffic rise in vehicular density, and the increase in number of vehicles, both private and public, will put tremendous pressure on the existing transport infrastructure and road network.

For reduction of road accidents, reducing disruptions resulting from floods and increasing the response time of the emergency services, a comprehensive mitigation strategy to improve the transport infrastructure becomes imperative.

However, in the present context, any substantive increase in the infrastructure capabilities would necessitate a large component of resettlement for which an appropriate policy and participatory strategy will have to be worked out. As of now, the Government of Maharashtra, based on the recommendations of the "Task Force on Policy Framework, Institutional Arrangements and Implementation Strategy for BUTP - II, Resettlement and Rehabilitation Project, July 1995" has been in a position to come out with a clear statement on urban R&R policy.

5.1.1.1 Expansion of rail services

The proposals of additional railway corridors, that is, the Sixth Corridor and the Seventh Corridor, need to be reviewed and refined further for implementation.

Additionally, proposed commuter lines in MMR region need to be expedited. Successful implementation of MUTP-II and subsequent phases therefore is essential. The list of priority projects proposed under MUTP-II is given below:

5.1.1.2 Priority rail projects proposed under MUTP-II

- Optimisation on Western Railway (including 12 car rakes on through line)
- Optimisation on Central Railway (including 12 car rakes on through line)
- 12 Car rake operation on local line of Central Railway
- Borivli-Bhayander additional pair of line.
- Bhayander-Virar additional pair of line
- 5th line on Western Railway from Santacruz to Borivli
- Kurla-Thane additional pair of line
- 12 Car rake operation on local line of Western Railway
- 6th line on Western Railway from Santacruz to Borivli
- East-West line : Bandra-Kurla
- Optimisation on Harbour line *
- 5th line : Kurla-Dadar-CST *

* Proposed in Phase - II

Most of these projects have a component of resettlement as well. These projects will be implemented by different agencies and hence call for a co-ordinated approach of the technical and non-technical component with emphasis on participatory planning and management of resettlement

In order to reduce pedestrian as well as vehicular traffic in A ward, the proposal of metro railway for this area needs to be seriously pursued. The proposal includes underground rail corridor connecting CST to Churchgate via Fort market, Stock Exchange and Nariman Point, thereby providing a circular loop between CST and Churchgate.

5.1.1.3 Road over Bridges (ROB) and flyovers

Most of the critical ROB proposals have already been included in MUTP-II. Completion of these would facilitate east-west mobility in addition to the new roads proposed. These ROB's are at Vikhroli, Jogeshwari (North) and Jogeshwari (South).

In addition, Maharashtra State Road Development Corporation (MSRDC) is undertaking the work of construction of flyovers across MMR region. Fifty such flyovers have been sanctioned out of which 43 flyovers are in Greater Mumbai. Works on majority of them have already started. A comprehensive traffic review will be required once all these projects are completed.

A list of these flyovers which are sanctioned is given below :

Western Express Highway

1. Mahim Junction
2. Kherwadi
3. Kalina Wakola
4. Santacruz Airport
5. Janata Colony
6. Jogeshwari-Vikhroli link road
7. Aarey Goregaon
8. Goregaon Mulund Link Road
9. Rani Sati Marg
10. Shantaram Talao
11. Akurli Road
12. Dattapada Road

13. National Park
14. Shiv Vallabh Road
15. Sahar Flyover

Eastern Express Highway

1. Sion
2. R.C.F. junction
3. S.G. Bharve Road (C.S.T road)
4. Chheda Nagar
5. Andheri Ghatkopar Link road
6. Vikroli junction
7. Jogeshwari Vikroli link road
8. Goregaon Mulund link Road
9. Nitin casting
10. Cadbury
11. Golden Dyes
12. Kapur Bawadi

Sion Panvel Highway

1. B.A.R.C.
2. Chembur Mankhurd link road

Mumbai City Roads

1. Haji Ali
2. J.J.Hospital-Bhendi bazar
3. Crawford market
4. S.B. Marg : N.M. Joshi
5. SB Marg : Elphinstone
6. SB Marg : Fergusson
7. Adi Shankara marg : LBS
8. Worli Naka
9. Siddhi Vinayak
10. Barfiwala Junction
11. Adi Shankara marg : JVLR
12. Dadar Khodadad Circle
13. Juhu Airport subway

5.1.4 Additional roads

For clearing the heavy vehicle traffic between Sion and the city, the proposed truck terminus at Wadala should be made operational and the access to the terminal via Anik-Panjarapole section needs to be provided. Other roads which need construction include Santacruz-Chembur link road (including ROB at Kurla) and Western Relief road from Juhu to Dahisar (including ROB at Dahisar).

5.1.5 Provision of special corridors for Fire Brigade, Ambulances, Police

Keeping in view, the location of municipal and government hospitals, fire stations and police stations, special corridors for the movement of fire brigade, ambulances and police can be identified and reserved for these services. Plan should be evolved to ensure that no other traffic is allowed to block the movement of these emergency service units. This provision of reserved corridors requires identification of inter-connecting small lanes and by-lanes so as to ensure complete north-south and east-west mobility. No parking or any other encroachments should be permitted on such identified corridors. No additional roads are envisaged in this proposal. The traffic police in consultation with fire services and hospitals should be in a position to identify such special corridors. Under this proposal, additional entrances for casualty may be required in some hospitals.

5.1.6 Provision of special corridors for BEST

In order to ensure that BEST buses do not slow down the traffic movement and also get a required priority being a mass transport, lanes can be reserved on the main roads for these buses. On such roads with reserved lanes, the left-turn for other traffic should only be permitted at the signals. Proposal for central corridor bus lanes has to be examined in this context.

5.1.7 Non-parking Roads

Roads with high vehicular density and the major arterial roads should be non-parking zones. Also, the areas having concentration of chemical storages and processing have a high-risk to fires. Many of these units have settlements in their vicinity which may require evacuation. Roads connecting to these locations should be kept free from parking. This would allow for easy evacuation if necessary. For example, Kurla-Mahul road through Washi naka in the vicinity of the refineries, section of Reay Road at Sewri etc., Sion-Mahim link road through Dharavi, can be declared as no-parking roads to facilitate evacuations during emergencies. Main access to all railway stations should also be declared as non-parking.

This in turn will require implementation of parking demonstration plan and evolving multi-storeyed parking facilities in high-density areas.

5.1.8 Roads Improvement:

- Based on technical recommendations of Merani Committee, a massive road improvement programme consisting of 64 km cc and 178 km asphalt has been undertaken.
- 24 Agencies for pot hole / minor repairs have been appointed.
- Survey of bad stretches / patches of road has been undertaken which is completed in March 2006. 9318 bad patches are identified and 4308 bad patches are attended. Remaining bad stretches / patches will be appropriately treated before monsoon.
- Adequate budget provision (Rs. 636.49 crores) has been made.
- 153 damage prone junctions have been improved so far in paver blocks / mastic.

5.1.2 Services and related infrastructure**5.1.2.1 Sanitation facilities**

Although there has been no serious outbreak of any epidemic in the city during the last thirty years, and there has been a daily quality monitoring of water supply, sanitation facilities are inadequate. It is estimated that more than 40,000 toilets are required to achieve a ratio of 1:25 families. The Slum Sanitation Programme of the BMC may provide some relief, but it has serious limitations to reach out to all the population. Innovative and non-conventional approach to sanitation is required with sufficient financial allocations and political back-up.

Sewer treatment and disposal facilities proposed under Bombay III BSDP at Lovegrove, Bandra, Ghatkopar, Bhandup, Malad and Versova need to be put on high priority and the bottlenecks need to be sorted out at the earliest.

5.1.2.2 Sanitation infrastructure at places of mass congregation

Mumbai attracts a large domestic tourist traffic. Also it has a number of locations of mass congregation. It is essential that these tourist and mass congregation locations are provided with adequate water and sanitation infrastructure. Mobile sanitation facilities can be one of the options. Alternatively, permanent sanitation infrastructure need to be made available at these locations for the visitors to ensure health safety for the local residents. For example, Shivaji Park, Girgaum, Dadar and Juhu Chowpatty, Mahalaxmi, Haji Ali etc.

5.1.2.3 Nallah training, soling and cleaning

The settlements along the nallahs are vulnerable to floods. Also, in the absence of training, soling and regular de-silting (cleaning), most of these nallahs have a tendency of flooding and choking. It is necessary that a programme of nallah training, soling and cleaning is undertaken rigourously through the Storm-water drainage department of the BMC. This may require shifting of some of the settlements along the nallahs. For instance, Adarsh Nagar, Janata colony at Worli, Hanuman Nagar at Malad, Devi pada at Borivali, Gawan Pada at Mulund (E), Slums along Patel wadi Nalla , Chain of slums along the bank of Mithi river at Kurla (W),

Desilting of Nallas upto 22nd May 2006

Area	Length of Nallas monsoon	Qty. of silt to be deslited before	Qty. of silt re moved (cu.mt.)	Length of Nalla cleaned (mtr.)	%
City	5710	16368	10700	3970	48.86%
W. Sub.	122437	176650	111085	81443	67.00%
E. Sub.	90861	135056	97920	59321	72.50%

5.1.2.4 Increasing capacity of storm water drainage

The present capacity of the storm-water drains needs to be augmented to a higher capacity which is under serious consideration with the Government of Maharashtra/BMC. In keeping with this present concern, care should be taken to ensure that no natural storm-water holding ponds are allowed to be encroached upon and reclaimed. The proposal of delinking sewer and storm water drainage system would further increase the capacity of storm water drainage and reduce the coastal pollution. The twin goals of the delinking need to be re-enforced through early implementation of these projects.

Arrangement of 77 pumps will be made by Corporation to take care of 26, 9, and 24 flooding spots in City, Western Suburbs and Eastern Suburbs respectively.

Micro Tunneling has been done at Slater Road & Milan subway, which will take care of discharge of monsoon water. As Storm water Drains and Sewer Lines are connected at several places the monsoon water will be quickly disposed off.

Following culverts will be cleaned by Western Railway and Central Railway before monsoon.

Central Railway	29 (City)	50 (Eastern Suburb)	79 (Total)
Western Railway	9 (City)	34 (Western Suburb)	43 (Total)

The work pertaining to MMRDA is under inspection by MCGM & MMRDA Engineers jointly. Municipal Corporation of Greater Mumbai is extending full cooperation and help to MMRDA. Mumbai Port Trust will clean and desilt all the drains in their premises.

All flood gates and sluice gates have been manned to operate the gates during high tide and low tide. At Hajiali Outfall, Tardeo provisions of multiple flap valves have been made first time. Flap valves have been provided at the Tardeo outfall to give relief to Nana chowk area.

Actual silt considering invert levels of storm water drains and nalla system is ascertained and accordingly tenders have been invited and Disilting work of i) major ii) minor iii) road side drains started and will be completed before 07.06.06, as per interim recommendation of Fact Finding Committee (Chitale Committee)

As per the recommendations of Fact Finding Committee's report dated 30/12/05 Automatic Weather Stations with rain gauge monitoring system are being installed at 26 locations in Mumbai for monitoring rain intensity with direction to facilitate early warning.

Storm water network and nalla system will be desilted till bottom before on set of monsoon for improving the flood receding time.

Chronic spot management – Special squads to be formed and deployed by 01.06.06.

A temporary mild steel bridge will be installed at Milan Subway for ease of traffic problem before monsoon. Widening and Deepening of Mithi: - Total 5, 57,500 cubic mtr. Silt to be removed. 4, 22,600 cubic mtr. Silt removed till date. 2, 94,605 metric ton silt transported. The work will be completed before 01.06.06, provided encroachments are cleared by Collector in time.

Department of Sewerage Operation will make following additional arrangement:

Adequate portable pump with operator and mobile phone will be made at Slater Road, Milan Subway, Andheri Subway & Malad Subway round the clock. Arrangement of portable pump will be made with truck for Express Highway

- Khar / Kherwadi: 3 Pumps
- Versova : 3 pumps
- Sakinaka Pumping: 2 pumps
- Bramhanwadi Pumping: 2 pumps

Additional dewatering arrangement will be made at places where necessary. Additional labours will be appointed in City and Suburb for removal of floating material and silt.

5.1.2.5 Upgrading Emergency Services

The response operations of the emergency services of police, fire brigade and hospitals are often hampered due to inadequate equipments and facilities. These departments are currently engaged in identifying specific items which will help them in their response operations. Helping these services to obtain such identified items would be a part of the mitigation strategy.

5.1.2.5.1 Communicable Disease during monsoon:

To prevent and control water and food borne disease (Gastro Enteritis, Jaundice, Typhoid and Leptospirosis etc.) all the concerned departments are informed to take preventive measures by taking out a necessary circular.

Wall posters informing personal hygiene, water hygiene and food hygiene are displayed at various strategic places in various institutions and community Wall posters pertaining to hygiene is made available by I.E.C. department of Public Health.. Cinema slides for do's and dont's are supplied to Cinema Halls to be shown. Public Relation Officer is asked to give a press note pertaining to do's and dont's during monsoon.

Hospitals are asked to keep the stock of O.R.S. packets. All wards are informed to stock and distribute chlorine tablets for purifying the water wherever contamination of water is reported.

All Pest Control Officers are asked to remain alert, keep sufficient stock of pesticide and take anti fly & anti mosquito measures. Hospitals and dispensaries are informed to stock and provide necessary medicines.

All M.O.H.s are asked to test at least 5 water samples in a day. If the sample is found non potable the same is brought to the notice of Asstt.M.C. Immediately so that necessary action is taken by H.E.'s Department, A.H.S., P.C.O. & M.O.H. All spoiled foodstuff from the road is with the help of Supdt. of License. Cleanliness drives are observed at Ward level.

5.1.2.5.2 Enforcing on-site fire fighting capability of hazardous industries

Presently, each hazardous industry is expected to have an on-site disaster management plan supported by adequate fire fighting capabilities. However, it is observed, that the capabilities of these industries are very

limited thereby increasing the pressure on BMC's Fire Brigade. A programme of upgradation through training and guidance on procurement from the Fire Brigade would go a long way in helping these industries to be self-sufficient for on-site disasters as well as be an additional resource available to the civic administration.

5.1.3 Housing infrastructure

5.1.3.1 Retrofitting and renovation of cessed buildings

Repairs and Reconstruction Board of MHADA has been receiving a set-back in achieving their targets due to various reasons, especially financial reasons. As a part of mitigation efforts, the Board has to ensure that repairs carried out on these cessed buildings should also take into consideration earthquake and cyclone impacts. This would mean additional financial requirements. Also, buildings for retrofitting need to be identified and appropriate technical options provided.

During every monsoon several landslides are noticed in Mumbai. This leads to loss of lives and property. All Assistant Commissioners, Officers from Slum Improvement Board and MHADA have taken joint inspection and proposed dangerous locations to construct retaining wall. Out of total 199 proposed work MHADA has completed 111 work, 58 under repaired and 30 work will started. Details of these works are given below:

Area	Sanctioned	Completed	In Progress	Not Started
City	34	9	17	8
Eastern Suburbs	109	70	31	8
Western Suburbs	56	32	10	14
Total	199	111	58	30

Each dilapidated building will issued notice either by MCGM or by MHADA. People will inform to remain alert during the monsoon.

5.1.3.2 Informal settlements

Most wards in the western suburbs have a coastal line dotted with informal settlements. As mentioned earlier, these settlements are most vulnerable to cyclonic impacts because of the type of housing material used. In order to reduce such impacts, the quality of housing in these settlements needs to be upgraded.

Under the current provisions of settlement improvement, various programmes have been promoted with limited success. Presently, Slum Rehabilitation Scheme (SRS) is a major programme for improving the shelter quality.

In order to speed up the rehabilitation process, an institutional arrangement in the form of "Shiv Shahi Punarvasan Prakalp" has been set-up by GOM. The present status of SRS is as follows:

- New Schemes : 148
- Conversion Schemes : 43
- Old Schemes : 210

In view of the large number of informal settlements, complementary strategies for shelter improvements will have to be coupled with the existing one. In this context, the approach of Slum Upgradation Programme (SUP) under BUDP can be re-considered. Under the SUP, providing collective tenure (lease-hold rights) to co-operative housing societies of the settlements and encouraging them to upgrade the quality of shelter, had demonstrated the possibilities of involving communities in the self-help process. The scheme also provided for upgradation of infrastructure to acceptable standards. It therefore becomes essential, that such strategies for shelter improvement take disaster mitigation into consideration, thereby reducing the vulnerabilities of these settlements.

5.1.3.3 Minimum access roads

Settlements with inaccessible roads should be taken up on priority under Slum Improvement Programme (SIP) so as to ensure minimum access roads for fire brigade and ambulances. Wherever, this is not technically feasible, relocation and safe siting of settlements should be undertaken. For example, M.P Mill Compound, New Jaifalwadi at Tardeo, Lal Dongar in Chembur, Vikhroli park site, Sanjay Nagar, Nav Bharat Nagar, Maharashtra Nagar at Mankhurd, , Asalfa at Ghatkopar Juhu lane Gilbert hill at juhu, Korba Mithagar at Sewree, Settlements along Railway lines, etc.

5.1.3.4 Up rooted trees

During monsoon falling of trees and branches are noticed. Following arrangement will be made to take care of such tree falling problem:

- A Mali will attend such complaints stationed at Ward Office between 8 a.m. to 5 p.m.
- A provision of two Mali will be made at each control room.
- Each fire brigade centre will be facilitated with two Mali during the monsoon.
- At Jijamata Udyan 9 malies, 1 mistry and 1 Asst. Garden Officer will kept during 11 pm to 7 am.
- All Ward Assistant Head Supervisor and Horticultural Assistant will be instructed to lift the tree cutting, trunk and branches with the help of one truck and four labourers provided to them.
- Each zone will have the facility of one J.C.B. and dumper twice in a week to lift the big trees. This arrangement will be looked by Horticultural Assistants.
- N.G.O.s will be allowed to lift the fallen trees and branches, if they are ready to do the work. However, the tree cutting will have to be deposited to the Municipal Corporation so that, no financial loss occurs to the Corporation.

5.2 Contingency Plan review in case of Disaster:

(Extra transportation arrangement in case of failure of major transport system, transit camp arrangement, hygiene and cleanliness)

5.2.1 Transportation arrangement in case of failure of transport system

BEST will put in service extra buses in case of failure of transport system. Flooding situation occurs whenever there is high tide and heavy rain coincides with it. A list of days when there will be a high tide of 4.7 mtr. and above will prepare and circulated to Railway, Police, and District Collector. Also Mumbai University and S.N.D.T. College will be requested not to schedule any examination during these days. Small booklets containing all concerned contact telephone numbers will be prepare and distributed.

5.2.2 Transit Camps

Each ward in Brihan Mumbai will be made arrangement at five schools as a temporary transit camps during any disaster. Also arrangements will be made to make keys of these schools available during holidays and at odd hours

5.2.3 Enhancement of Response to Disaster Capability**5.2.3.1 Man power strengthening**

Commissioned six command centers of fire brigade capable of acting independently under Dy.C.F.O.'s. Approximately 500-fire personal 90 officers recruited. Three highly trained special Search and Rescue Team formed and will be deployed at highly strategic points by 1st week of June 2006. 60 fire personals started for training operation and handling of flood rescue equipments.

Training of search and rescue team members for Flood rescue was provided at Mafatlal Sweeming Pool. Basic training of collapse structure / Medical first responder / Rope rescue is also proposed.

5.2.3.2 Enhancement Equipments

Following equipments are procured for the search and rescue team by MCGM.
List of Equipments for Search & Rescue Team:

VOLUME I

SR	DESCRIPTION OF ARTICLE	QTY
	Inflatable board with Out Board motor	6 nos.
	Inflatable Kayak	12 nos.
	Rescue Board with Power Line	6 nos.
	Wet Suit	30 nos.
	Water proof Torch	12 nos.
	Life Jacket Foam type	42 nos.
	Life Jacket Inflatable type	42 nos.
	Ring Buoys with 30 mtrs. rope	30 nos.
	Rescue Tube	30 nos.
	Floating Stretcher	6 nos.
	Hand Throw Bag Inflatable type with 30 mtrs. Life Line	18 nos.
	Polypropylene rope with splices ends of 50 mtrs. Length	24 nos.
	Driver's Knife	12 nos.

Besides these equipments, under GOI-GOM-UNDP Disaster Risk Management Programme, UNDP

Sr. No	Description	Quantity
has provided Emergency Rescue Kit to MCGM. This kit contains:		
1	Gas cutter 450 mm (Heavy duty)	8
2	Tent	6
3	Bolt Cutter 30 inch	8
4	Life Jacket	8
5	Life Buoys	8
6	Nylon Rope (in mt)	800 mtr
7	Keyhole saw complete set with 4 different blades	8
8	Handsaw (600 mm)	8
9	Safety vests (flouresent & waterproof)	8
10	Sledge Hammer (10 kg)	16
11	Large Bucket (25 Litre)	8
12	Small Bucket (15 Litre)	16
13	Torch	8
14	Nose Mask	16
15	First Aid Kit	8

5.2.3.3 Procurement of Home Guards

During monsoon 600 Home Guards are engaged for two months round o clock (i.e. 15 June 2006 to 15 August 2006) in 10 vulnerable wards.

5.2.3.4 Public Relations

Nodal Officer of MCGM will be asked to brief media, news papers, T.V. and public from time to time. Information will be broadcasted from Aakashvani, F.M. Radio and T.V. for public before the Railways system will disrupt.

5.2.3.4 Arrangement made by Disaster Management

Municipal Corporation of Greater Mumbai will establish anti flooding control rooms in all 24 wards from 01st June 2006 to face any problem in monsoon. These control rooms will be upgraded with equipped staff, equipments, telephones, wireless sets etc. Telephone numbers of Disaster Control are 2269 4725, 2269 4727, 2270 4403 and fax no. is 2269 4719 also e-mail address is ccrs@vsnl.net and for lodging civic complaint the number is 1916.

5.2.4 Emergency Operation Center

With a view to upgrading the existing Disaster Management Cell, it has been decided to modernize / expand the existing unit into a full-fledged well equipped centre with all modern amenities like an array of communication systems, television sets tuned to major news channels, networked computer systems with Disaster Management Software, video conferencing set up, conference and press rooms and ration stocks, uninterruptible power supply with generators, pantry as well as dormitory toilet facilities.

Thus this centre will be a self-sufficient control centre built to withstand and outlast disaster. Such well-equipped units will also be established at Ward levels. These Emergency Operation Centers shall contribute towards successful execution of the meticulous planning, command and control in respect of all rescue operations. They will also serve as Research and Development Unit as well as training centre. These Emergency Operation Centres shall thus be disaster – proof and well equipped to outlast long term disaster. Work is expected to be completed by middle of May, 2006

5.2.5 Installation of 26 Rain Gauges

As per the recommendations of Fact Finding Committee's report dated 30/12/05 Automatic Weather Stations with rain gauge monitoring system are being installed at 26 locations in Mumbai for monitoring rain intensity with direction to facilitate early warning.

5.2.6 NGO's Assistance

In monsoon period there are 18 days having the high tide of more than 4.5 mt. and those days 20 volunteers from Anirudha Academy of Disaster Management will be made available in three shifts at ward control room. If required more volunteers also will be made available from them. List of all volunteers have been faxed to Asst. M.C. of all wards. Moreover all Asst. M.C.'s have list of NGO's for particular ward and if required help will be taken from them.

5.2.7 Communication and Public Information Systems

Public Information System (PIS) demands that people are kept aware and informed in the entire cycle of disaster management from the stage of risk assessment. A lot of community education, awareness building, plan dissemination and preparedness exercises has to precede if a meaningful PIS is made operational. Thus, these tasks have already been listed in the DMP. Involvement of citizen's groups, NGOs and CBOs in plan dissemination and preparedness is going to be one of the crucial elements.

Additionally, familiarity with warning systems and regular drills to respond to such a system and specific do's and don'ts for the community during the disaster situation have also been suggested. Respective agencies have been assigned to undertake such tasks.

5.2.8 Wireless communication

For efficient co-ordination and effective response, communication amongst line departments such as BMC, police, fire brigade, municipal/government hospitals, meteorological centre and BEST is essential. This can be ensured by upgrading the present communication system with a more efficient wireless system. The wireless system should be full-duplex and also enable communication with different line departments. All 24 ward offices are equipped with wireless sets. Total 38 locations are covered by wireless network, including control rooms and hospitals. At 10 locations the system has some problem and the concerned are directed to get it repaired through the following agency.

The Disaster Control Cell of Corporation will make it sure that the wireless system at following location is working satisfactory

The Disaster Control Cell of Corporation will make it sure that the wireless system at following location is working satisfactory

1.	Mantralaya Control Room
2.	C.P. Control Room
3.	Traffic Control Room
4.	D.C.P. Airport
5.	D.G. Control Room
6.	Civil Defence Control Room
7.	BEST
8.	Fire Brigade Control Room
9.	24 Wards & Hospitals

5.2.9 Dedicated Communication:

In addition to the VHF network high band side with Mumbai fire brigade the proposal for having dedicated state of the art communication system is being finalised by TCS in consultation with consultants from Gol and GoM.

The dedicated communication include

- Radio Trunking
- Incident Command Vehicle
- ICCV along with CCTV
- Fixed, Mobile, Handheld Radipoes
- Dispatch system with E.OC.
- Networking between E.O.C. Fire Brigade Control Room, Wards and Hospitals etc.

5.2.10 Hot Lines:

Hotlines connected with Mantralaya Control, C.P. Control, Western Railway Control, B.E.S.T. and Fire Brigade Control, Central Railway Control, I.M.D. and Jt.C.P. (Traffic) Control are functioning.

5.2.11 Display Boards

Also, as a part of mitigation measure, electronic information display boards should be installed which could be monitored from BMC control room. The messages displayed are essentially instructional during the time of disasters. The information displayed will direct public response and help the administration in localising the impact. In the normal times, the same display boards can be used for community education on social issues and disaster preparedness messages.

The Traffic Police and BMC have jointly identified 44 locations where these display boards can be put-up. The critical locations are all rail terminus, airports, MSRTC depots, BEST bus stations, Air-India Building, Regal Cinema, Girgaum Chowpatty, Haji Ali, Worli naka, Gadge Maharaj chowk, Dadar T.T, Sion, Bandra, Mankhurd, Vashi, Panvel, Ghatkopar, Mulund, Thane, Dahisar, Virar etc.

5.2.12 Public address systems in local trains

In order to keep the passengers informed about the movement of rail services, especially during monsoon and other contingencies, public address systems needs to be installed in all the rakes. This would also require a wireless contact between the guard and the railway stations. Such a system would allow the passengers to take timely decisions with respect to their travel.

5.2.13 Public address systems at railway stations and bus stations

All railway stations, BEST bus stations, MSRTC bus stations within MMR region, should have the facility of public address system to keep the passengers updated on traffic situation.

5.2.14 Cable TV networks

Information put on the cable TV networks may help the citizens to take decisions with respect to their travel. Since cable TV operators have local coverage, a ward wise arrangement will have to be made for information inputs.

5.2.15 GIS

All the infrastructural facilities and utilities in Greater Mumbai need to be mapped on to a GIS application on a multi-user basis. There is therefore a need to develop a GIS on a scale of 1:1000. This would help the planners, administrators, emergency services and utility providers

5.2.16 Installation of 26 Rain Gauges:

As per the recommendations of Fact Finding Committee's report dated 30/12/05 Automatic Weather Stations with rain gauge monitoring system are being installed at 26 locations in Mumbai for monitoring rain intensity with direction to facilitate early warning.

5.2.17 Posting of Home Guards:

Considering the experience of unprecedented rain in 2005 provision of 600 home guards, 60 each in flooding prone wards will be made from 15th June 2006 for two months. The wards selected are H/East, K/East, K/West, P/South, P/North, R/South, R/North, L Ward and S Ward.

5.3 Land use policies and planning

The Draft Regional Plan for MMR Region 1996-2011, provides a basic framework for the land use policies and indicates the directions for planning. Within the context of the policy framework incorporated in this document and the priorities listed, the following can be brought within the purview of the mitigation strategy.

5.3.1 Safe siting

The MEIP study on community preparedness and environmental management for Mumbai has indicated the typology of vulnerable settlements including pavement dwellers. The current typology of settlements only looks at the ownership and eligibility for regularisation. A detailed analysis of the existing settlements in terms of typology of vulnerability would facilitate the preparation of a master plan for safe siting of such vulnerable settlements.

5.3.2 Improvement and protection of landfill sites

It is observed that at all the landfill sites, the current practice of crude dumping and absence of watch-and-ward has led to proliferation of informal settlements thereby adding to the already existing stock of vulnerable settlements. This also results in loss of opportunity to use such sites through compacting and providing layers of soil cover for alternate safe siting of vulnerable settlements and pavement dwellers.

5.3.3 Control on land reclamation

All existing water bodies and storm water holding ponds will have to be protected under strict development control rules. Clauses providing for any exceptions should be deleted from the development control rules.

5.3.4 Shifting of storages and hazardous units from residential areas

As a matter of policy, storage and processing of hazardous material in residential areas, is normally prohibited. However, looking at the present situation, a conscious effort to encourage such units to move out from the residential area will need a package of incentive and subsequent enforcement. This exercise will have to be done at the micro-level, that is the ward level. A ward-wise inventory of such units is already available with BMC and can form the basis for evolving a phased programme.

5.3.5 Decongestion

Mumbai being an island city has reached its maximum capacity in terms of services and infrastructure. The GOM has been pursuing the policy of guided land development schemes such as Bandra-Kurla complex, Oshiwara district centre, Powai area development scheme, transfer of development rights from south Mumbai to suburbs, development of new townships such as Navi Mumbai, as strategies towards decongesting the island city. Simultaneously, efforts have also been made to shift employment opportunities by shifting some of the major commercial activities such as port, agriculture, steel and other wholesale markets outside Mumbai. The potentials of regional dispersions in the MMR needs to be further pursued by concerted strategies incorporating job location and infrastructure development.

NEED FOR CO-ORDINATION MECHANISMS

6.1 Special Features of Greater Mumbai

The bifurcation of Greater Mumbai in Mumbai city and Mumbai Suburban districts is more a revenue administrative arrangement whereas the Greater Mumbai as a whole has a Municipal Corporation divided into wards for managing municipal services. The two District Collectors will assist the Municipal Commissioner in all aspects of disaster management.

There exist the following Control Rooms in Greater Mumbai

- Police Control Room
- BMC Control Room
- Fire Brigade Control Room
- BEST Control Room
- Central Railway Control Room
- Western Railway Control Room
- Konkan Railway Control Room
- District Control Room for Mumbai district
- District Control Room for Mumbai Suburban district
- Civil Defence Control Room

In addition, on specific request from the Additional Chief Secretary (Home), help from the armed forces can be sought, especially for evacuation, medical aid, provision of relief and establishment of relief camps communication aid, repair to damaged infrastructure, management of International Relief etc. These activities will be co-ordinated through the Army control room which will form a part of the co-ordination structure.

During monsoon, temporary control rooms are set-up at all ward offices. In addition, the Health Department of BMC maintains a daily surveillance on water quality for epidemics. Water and Sewer Control Rooms also exist within BMC for monitoring internal co-ordination of these services.

The public transport is managed by the Corporation through BEST and the rapid mass rail transport is managed by Central Railway and Western Railway. On an average, about 4 million commuters use these services. Therefore any disruption in the transport services, can lead to passengers being stranded at various locations; more specifically, at terminal, transit or junction points like CST, Churchgate, Dadar, Kurla and Thane (Thane District).

Since, South Mumbai, is primarily a business cum commercial centre, the possibility of passengers being stranded at work places is very high and needs special attention. Further, the working population and the labour force is drawn extensively from Thane District and the Navi Mumbai Municipal Corporation area which serve as the dormitories of Mumbai city. Any disaster in Mumbai therefore affects the population in Thane and Navi Mumbai Corporation areas as well. The authorities from Thane and Navi Mumbai are also brought into the co-ordination mechanism by co-ordinating with Thane District Control Room, Thane Municipal Corporation and Navi Mumbai Municipal Corporation.

The experience shows that floods, rail accidents and power failures have mainly been responsible for such disruptions. Therefore, in such cases, there is a need for co-ordination with state and central government agencies and local authorities, particularly, between Central Railway, Western Railway, Police Department and BMC.

Mumbai city and suburbs experience a number of disasters, the frequency and intensity of which has been increasing over the last few years. During the disaster situation various control rooms, municipal departments and state departments are actively associated and are simultaneously involved in disaster response from warning to relief and rehabilitation. This creates a situation of multiple authorities and multiple controls and calls for effective co-ordination mechanisms.

Greater Mumbai Disaster Management Action Plan therefore provides for co-ordination of various control rooms, departments of municipal corporation, departments of state government with each other and the state level EOC.

INSTITUTIONAL ARRANGEMENTS

The Municipal Commissioner vide order No.ENV/1093/DEA/CR/36/TK dated 16th February, 1994 is appointed as the District Disaster Officer for Greater Mumbai. In majority of the disasters within the managerial capacity of BMC, the BMC will manage the disaster situation without intervention from the State authorities. Micro-level plans at ward level have been prepared for all the 23 wards incorporating specific responsibilities of ward officer who will act as Ward Disaster Manager. The disaster management operations for functionaries at the ward level has been given in Section XI.

However, in cases of disasters of exceptionally large magnitude which requires co-ordination with wide range of lateral agencies including central government agencies, the Additional Chief Secretary (Home) will assume the responsibility of Disaster Manager for Mumbai.

Co-ordination arrangements for managing receipt of warning and response operations on occurrence of disaster are given in separate charts.

7.1 State Executive Sub Committee for Mumbai

There will be a State Executive Sub Committee for Mumbai under the chairmanship of Additional Chief Secretary (Home). The Committee will consist of the following members.

1.	Add. Chief Secretary (Home)	President
2.	Municipal Commissioner – Mumbai	Dy. President
3.	Principal Secretary , Relief & Rehabilitation	Member
4.	Principal Secretary (Housing Development)	Member
5.	Principal Secretary (Public Health)	Member
6.	Principal Secretary (Urban Development)	Member
7.	Secretary (Medical Education	Member
8.	Secretary (Food & Civil Supply)	Member
9.	Divisional Commissioner (kokan Division)	Member
10.	Police Commissioner, Mumbai	Member
11.	General Manager , Central Railway	Member
12.	General Manager , Western Railway	Member
13.	General Manager , B.E.S.T	Member
14.	President, Mumbai Port Trust	Member
15.	Commissioner MMRDA - Mumai Mahanagar	Member
16.	Chief Executive Officer, Maharashtra Maritime Board	Member
17.	Dy. General Director , I.M.D.	Special Inviters
18.	Director , Airport Authority	Special Inviters
19.	Flag Officer, Maharashtra Area , Indian Navy Force	Special Inviters
20.	Station Officer 411, Air force Station, Indian Navy Force	Special Inviters
21.	Officer Commanding , Maharashtra & Gujrat Area, Indian Army Force	Special Inviters
22.	Add. Municipal Commissioner, (Western Suburbs)	Member Secretary

SPECIAL INVITEES

1. Commissioner, Thane Municipal Corporation
2. Collector, City
3. Collector, Suburbs
4. Dy. Chairman, MHADA
5. Director, Home Guards & Civil Defence
6. Commander, CRPF
7. Jt. Commissioner of Police (Traffic)
8. Director, Akashwani
9. O.S.D., Airport Authority
10. Director, Doordarshan

7.2 Functions of the State Executive Sub Committee for Mumbai

The functions of the State Executive Sub Committee for Mumbai would be to :

- Ensure effective inter-departmental co-ordination between all state departments
- Provide policy decisions when required
- Keep the government informed about disaster situation
- Review disaster related activity reports received from BMC Control Room, Police Control Room and Army Control Room and provide appropriate directions.
- Co-ordinate the activities of lateral, and Central Government agencies like
 - Defence Services, SRP, CRPF, Coast Guards, CISF
 - MTNL, AAI, Port Trust, FCI
 - DD, AIR
 - Meteorology Dept, MPCB, BARC

The ACS (Home) may set-up an informal group (core committee) as a part of preparedness measures and on-going consultations with respect to disaster management plan. This core group can consist of the following members which can meet more frequently to help in streamlining resource mobilisation particularly specialised equipments (such as given below) for specific emergencies such as gas leakages, house collapses etc, and for better co-ordination.

- ACS (Home)
- BMC, Municipal Commissioner
- Police Commissioner, Mumbai
- Chief Fire Officer, Mumbai
- GOC Maharashtra Gujarat Area

Materials/Equipments for resource mobilisation

- Ambulances
- Boats/Rescue Boats
- Buses
- Cranes
- Demolition equipments
- Drilling rigs
- Earth moving equipments
- Foam Tenders
- Generators
- Ham sets
- Helicopter service
- Mobile trauma care vans
- Mobile X-Ray units
- Public address systems
- Pumps – diesel and electric
- Self breathing apparatus
- Sniffer dogs
- Tankers
- Tents
- Toxic gas masks
- Tractor
- Trucks
- VHF sets with batteries
- Wireless sets

7.3 Functions of Municipal Commissioner

- ❖ Establishing Priorities
- ❖ Supervision and Monitoring of disaster management and relief activities
- ❖ Coordinate the activities of
 - Police Control Room
 - BMC Control Room
 - Fire Brigade Control Room
 - Central Railway Control Room
 - Western Railway Control Room
 - Konkan Railway Control Room
 - District Control Room for Greater Mumbai district
 - District Control Room for Mumbai Suburban district
 - Civil Defence Control Room
- ❖ Coordinate with NGOs, and aid agencies.
- ❖ Enlist services of GOI/GOM laboratories and expert institutions for specialised services through the office of ACS as and when required.

**STANDARD OPERATING PROCEDURES
(SOP)
FOR
RESPONDING TO MONSOON-RELATED FLOODING
IN GREATER MUMBAI**

8. INTRODUCTION

1. This SOP identifies the main public agencies concerned with dealing with situations arising from monsoon-related flooding in Greater Mumbai, enumerates their broad responsibilities in this regard, and lays down the sequence of actions to be taken by these agencies and the institutional mechanism for the co-ordination of their actions.
2. The system for responding to monsoon-related flooding rests on a tripod of three partnerships- partnership among public agencies(public-public partnership), partnership between public agencies and non-Government and other organisations (public-private partnership) and partnership between public agencies and information disseminators (public-media partnership). This SOP also lays down the mechanics of these partnerships.
3. The problem of monsoon-related flooding calls for long-term and annual disaster mitigation measures, such as broadening and deepening of rivers and nallas, upgrading and cleaning of storm water drains, construction of anti-landslide retainer walls, relocation of vulnerable settlements, repair/reconstruction of dilapidated buildings, improvement of solid-waste management and transport infrastructure and services, installation of Doppler Weather Radar System, setting up of rainfall monitoring stations, etc. Such measures are beyond the scope of this SOP.
4. The structure of the SOP is as follows:
 - public agencies and their responsibilities;
 - coordination and supervision mechanism;
 - pre-monsoon preparations;
 - monsoon period measures; and
 - alert notification and subsequent action.

PUBLIC AGENCIES AND THEIR RESPONSIBILITIES

5. The main public agencies required to respond to monsoon- and their related flooding in Greater Mumbai are as follows:
 - Municipal Corporation.
 - Fire Brigade
 - BEST
 - MMRDA
 - Police Commissionerate
 - Traffic Police
 - Home Guards and Civil Defence
 - District Collectorates (City & Suburban).
 - India Meteorological Department (Regional Office).
 - Railways (Central & Western)
 - M.T.N.L.
 - Electric supply agencies.
6. The broad responsibilities of the said public agencies are enumerated at Annexure I to XII.

COORDINATION AND SUPERVISION MECHANISM

7. There is a 3-tier institutional mechanism for responding to monsoon-related flooding. At the municipal ward level, the Assistant Municipal Commissioner in charge of the ward is the Ward Disaster Manager. The Ward Disaster Manger functions under the direction, control and supervision of the Municipal Commissioner, who is the Greater Mumbai Disaster Manager. He coordinates the activities of all public agencies in Greater Mumbai charged with the responsibility of responding to monsoon-related flooding. However, in cases of disasters of exceptionally large magnitude, which require co-ordination among a wide range of lateral agencies, including Central Government agencies, the Greater Mumbai Disaster Management Committee will coordinate disaster management in Greater Mumbai. In the months of April and May, regular meetings of the public agencies should be held at all these three levels to achieve adequate coordination in their pre-monsoon preparations.

PRE-MONSOON PREPARATIONS

8. In order to be able to discharge its stipulated responsibilities effectively, every public agency will identify, assemble and train the required personnel and store adequate materials not later than 30th May.
9. The names and office and residential addresses and telephone numbers of the key personnel identified by each public agency will be communicated to the Emergency Operations Centre at Mantralaya and the Municipal Commissioner by 30th April.
10. Similarly, a complete inventory of the materials stocked by each public agency will be communicated to the Emergency Operations Centre at Mantralaya and the Municipal Commissioner by 30th April.
11. Where it is planned to use vehicles, equipment, etc. sourced from private agencies, each public agency will communicate to the Emergency Operations Centre at Mantralaya and the Municipal Commissioner a list of these private suppliers, specifying what is to be sourced and the quantities thereof, by 30th April.
12. Public-private partnership is a sine qua non for effectively responding to monsoon-related flooding. The best way to secure such partnership is to suitably involve Non-Government Organisations (NGOs) in the activities of public agencies. Each public agency will identify the Non-Government Organisations relevant to its responsibilities and establish a dialogue with them well in advance of the on-set of monsoon. A list of Non-Government Organisations thus identified, containing their names, addresses, telephone numbers and the names of their representative functionaries, will be prepared and communicated to the Emergency Operations Centre at Mantralaya and the Municipal Commissioner by 30th April.
13. A ward-wise list of locations prone to monsoon-related flooding is given at Annexure XIV. The list will be reviewed by the Municipal Commissioner and an updated list of such locations will be communicated to the Emergency Operations Centre at Mantralaya and the various public agencies by 30th April.
14. Taking into consideration the monsoon-related flood-prone locations identified and the personnel and materials assembled, each public agency will formulate a detailed Action Plan, spelling out in particular the deployment of manpower and positioning of material resources and the modus operandi to be adopted. The Action Plan will be submitted for the review of the Greater Mumbai Disaster Management Committee by 30th April.

MONSOON PERIOD MEASURES

15. During the period from 1st June to 30th September, the Municipal Corporation will set up a Control Room. Similarly, the Fire Brigade, BEST, Municipal Health Department, MMRDA, Police Commissionerate, Traffic Police, Home Guards and Civil Defence Directorate, City Collectorate, Suburban District Collectorate, Central

Railway, Western Railway, MTNL and electric supply agencies will set up separate Control Rooms. They will also depute their representatives to the Municipal Control Room, which will function as the Central Control Room.

16. During the period from 1st June to 30th September, the India Meteorological Department's Regional Office will submit reports of rainfall (actual and forecast) twice daily to the Emergency Operations Centre in Mantralaya and to the Municipal Control Room, BEST Control Room, MMRDA Control Room, Police Control Room, Traffic Police Control Room, City Collectorate Control Room, Mumbai Suburban District Control Room, Central Railway Control Room and Western Railway Control Room. If IMD's assessment indicates heavy rainfall, IMD will submit reports of rainfall at 6-hour intervals (or sooner, if necessary). The Deputy Director General, IMD will follow up these reports by telephone calls to the Additional Chief Secretary (Home), the Municipal Commissioner and the Police Commissioner.

NOTIFICATION OF ALERT AND SUBSEQUENT ACTION

17. If the I.M.D. report indicates rainfall of a magnitude likely to cause floods, the Municipal Control Room will alert all the relevant public agencies required to respond to the flood situation, whereupon the said agencies will take all necessary actions to discharge their stipulated responsibilities, for which they will be fully and solely accountable.
18. On alert being sounded by the Municipal Control Room, the Control Rooms of the various public agencies will be in continuous communication link with the Municipal Control Room through their representatives located in the Municipal Control Room. These Control Rooms as well as the Municipal Control Room will also be in continuous communication with the Emergency Operations Centre in Mantralaya.
19. On the notification of alert, the identified public agencies personnel will immediately report to their assigned workstations and remain on duty throughout the alert period. All non-medical leave of such personnel will stand automatically cancelled and no non-medical leave will be sanctioned during the alert period. General decisions of closure of offices/establishments, if any, will not apply to such personnel.
20. During the alert period, the Municipal Control Room, Fire Brigade Control Room, BEST Control Room, Municipal Health Department Control Room, Police Control Room, Central Railway Control Room and Western Railway Control Room will submit to the Emergency Operations Centre at Mantralaya a daily report in the prescribed proforma, vide Annexures XV to XX.
21. The daily reports aforesaid will be consolidated by the Emergency Operations Centre at Mantralaya in the prescribed proforma (vide Annexure XXI) and placed before the Greater Mumbai Disaster Management Committee for review and decision and directions as may be necessary.
22. Quick dissemination of relevant and accurate information among the public is central to effective response to monsoon-related flooding. It is necessary to forge a mutually advantageous partnership with the media in this regard. As will be seen from Annexures I to XII, every public agency is expected to set up an information centre to organise sharing of information with the media. This is a mandatory requirement. At the same time, in order to enable the media to secure information about different aspects of the management of disaster resulting from monsoon-related flooding from a single window, during the alert period, the Director General, Information and Public Relations will set up a Media Centre in Mantralaya. This Media Centre will be headed by the Director General and will work in conjunction with the Emergency Operations Centre in Mantralaya. It will be the responsibility of the Media Centre to pro-actively disseminate relevant and accurate information among the public through the media, including cable television, ham radio, etc.

Annexure I**MUNICIPAL CORPORATION****General**

- (1) Drain flood waters and remove impediments to movement from all roads under its control.
- (2) Repair, restore and maintain all roads, storm water drains, etc. under its control.
- (3) Repair, restore and maintain all other municipal infrastructure, services, facilities, amenities, etc.
- (4) Rescue persons.
- (5) Transport injured persons to hospitals.
- (6) Transport and dispose of corpses
- (7) Transport/shift/ evacuate stranded/affected persons.
- (8) Organise temporary shelters with food and water supply.
- (9) Issue passes/identification stickers for vehicles on relief duty.
- (10) Issue passes/identity cards to persons on relief duty.
- (11) Coordinate the activities of NGOs and other private entities engages in relief work.
- (12) Aid and supplement efforts and activities of all other departments and agencies with regard to disaster management.
- (13) Undertake and perform all duties and functions not specifically assigned to any other public agency.
- (14) Set up information centre for sharing of information with the media and the public.

Municipal Health Department

1. Organise emergency supplies of medicines and blood.
2. Organise provision of ambulances.
3. Organise on-site treatment of injured with tagging and triage and their transport to hospitals.
4. Provide treatment to the injured at hospitals.
5. Organise post-mortem examination and corpse disposal.
6. Undertake epidemic prevention measures.
7. Involve and coordinate with Government and private hospitals and medical entities in the discharge of above functions.
8. Set up information centre for sharing of information with the media and the public.

Annexure II

FIRE BRIGADE

1. Rescue persons.
2. Transport injured persons to hospitals.
3. Evacuate persons from the affected areas.
4. Ensure safety from electrical installations or power supply at the disaster site.
5. Clear roads or pathway of uprooted trees.
6. Carry out salvage operations.

Annexure III

BEST

1. Provide information to the public regarding cancellation, re-routing and delays in operation of buses, location of temporary shelters and the measures being undertaken to restore normalcy of service.
2. Deploy additional buses along certain routes to clear passenger traffic.
3. Organise transport for stranded passengers, particularly from railway stations, and for children from schools.
4. Set up information centre for sharing of information with the media and the public.

Annexure IV

MMRDA

- (1) Drain floodwaters and remove impediments to movement from all roads under its control.
- (2) Repair, restore and maintain all roads, storm water drains, etc. under its control.
- (3) Supplement and coordinate the disaster management activities of various public agencies in Bandra-Kurla Complex area.
- (4) Set up information centre for sharing of information with the media and the public.

Annexure V

POLICE COMMISSIONERATE

1. Maintain law and order
2. Control crowd.
3. Dispose of corpses.
4. Transport/shift injured persons to hospitals.
5. Transport/shift stranded or affected persons through police and other vehicles.
6. Aid and supplement efforts and activities of all other departments and agencies with regard to disaster management.
7. Set up information centre for sharing of information with the media and the public.

Annexure VI

TRAFFICE POLICE

1. Control and monitor traffic.
2. Divert traffic to alternate roads as and when necessary.
3. Provide information about traffic flow through the media, public address system, sign boards and display boards.
4. Organise toeing of stranded vehicles obstructing movement of traffic.
5. Organise transportation of stranded or affected persons through police and other vehicles, including BEST buses.

Annexure VII

HOME GUARDS AND CIVIL DEFENCE

1. Rescue persons
2. Evacuate persons
3. Assist in relief activities

Annexure VIII

DISTRICT COLLECTORATES (CITY & SUBURBAN)

1. Requisition accommodation, vehicles and equipment for relief operations.
2. Set up transit camps and arrange food distribution.
3. Arrange for dry ration and family kits for cooking.
4. Arrange for clothing.
5. Provide gratuitous relief.
6. Set up information centre for sharing of Information with the media and the public.

Annexure IX

**INDIA METEOROLOGICAL DEPARTMENT (IMD)
REGIONAL OFFICE**

1. Report actual rainfall.
2. Forecast rainfall and related phenomena, such as cyclones.

Annexure X

RAILWAYS (CENTRAL & WESTERN)

1. Monitor flood situation on railway tracks.
2. Drain flood waters from railway tracks.
3. Disseminate information through public address system at railway stations and through the media on the running of trains and the measures being undertaken to restore normalcy.
4. Control crowd at railway stations through the Railway Police.
5. Provide facilities at railway stations for the provision of emergency food and water to stranded passengers.

6. Provide information of location of temporary shelters organised by the Municipal Corporation for railway passengers.
7. Make alternate transport arrangements for stranded passengers through BEST.
8. Provide medical and first-aid facilities at railway hospitals.
9. Set up information centre for sharing of information with the media and the public.

Annexure XI

M.T.N.L

1. Restore telephone lines.
2. Attend to complaints of breakdown of telephone services.

Annexure XII

ELECTRICITY SUPPLY AGENCIES

1. Cut off power supply if necessary.
2. Restore power supply as soon as possible
3. Attend to complaints of power break-down and short circuits.

**Functions of Various Department of
Municipal Corporation of Greater Mumbai**

STANDARD OPERATING PROCEDURE

9. MUNICIPAL CORPORATION

General

1. Drain flood waters and remove impediments to movement from all roads under its control.
2. Repair, restore and maintain all roads, stormwater drains, etc. under its control.
3. Repair, restore and maintain all other municipal infrastructure, services, facilities, amenities, etc.
4. Rescue persons.
5. Transport injured persons to hospitals.
6. Transport and dispose of corpses
7. Transport/shift/ evacuate stranded/affected persons.
8. Organise temporary shelters with food and water supply.
9. Issue passes/identification stickers for vehicles on relief duty.
10. Issue passes/identity cards to persons on relief duty.
11. Coordinate the activities of NGOs and other private entities engage in relief work.
12. Aid and supplement efforts and activities of all other departments and agencies with regard to disaster management.
13. Undertake and perform all duties and functions not specifically assigned to any other public agency.
14. Set up information centre for sharing of information with the media and the public.

Municipal Health Department

1. Organise emergency supplies of medicines and blood.
2. Organise provision of ambulances.
3. Organise on-site treatment of injured with tagging and triage and their transport to hospitals.
4. Provide treatment to the injured at hospitals.
5. Organise post-mortem examination and corpse disposal.
6. Undertake epidemic prevention measures.
7. Involve and coordinate with Government and private hospitals and medical entities in the discharge of above functions.
8. Set up information centre for sharing of information with the media and the public

Annexure II

Fire Brigade

1. Rescue persons.
2. Transport injured persons to hospitals.
3. Evacuate persons from the affected areas.
4. Ensure safety from electrical installations or power supply at the disaster site.
5. Clear roads or path-way of uprooted trees.
6. Carry out salvage operations.

S.O.P. OF VARIOUS DEPARTMENTS OF M.C.G.M.**S.O.P. for Disaster Management Control****➤ On receiving warning**

- ❖ Inform Municipal Commissioner, Additional Municipal Commissioners and Deputy Municipal Commissioners
- ❖ Designated officer will take charge of control room operations.
- ❖ Disseminate warning to Ward Control Room.
- ❖ Relay warning to the public through media (TV, FM Radio, SMS, etc.)

➤ When Disaster Strikes

- ❖ Co-ordinate with C.P. Control, Jt.C.P. (Traffic) Control and Fire Brigade for rescue and relief operations.
- ❖ Co-ordinate with Railways for management of disruption of rail traffic, congestion on platforms and evacuation of stranded passengers.
- ❖ Co-ordinate with BEST/ State Transport authorities for deployment of buses

➤ Rescue & Relief Operations

- ❖ Ploy Search & Rescue teams from the Regional Command of Fire Brigade.
- ❖ Co-ordinate with Home Guards and identified voluntary agencies for providing emergency water and food, taking the help of Search & Rescue Team wherever necessary.
- ❖ Co-ordinate evacuation of stranded people to the nearest transitory shelter with the help of volunteers.

➤ Relief Operations (contd.)

- ❖ Co-ordinate with Dy. Municipal Commissioner (Education) for special care of school children according to the contingency plan.
- ❖ Co-ordinate with Jt. Municipal Commissioner (Health) and Executive Health Officer for treatment of the injured and sick.
- ❖ Deployment of emergency medical teams where people cannot be immediately shifted.

➤ Post Disaster Actions

- ❖ Co-ordinate with Police and Health authorities for corpse disposal.
- ❖ Co-ordinate with Chief Engineer (Solid Waste Management) for deployment of machinery for disposal of carcasses and removal of debris and garbage.
- ❖ Deploy paramedical teams for anti-fly measures and spraying of insecticides.

9.2 MCGM Control Room

In addition to performing the tasks listed below, the BMC Control Room in its capacity as a nodal control room will be responsible for co-ordinating the support from all other control rooms for the activities of all line departments and agencies which are involved at the disaster site. The BMC Control Room may seek assistance from the District Collector (Mumbai city and Mumbai Suburban) for requisitioning of resources such as private transport, temporary shelter and other resources.

The field level operational functions of BMC Control Room are as follows :

- Emergency supplies of water and cooked food
- Transfer of stranded and marooned persons
- Emergency transport for the seriously injured
- Setting up temporary shelters
- Salvage Operations
- Corpse disposal
- Assistance to other control rooms for movement/transport of staff including Rescue parties, Relief Personnel and Relief Materials
- Communicate to EOC additional resources required by various control rooms
- Establishing communication links with
 - ❖ EOC
 - ❖ Mutual Aid and Response Group
 - ❖ NGO coordinating committee
 - ❖ Private donors
- Dispatch of Preliminary Information Report to Emergency Operations Centre
- Dispatch of all information and any other as asked for by Emergency Operations Centre
- Report to Emergency Operations Centre on deployment and reinforcements of staff and resources.
- Issue of passes and identification stickers for vehicles on relief duty
- Provide official shoulder bands with BMC emblem to all ward officers and other BMC officers on disaster duty for easy identification.
- Issue of passes and identity cards to relief personnel including the persons from NGOs
- Coordinate NGO activities through necessary support to ensure community participation by
 - ❖ Establishing coordination mechanisms among NGOs
 - ❖ identification of NGOs to serve on committees, task force
 - ❖ assigning well-defined area of operations and report to EOC
 - ❖ assigning specific response functions to specialised NGOs and report to EOC
 - ❖ Coordinate supplies distributed directly by NGOs and other organisations including private donors
 - ❖ reporting upon procurement and disbursement of relief materials received through government and non-government channels
 - ❖ Mobilising and coordinating work of volunteers ensuring community participation
- Organise and coordinate clearance of debris
- Temporary Repairs to damaged infrastructure

- ❖ power
 - ❖ water
 - ❖ transport
 - ❖ telecommunication
 - ❖ roads
 - ❖ wharves
 - ❖ bridges
 - ❖ canals
 - ❖ public buildings
- Coordination of Transport with
 - ❖ Railways
 - ❖ MSRTC and BEST
 - ❖ Private transporters
 - ❖ Boat Operators
 - Request MPT for providing access through MPT roads during emergencies for specific time duration and monitor the requirement of such an access
 - Set-up an information centre to organise sharing of information with mass media and community
 - Provide all information contained in the Risk and Vulnerability Assessment document of Mumbai district to all the other control rooms and in special circumstances communicate the disaster prone sites to all control rooms.
 - Monitor disaster warning or disaster occurrence and communicate the same to EOC and the other control rooms for better preparedness and effective response in coordination with and on the advise of the following agencies :
 - ❖ Meteorology Department (Heavy Rains, Cyclones, Tidal waves),
 - ❖ MERI, BARC, Meteorology Department (Earthquakes),
 - ❖ Industries (Industrial and Chemical Accidents),
 - ❖ Fire Brigade, Police (Road Accidents, Riots, Bomb threats/blast, Fires, House Crashes, Landslides)
 - ❖ Railways (Accidents and Disruptions).
 - ❖ Health Department (BMC/Government) (Epidemics and Food Poisoning)
 - Coordinate with other control rooms
 - Keep readily available all the information contained in DDMAP, including
 - ❖ Inventory of Resources as given in Mumbai DDMAP
 - ❖ Office and residence telephone numbers, fax numbers, and mobile numbers where applicable of Chief Secretary and other Secretaries including those of Mumbai Disaster Management Committee at Mantralaya and BMC Disaster Management Committee
 - ❖ Phone numbers, names, addresses and pager numbers where applicable of the officers from various control rooms
 - ❖ List of people who are organising and co-ordinating the relief activities at the site
 - ❖ Phone numbers, names, and addresses of the BMC ward level officers
 - ❖ Phone numbers, names, and addresses Non-officials (like MPs, MLAS, and Corporators) in the city
 - ❖ Planning Information required including maps incorporated in Mumbai DDMAP
 - ❖ Disaster Site Map and indications on extent to which other areas may be affected, etc.
 - ❖ Information regarding alternate routes, water sources, layout of essential services which may be affected, etc.

Standard Operating Procedures for Storm Water Drains Control Room

- ❖ Warning received about flooding disaster from Central Control Room of MCGM by concerned SWD office in City /W.S./E.S.
- ❖ The officer on duty will inform the nearby SWD contractors executing the work to deploy labour and machinery to inform concerned Ward Control Room about action taken.

SWD department has formed three Disaster Control rooms

Sr. No.	Area	Location of SWD Control Room	Telephone No.
1	City	SWD Workshop, Senapati Bapat Marg, Dadar (W), Mumbai – 400 028	2432 7674 2422 4556
2	Easter Suburbs	Pant Nagar Garage Building, Ghatkopar (E)	2510 6230 2510 6238
3	Western Suburbs	K/West ward office building, Andheri (W)	2625 3594 2623 9131

Floodgate Operation

- ❖ On receipt of alert from Disaster Control Room, the flood gate staff operators will be informed to be remain vigilant
- ❖ Phone
 - o Cleavland Bunder
 - o Haji Ali Flood Gate
 - o Lovegrove Flood gate
- ❖ Dadar Workshop will be put on alert and the spare pump sets will be kept ready

City Area

- ❖ During monsoon, city division of sewerage operation is required to monitor following flooding spots, continuously:
 - o Hindmata
 - o Maratha Mandir
 - o Sleater Road
 - o King Circle

1. SOP for City Area

- ❖ At identified locations, temporary chowkies are provided with 24 hour operating staff who
 - o Continuously monitor these flooding spots and open the sewer manholes to drain the storm water
 - o Barricade the open manholes to avoid accidents
- ❖ At Sleater road, Diesel Engine driven-pumping arrangement is provided for accepting storm water into main sewer network near Tardeo Bridge
- ❖ At King Circle also as soon as accumulation of rainwater is noticed, round the clock municipal gang will be diverted to open manhole on 42” sewer line going to Dharavi shaft.
- ❖ All these four spots are provided with mobile telephone facility for monsoon.
- ❖ The new flooding spots and standby pumps will be monitored by the A.E. (Environment) of the concerned ward to whom the agency for operating.

SOP for Suburb

❖ **Milan Subway:**

- Stationary pumps (7.2 MLD & 2.8 MLD) will be installed at Milan Subway.
- As soon as rainwater accumulates (6” deep) at the lowest portion of Milan Subway the pump will be started. The discharge will either be in LIC Nalla or 1800 mm. dia. trunk main sewer.
- The operating team will be available round the clock.
- The mobile number will be communicated to disaster control in head office for on-the-spot information.

❖ **Andheri Subway:**

- A dewatering pump of 3.6 MLD Capacity will be installed at Andheri Subway, which will be manned round the clock and having permanent mobile number.
- The rainwater accumulated at Andheri Subway will be lifted and delivered into a 700 mm. dia. sewer line adjacent to Andheri Subway, provided the main sewer line is not in the surcharged condition.
- A dewatering pump of 3.6 MLD capacities will be installed at Malad Subway, which will be manned round the clock and having permanent mobile number.
- The accumulated rainwater will be discharged into adjacent nalla to the subway.

❖ **Dahisar Subway**

- A dewatering pump 3.6 MLD Capacity will be installed at Dahisar Subway, which will be manned round the clock and having permanent mobile number.
- The accumulated rainwater will be discharged into adjacent nalla to the subway.

Control Room at Versova

- A 24 hours main sewer control room at Versova Pumping Station will receive the complaints of floods at isolated locations. There will be 2 stand by pumps of 3.6 MLD capacity each at Versova Pumping Station and Kherwadi Pumping Stations,
- A.V.H.F. set will be installed at the Versova Control Room and on the vehicle of E.E. / Mech. (MS) (WS) for two-way communication in case of failure of other communication lines.
- Divers available with the E.E. Mech. (MS) WS will be also kept on an alert for rescue in case of any drowning mishap.

MAIN SEWER EASTERN SUBURB DIVISION UNDER

Dy.Ch.E. (S.O.) Es / E.E.M. (M.S.) Es

- ❖ The main sewer eastern suburb division is located at Old Ghatkopar pumping station, Ghatkopar Mahul Road, Tilak Nagar, Mumbai – 400 089.
 - There are following 5 locations in Eastern Suburbs area which get affected by excessive rain. The portable pumping arrangements as shown are proposed for these locations to control the situation.

Sr. No.	Name of the Location	Ward	Capacity of the pump	No. of pumps
1	Kalpana Talkies on LBS Marg	L	100-125 Cu.M./hr.	1
2	Brahaman Wadi Ppg. Station	L	100-125 Cu. M/hr.	1
3	Christant Village near Father Petter Perera Marg	N	100-125 Cu. M/hr.	1
4	Suman Nagar on V.N. Purav Marg, Chembur	M/W	100-125 Cu. M. / hr.	1
5	Subway below railway track near Mankhurd Rly. Station	M/E	100-125 Cu. M. / hr.	2

1. The standard operating procedure for all these locations
 - ❖ Adequate capacity dewatering pumps will be used round the clock to for controlling the flood
 - ❖ The contractor’s personal operating the pumps shall be provided with mobile telephone no. for continuous communication.
 - ❖ The daily report of the flood control at these spots will be reviewed at 8 am everyday.
 - ❖ In addition to this 2 nos. of pumps of 2.4 – 3 MLD. Capacity shall be kept as a stand by at Old Ghatkopar Pumping Station to meet emergency requirement.
 - ❖ The stand by pumps available to this office requirement will be handed over to A.E. (Env.) of the ward.
 - ❖ The departmental emergency gang with vehicle will be situated at Ghatkopar Pumping Station round the clock.
 - ❖ The work of sewage chock / overflow will be carried out round the clock as usual.
 - ❖ The divers and diving unit shall be made available at control room to operate the same during day time in case of receipt of complaint regarding drown cases received from fire brigade / disaster management control room.
 - ❖ The sewage pumping Station at Ghatkopar and Bhandup will maintain the optimum wet well level by operating adequate number of pumps.
 - ❖ Uninterrupted electric supply will be ensured from supply companies by continuous liasoning with supply companies.

**Standard Operating Procedures for
Hydraulic Engineer’s Department**

Dept. Name/Agency Name	Hydraulic Engineer
Dept. Name/ Agency Address	Hydraulic Engineer’s Dept., Brihanmumbai Mahanagarpalika, Annex Building, Ground Floor, Mahapalika Marg, MUMBAI – 400 001
Contact Person Name	Shri D.P. KAJBAJE
Contact Person Address	Hydraulic Engineer’s Dept., Brihamumumbai Mahanagarpalika, Annex Building, Ground Floor, Mahapalika Marg, MUMBAI – 400 001
Telephone Number-1	2262 0025
Telephone Number-2	2262 0251 Extn. 2004
Telephone Number-3	---
Mobile /Page Number	98694 23792
Fax Number	2263 4329
Email ID	hebmc@mtnl.net.in
Source	Government

H.E.’s Control Rooms

- ❖ *HE’s Department has three Control Room Stations working round the clock situated about three places*
 - City - Malabar Hill Control
 - Western Suburbs – Parla Control
 - Eastern Suburbs – Ghatkopar Copntrol

**MAIN FUNCTION OF
HYDRAULIC ENGINEER DEPARTMENT**



Preparedness to combat leakages during monsoon and methods to reduce water contamination

- ❖ As far as leakages through water mains upto 300 mm. is concerned, the same are repaired at Ward Level for which regular staff is available at Ward Level in respective Ward.
- ❖ The labour staffs are working during normal time 8.00 am to 5.30 pm, however in emergency the staff's works continuously till the completion of the work.
- ❖ For leakages through water mains having dia. more than 300 mm. the same are repaired through the emergency staff of maintenance department. The said staffs are available for 24 hours on all days.
- ❖ The said Department well equipped with machineries & plants, materials, labour staff & superior staff etc. and manage all types of repairs.
- ❖ As regards attending the contamination complaints, the same are attended on priority basis at Ward level immediately.
- ❖ Efforts are being taken to minimize the contamination complaints.

Availability of Water tankers in case of emergency

- ❖ Five Nos. of water tankers will be made available for 24 hours on all days during monsoon period in all the 24 Wards and will be stationed in the respective Ward Office.
- ❖ The daily valve operations in all 24 wards are managed by the respective ward staff at the respective timings of the operations.
- ❖ The operating staff is working in three shifts round the clock during all the 365 days of the year. Also all supply station i.e Pumping Station.

**List of Zonal Control Rooms and Contact Numbers
Hydraulic Engineer's Department
List of Zonal Control Rooms and Contact Numbers.**

Sr.No.	Zone	Control Room/Ward	Tel.No.	Mobile No.
1	Malbar Hill Control A, B, C, D,E, F/S, F/N, G /S, G/N Wards	Malabar Hill Control 23683583	23678109	98694 23916
2	Western Suburbs	Vile Parle Control H/E, H/W, K/E, K/W, P/S, P/N, R/S, R/N, R/Central Wards.	26184173	98694 25241
3	Eastern Suburbs	Ghatkopar Control L, M/E, M.W, N, S, T, Wards.	25153258 25153272	98694 25714
Complaints regarding water supply can also be lodged on MTNL No.1916				

Standard Operating Procedures for Health Department**Part A (At Ward Level)**

- ❖ E.H.O. will communicate about impending disaster to A.M.C. (E.S.), Jt.M.C. (ME&H), and concerned MOH/AHO/DEHO.
- ❖ Ward MOH to invoke his disaster plan viz. alerting the staff of Dispensaries, Health Posts and Peripheral Hospital.
- ❖ Zonal AHO's/DEHO's to proceed with immediate assessment of Hazard and its effects, assessing further vulnerability and real damages, which have occurred.
- ❖ Risk identification – On receiving warning signals from control room of MCGM or any other agencies.
- ❖ Zonal DEHO's/AHO have to identify geographical area and demographic profile of the affected area, GIS mapping and monitoring of event.
- ❖ Ward MOH – To assess and keep constant vigil on availability of emergency drugs, potable water, food packets, rescue materials and assess the need to start additional clinical services at spots identified in plan in the affected area.
- ❖ Zonal AHO's/DEHO's will mobilize additional staff as per the need.
- ❖ Ward MOH to issue alert signal to the Pvt. and other public sector hospital for rendering the services in affected ward and coordinating with neighboring wards.
- ❖ Zonal AHO/DEHO to initiate liaison with secondary and tertiary level medical institutions for coordination and care in case of critically wounded.
- ❖ Ward MOH to initiate liaison with local blood banks and ambulance services.
- ❖ Ward MOH to coordinate with Police for early disposal of dead.
- ❖ Ward MOH to alert PCO to undertake disinfecting measures in coordination with AHS.
- ❖ Ward MOH to initiate social mobilization of human resources through NGO's Public and Pvt. Sector.
- ❖ Zonal Health Officers/MOH/Medical Officer/Paramedical Staff to adopt principle of Triage (prioritizing).

Priority of cases

- ❖ Priority I – Critical and severely ill cases.
- ❖ Priority II – Moderately ill requiring resuscitation and early surgery within next 24 hours.
- ❖ Priority III – Minor cases / moribund cases.

Part B (At Control Room level)

- ❖ Standard Operating Procedures –
- ❖ H.O Control Room & Epidemic Control Unit at Kasturba Hospital
- ❖ Central Control Unit :
- ❖ Responsibility - EHO/DEHO/ AHO / MOH.

Procedures

- ❖ Establishment of round the clock control room in Head Office for monitoring and guidance of all the activities, which be undertaken by the Public Health Dept.
- ❖ Invoking Epidemic Control Unit (ECU) at Kasturba Hosp. to be operated round the clock.
- ❖ ECU to receive information about the incidence of diseases, line listing of patients, collecting the statistical data of the cases of various diseases, compilation, analysis of the data.
- ❖ ECU to receive information from hospitals (Public & Pvt.), cases and deaths and containment measures from the field staff.
- ❖ ECU to issue guidance to the staff in peripheral as per the prevailing situation.
- ❖ Dy.EHO (IEC) to initiate IEC activities in consultation with ECU.
- ❖ ECU to submit the detailed report of the various activities and disease surveillance to Head Office at per the designated time.
- ❖ H.O. Control Room to procure drugs and other materials as required by the field staff and medical institutions.
- ❖ H.O. Control Room with liaise with Jt.M.C. (ME&H)/A.M.C./ M.C. and Disaster Management Control Room.

- ❖ H.O. Control Room to liaise with G.O.M. and G.O.I.. (Public Health Depts.) for submitting the reports and receiving the guidelines.
- ❖ EHO to take regular review of activities undertaken by the field staff who are rendering health and other services, with ECU about the incidence and prevalence of various diseases and its containment measures and report back to Jt.M.C.(ME&H) / A.M.C. about the situation.

Standard Operating Procedures for Garden Department

- ❖ The tree fallen complaints received during the office hours i.e. from 8.00 a.m. to 5.30 p.m.
 - The complaints should be directed to the ward control room.
 - The complaints will be received by the Complaint Officer or the Duty Officer of the Control room.
 - Thereafter the complaint will be given to the Horticultural Assistant of the respective ward.
 - The Horticultural Assistant will arrange for cutting of trees by the staff provided for the purpose.
 - The cut tree branches & cut wood will be simultaneously removed by utilizing the lorry provided by the A.H.S. & dump the collected material in the cemetery existing in respective ward.
- ❖ Tree fallen complaints to be received after office hours by the Ward Control room of each ward i.e. from 5.30 p.m. to 8.00 a.m.
 - The in charge of the anti flooding gang i.e. either Junior Engineer or Horticultural Assistant will receive the complaints.
 - There will be two gangs of Malies kept at each ward for attending to tree fallen complaints.
 - One gang consisting a 4 Malies & 1 Mistry will be on duty from 3.00 p.m. to 11.00 p.m.
 - Another gang consisting of 4 Malies & 1 Mistry will be on duty from 11.00 p.m. to 7.00 a.m.
 - The in charge of the Ward Control Room will give the complaints to these gangs received during that hour.
 - This gang will arrange to cut the fallen trees so as to clear the obstruction.
 - There will be 1 lorry with 4 labourers on duty in each ward & collect all the cut wood and tree branches & dump the same at the designated cemetery in each ward.
- ❖ Arrangement made for receiving tree fallen complaints after the office hours at V.J.B. Udyan.
 - The tree fallen complaints will also be received at V.J.B.Udyan i.e. head Quarter of Garden Dept. Throughout 24 hours on telephone no. 2372 5799, 2375 9821.
 - Complaints received during the day time will be intimated to the Horticultural Assistant of the respective wards.
 - This work will be monitored by Shri Jadhav R.K., Dy. Supdt. Of Gardens (V.J.B.Udyan) Shri More, Horticultural Assistant of V.J.B. Udyan.
 - To gangs consisting of 6 Malies, 1 Mistry & 1 Horticulture Assistant in each gang from 3.00 p.m. to 11.00 p.m. , 11.00 p.m. to 7.00 a.m.
 - The complaints received will be given to the said gangs who will remove the obstruction of fallen trees by cutting & making into pieces.
 - The unattended complaints if any, by the said gang will be intimated to the Horticulture Assistant of the concerned ward in the morning for attending the same.
- ❖ The over all supervision to ensure that the fallen trees are cut & remove from site.
 - Zonal Dy. S.G.'s & Asst. Supdt. Of Gardens will monitor & see that the fallen trees are cut into pieces & taken to the cemetery in each ward in their zone.
 - For City – Tel. No. 2303 0241- Dy. Supdt. Of Gardn
 - For W.S. – Tel. No. 2628 1473-Dy. Supdt. Of Gar
 - For E.S. – Tel. No. 2592 4648- Dy. Supdt. Of Gardens

Standard Operating Procedure for Education Dept.

- ❖ Receive alert from Disaster Control Room at Education Officers office at Hindu Colony where 24 hours staff will be available (Phone No. 2414 5923)
- ❖ Coordinate disaster response operations in every ward through the identified nodal officers
- ❖ Alert low lying schools / zonal control rooms where 24 hour staff is available
 - List of Zonal Schools where 24 hours staff is available.
 - List of schools in low lying areas.
- ❖ Alert shelter schools for readiness
- ❖ Students of low lying area schools will be either shifted to shelter schools or released depending upon the intensity of rain and prior warnings. This will be decided by the Zonal officer with intimation to Education Head Quarter and Head Office control room.
 - List of Zonal / nodal officer
- ❖ Respective low-lying area school will contact local fire station/ ward control to evacuate students to the shelter schools
- ❖ Students shifted to shelter school, will be provided with following provision already made by zonal/nodal officer
- ❖ Dry food for 48 hours.
- ❖ Fresh water for 48 hours.
 - Bed sheets.
 - Generators of required capacity.
- ❖ After alert is withdrawn by Control Room and flood waters have receded, the students will be released.

Standard Operating Procedure for Wards

- ❖ On receipt of alert from head office control room at the ward office control room, all concerned officers will be informed
 - Asst. M.C / Zonal D.M.C
 - A.E (Maint.)
 - A.E (ENV)
 - A.E (Bldg. & Fact.)
 - A.H.S (Garden dept.)
 - A.O (School)
- ❖ Ward response teams consisting of ward officials, home guards, volunteers along with equipments such as J.C.Bs and dumpers will be put on high alert for deployment.
- ❖ C.F.O and local fire officer will be informed immediately.
- ❖ Ward control room will contact local schools in low-lying areas and inform school control at Dadar.
- ❖ Local school heads will be asked to assess the situation and decide on whether to allow students to go or detain them at higher floors.
- ❖ Local active NGOs will be requested to provide – be ready with dry food for school children at shelter schools.
- ❖ AE (maint.) and AE (ENV) will be asked to arrange the shelter school provisions.
- ❖ Teams of labourers will be deployed at low lying areas for :
 - ❖ Removing floating materials.
 - ❖ Clearing water entrances.
 - ❖ Cleaning mouth of direct outfalls
 - ❖ Allow water to enter sewer network at specified locations opening manholes of sewer line and putting guard tripods
 - ❖ Flood gate operation checking.
 - ❖ Deployment of pumps at identified locations.
- ❖ Central agency- sewerage operations control rooms and S.W.D control room will be contacted for readiness or deployment of pump operations depending as severity of rain.
- ❖ AE (env) will monitor all spot of pump operation for readiness in all respect.

- ❖ Municipal hospitals as well as Gov hospitals will be contacted for preparedness. Dean of hospitals will be contacted
- ❖ Solid waste dept. control room will be contacted for additional machinery requirement
To keep in touch with
 - Western railway & central railway for nalla- position inside railway premises
- ❖ Railway will be requested to deploy labour at railway culverts/nallahs – for removing floating materials and monitor water logging.
- ❖ Following officers are made in-charge of various activities after alert is declared
 - AE (Maint)
 - Low lying schools – arrangements
 - Shelter schools - arrangement
 - Railway co-ordination
 - Co-ordination with reliance / BEST
 - AE (ENV)
 - SWD labourer deployment
 - WE and outfall cleaning
 - SWM & CFO co-ordination
 - Horticulture
 - Tree cutting and roadblock
 - AE (WW) – rain gauge data & contamination of water. Readiness of additional tankers
 - AE (B&F)
 - Vulnerable landslide alert
 - Building collapse
 - ASCEND/ AHS –
 - Asst. MC
 - Overall in charge
 - Control room operations co-ordination
 - Manpower deployment (Home guards, volunteers, labourers)
 - NGO co-ordination
 - Zonal DMC Co-ordination
 - JCB deployment & dumper deployment

House collapse & land slide

- ❖ In case of house collapse – to inform local fire officer and central fire control AT Buyculla
- ❖ Coordination with traffic police for clearance of traffic
- ❖ Coordination with Reliance / BEST for power supply cut-off if necessary
- ❖ Coordination with hospitals for ambulances and arrangement of patients.

Fire Brigade Control Room

- Rescue and evacuation
- Salvage Operations
- Communicate to BMC Control Room details of all the above activities
- Communicate to BMC Control Room any additional resources required for performing the above tasks

Railways Control Room (Central and Western)

- Rescue and Salvage Operations for rail accidents
- Monitor flood situations on railway tracks and co-ordinate with BMC Control Room for mass transport requirements
- Co-ordinate with BMC Control Room for draining of flood waters from the railway tracks
- Co-ordinate medical and first aid with Railway Hospitals and BMC Control Room
- Set-up an information centre to organise sharing of information with mass media and community
- Communicate to BMC Control Room details of all the above activities
- Communicate to BMC Control Room any additional resources required for performing the above tasks

District Control Room for Greater Mumbai district

- Requisition of accommodation, structure, vehicles and equipments for relief
- Setting up of transit camps and arranging for food distribution
- Arrangements for dry rations and family kits for cooking
- Provide gratuitous relief
- Set-up an information centre to organise sharing of information with mass media and community
- Communicate to BMC Control Room details of all the above activities
- Communicate to BMC Control Room any additional resources required for performing the above tasks

District Control Room for Mumbai Suburban district

- Requisition of accommodation, structure, vehicles and equipments for relief
- Setting up of transit camps and arranging for food distribution
- Arrangements for dry rations and family kits for cooking
- Provide gratuitous relief
- Set-up an information centre to organise sharing of information with mass media and community
- Communicate to BMC Control Room details of all the above activities
- Communicate to BMC Control Room any additional resources required for performing the above tasks

Health Activities during Disaster (for BMC and State Government)

- Emergency Supplies of medicines and first-aid
- Providing emergency treatment for the seriously injured
- Corpse disposal
- Preventive medicine and anti-epidemic actions
- Supervision of food, water supplies, sanitation and disposal of waste
- Assess and Co-ordinate provision of ambulances and hospitals where they could be sent, (public and private);
- Provide special information required regarding precautions for epidemics
- Set-up an information centre to organise sharing of information with mass media and community
- Communicate to BMC Control Room details of all the above activities
- Communicate to BMC Control Room any additional resources required for performing the above tasks.

Civil Defence Control Room

- Rescue and evacuation
- Communicate to BMC Control Room details of all the above activities
- Communicate to BMC Control Room any additional resources required for performing the above tasks

Army Control Room

- Maintain liaison with the Mumbai Disaster Committee for vital inputs during warning period
- Collate information and warn appropriate Army units
- Coordinate movement of men and material as required
- Establish communications till site of disaster and supplement the civil communication set up if required.
- Coordinate all military activity required by the civil administration.

The armed forces can be requested by the Additional Chief Secretary, Home to perform the following activities in the event of a disaster:

- Infrastructure for Command and Control

Infrastructure for setting up command and control organisation for relief can be an important task for armed forces. This would include provision of communications (radio, telephone) and specialised manpower.

- Medical Aid

Provision of medical care with the help of the medical teams, including treatment at the nearest armed forces hospital.

- Transportation of Relief Material

Provision of logistic back-up (aircrafts, helicopters, boats, etc) and vehicles for transportation of relief material to the affected areas.

- Establishment of Relief Camps

Setting up relief camps and overseeing their running can be done through the armed forces.

- Construction and Repair of Roads and Bridges

Construction and repair of roads and bridges to enable relief teams/material to reach affected areas can be undertaken by army engineers. This will include provision of technical and plant equipment such as cranes, bulldozers and boats etc.

- Maintenance of essential services

Repair, maintenance and running of essential services can be undertaken in the initial stages of relief.

- Evacuation of people to safer areas

Assist in evacuation of people to safe places before and after the disaster.

- Management of International Relief

Management of handling of international relief can be undertaken by the defence services.

Key officials and contact persons for response plan**Designation**

Additional Chief Secretary, Home, Mantralaya
Secretary, Relief and Rehabilitation, Mantralaya
Secretary, Home (Law and Order), Mantralaya
Secretary, Housing, Mantralaya
Secretary, Medical Education, Mantralaya
Secretary, Food and Civil Supplies, Mantralaya
Divisional Commissioner (Konkan), Kala Ghoda, Fort
Transport Commissioner, Colaba
Municipal Commissioner, BMC, Fort
Collector, Mumbai City, Ballard Estate
Collector, Mumbai Suburban, Bandra
Commissioner of Police, Crawford Market
General Manager, Central Railway, CST
General Manager, Western Railway, Churchgate
General Manager, Konkan Railway, Belapur, Navi Mumbai
General Manager, BEST, Electric House, Colaba
Dy. Director General, Meteorology Department, Colaba
Secretary, Industries, Mantralaya
Chairman, Mumbai Port Trust, Ballard Estate
Director, MPCB
Secretary, Public Works, Mantralaya
Director, Airport Authority of India, Mumbai, Santacruz
GOC, Maharashtra Gujarat Area
Commander, Mumbai Sub Area
Colonel General (Staff)
Chief Fire Officer, BMC, Byculla
Executive Health Officer, BMC, Fort
Director of Medical Services, Fort
General Manager, BSES
Technical Director, MSEB
HPCL, Mahul
BPCL, Mahul
RCF, Chembur
Oswal Petrochemicals, Mahul
BARC, Trombay
Tata Thermal Generating Station, Trombay

10. AUTOMATIC WEATHER STATION NETWORK

MCGM has installed automatic rain gauges at 26 fire brigade stations, so as to know exact pattern of the rain all over Mumbai city & suburb.

This rain gauges data is transmitted to control room every one hour.

The rain gauges can be further calibrated to give alarm at prefixed rainfall intensity. (*above 20mm rainfall*)

These data serves ultimately as warning and evacuation signal if required.

Fire brigade being first respondent and on 24 hours alert, the rain gauges are installed at fire stations.

Details of Rain gauges at different fire stations and Wards

Sr. No.	Name of the Fire Station
1.	Municipal Head office
2.	Colaba
3.	Memonwada
4.	Byculla
5.	Gowalia Tank
6.	Worli Fire Station
7.	Dadar (East)
8.	Dharavi
9.	Wadala
10.	Kurla Kamani
11.	Chembur
12.	Deonar
13.	Vikhroli
14.	Mulund (W)
15.	Gawanpada
16.	Bhandup Complex
17.	Tulsi Lake
18.	Bandra (West)
19.	Bandra Kurla
20.	Vile parle
21.	Andheri
22.	Marol
23.	Goregaon
24.	Malad – Malvani
25.	Kandivali
26.	Borivali

11. JCB & DUMPERS

Anti Flooding Control Room are established at all 24 wards, which will be operative round the clock. Each ward has one JCB and two dumpers at their disposal which are stationed at various fire stations.

LIST OF JCB'S & DUMPERS

Sr. No	Name of Fire Station	Nos of JCB's	Nos of Dumper
1	Gowalia Tank	2	4
2	Byculla	1	2
3	Nariman Point	1	2
4	Wadala	4	8
5	Kurla	2	4
6	Vikroli	2	4
7	Mulund	2	4
8	Marol	5	10
9	Borivali	5	10
	Total JCB's & Dumpers	24	48

11.1 D.G. SETS

Anti Flooding Control Room are established at all 24 wards, which will be operative round the clock. These Control Rooms are equipped with telephone lines, two Diesel Generators (one for ward and one for shelter school) and other necessary tools & equipments.

12. NON-GOVERNMENTAL ORGANISATIONS (NGOS) AND VOLUNTARY AGENCIES

The non-governmental organisations and voluntary agencies play an important role in disaster management and provide a strong band of committed volunteers with experience in managing the disasters. Their strength lies in the choice of their manpower, the informality in operations and flexibility in procedures. These organisations enjoy a fair degree of autonomy and hence can respond to changing needs immediately.

However, in order to maintain uniformity in operations and effective co-ordination, it is desirable that they follow the standards of services (as given in the Guidelines), information exchange and reporting so as to enable the Municipal Commissioner to have a total picture of resource availability, disbursements and requirements. NGOs therefore have been assigned specific tasks by the Municipal Commissioner to undertake relief work within the overall institutional framework. As and where possible, NGOs may also be able to improve the quality of delivery of services. In addition, Mohalla Committees have been operating at the community level, especially in times of emergencies like house collapses, fires, floods. Such committees have been identified at the ward level.

Specific activities in which NGOs/Private Sector can be involved during disaster management operations are :

- Search and rescue operations
- Information dissemination
- First aid
- Disposal of dead
- Damage assessment
- Management of information centres at temporary shelters
- Mobilisation and distribution of relief supplies including finances
- Manpower for community mobilisation, crowd control, rumour control, traffic management
- Specialised services (psychiatric and mental health assistance)
- Management of transit camps

The following agencies will be associated with relief and rehabilitation activities. Most of these agencies have the capacity to mobilise required resources and have assisted the administration in the past in managing relief and rehabilitation activities. These agencies include :

- 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

11.1 Encouraging Community Preparedness

Disasters may result in cutting off essential services and in spite of administrative preparedness it may not be possible for the administration to reach out immediately.

Mitigation efforts and preparation of the disaster management action plan for local areas are essential elements and pre-requisites. Preparedness to a large extent would reduce the impact and the damage. Training and simulation exercises for enhancing the community's preparedness and response capability to identified risks will simultaneously strengthen and enhance the capacity of the administration to undertake necessary preparedness or evacuation measures. The Corporation wants to encourage and support initiatives towards community preparedness measures.

Private Sector units, NGOs and other organisations have been identified as resource groups for involvement in community preparedness measures. These agencies will be able to get the benefit of training for the same from the training activities undertaken by YASHADA. These agencies are :

- Apnalaya
- AVEHI
- Bombay Environmental Action Group (BEAG)
- Foundation for Research in Community Health
- Jagruti Kendra
- Mohalla Committee Movement Trust
- Nirmala Niketan School of Social Work
- Parisar Asha
- Save Bombay Committee
- SIDDHI
- Slum Rehabilitation Society
- SPARC
- Tata Institute of Social Sciences
- YUVA
- YWCA

As a part of general preparedness at community level, the NGOs will make the communities conscious about the type of hazard that the community faces. Thus local disaster management action plans for hot-spot areas in the context of specific vulnerability would be developed. For areas with high concentration of industries particularly engaged in production, storage and transport of hazardous materials, Mutual Aid and Resource Groups will be set-up.

Mutual Aid and Resource Groups (MARGs)

The objective of setting up MARGs is to

- Make the industrial zone self-sufficient
- Encourage pooling of resources to tackle industrial accidents
- Manage both on-site and off-site industrial accidents
- Provide for a degree of expertise in managing disasters
- Reduce the response time for managing disasters
- To integrate the on-site plan of industries with an off-site plan.
- Assist the Corporation in managing disasters

Private sector institutions which will be associated with the task of undertaking training for member organisations include the following

- Bombay Chamber of Commerce and Industries
- Confederation of Indian Industries
- Federation of Indian Chamber of Commerce

Areas of Community Participation

BMC and NGOs at the disaster site should ensure maximum community participation in all stages of operation in order to maintain community morale and confidence, maximise the use of local resources and promote a faster recovery. Disaster management situations offers a wide range of choice and demands a immediate decision making. The participation of communities and their representatives would reduce the pressures on the field agencies with regard to the choice and uncertainties of community's response to the decisions.

Based on local dynamics, ethos and the experience of Mumbai, an appropriate strategy to ensure community support has been evolved. Such efforts to enlist community support and participation have gone a long way in reassuring the community about the administration's intent and seriousness about managing the disaster.

Efforts to enlist community participation is being ensured by

- ❖ identifying situational, opinion and position leaders in the community and voicing administration's confidence in their capabilities to undertake the tasks.
- ❖ Consultations and dialogues expressly indicating the need for assistance would encourage the community and its leaders to come forward.
- ❖ Regular feedback meetings and an open book approach to demonstrate transparency.
- ❖ Involving community in decision making at local levels

The major areas of community participation are being identified and include the following :

During Evacuation

For appropriate security and law and order evacuation would be undertaken with assistance from community leaders and community based organisations (CBOs). The entire family would evacuate together as a unit. However, to avoid stampede and confusion and in cases of inadequate transport or limited time, emergency evacuation would be undertaken in the following order :

- seriously injured and sick
- children, women and handicapped
- Old
- Able-bodied

In case of evacuation, people would be advised to follow these steps:

- Secure their homes/establishments. Close and lock doors and windows.
- Turn off the main water valve and electricity
- Leave early enough to avoid being trapped.
- Follow recommended evacuation routes. Not to take shortcuts. They may be dangerous.
- Not to move into flooded areas because the authorities may have removed the manholes for efficient drainage and the indicators may get shifted due to water currents.
- Stay away from downed power lines.

During the Disaster

Community leaders could be given the responsibility for ensuring the following community behaviour :

- People stay calm and panic behaviour is not encouraged. Regulate helter-skelter running or crowding of people.
- Encourage people to stay at a secured place and protect themselves from injuries.
- People do not enter damaged buildings or structures

- People do not touch electric poles, utility wires/cables
- People do not use telephones except in life-threatening situations
- Preparedness of community for recurrence of the disaster, increase in severity, or consequential emergencies
- Check for injuries. Do not attempt to move seriously injured persons unless they are in immediate danger of death or further injury.
- Undertake first-aid activities
- Visually inspect utility lines and appliances for damage.
- If water pipes are damaged, shut off the water supply at the main valve.
- People stay away from damaged areas, unless their assistance has been specifically requested by police, fire or relief organizations.
- Mobilise people to put out small fires and people inside are made to evacuate.
- Help police, if requested, to maintain law and order and watch the evacuated property during the disaster

During Relief and Rehabilitation

Immediately after the disaster, the members of the community may look depressed and helpless, but very soon gets euphoric when they find that after all everything is not lost. Participation of community at this stage helps in early recovery and promotes mental health. It is necessary to see that member of the community are continuously engaged in some sort of helping activity to draw them out of their depression.

Relief authorities at the site would therefore:

- Encourage self-help in every activity of their day-to-day living.
 - Encourage assistance for identification of dead, disposal of dead bodies, and disposal of damaged food stocks
 - Encourage contribution of labour (loading, unloading, distribution, temporary constructions, food distribution etc)
 - Enlist assistance for updating records of damages and losses.
 - Enlist assistance in maintenance of law and order
 - Enlist assistance in maintaining sanitation standards and disposal of waste
- Promote cultural and recreational activities in order to protect the mental health

13. REPORTING FORMATS

The institutional arrangements would not be effective unless it is operationalised through reporting formats. Such tools define the direction and the content of information as also the source. The flow of information brings in the dimension of accountability and the source provides the authenticity. Reporting formats have been prepared for the various line departments. These will be consolidated by the EOC/BMC control room depending on the nature and extent of the disaster and forwarded to the Additional Chief Secretary (Home). These formats will also be useful in monitoring the field situation.

ANNEXURE XV

Status and Action taken Report for MCGM

Item of Information	Details & Remarks
I. Status	
i. Nature of event	
ii. Estimates of number of locations affected and names of these locations	
iii. Overall assessment of impact:	
· Estimated persons stranded/affected:	
· Number of persons needing evacuation from following locations	
· Estimated loss of lives:	
· Estimated number of injured:	
· Estimated number of houses/structures/area damaged:	
II. Damage to infrastructure:	
· i. Road transport	
· ii. Power supply	
· iii. Water supply	
· iv. Telecommunication	
· v. Drainage systems	
III. Actions Taken	
i. Communications established with:	
· Fire Brigade	
· Police	
· BEST	
· Civil Defence and Home Guards	
· District Control Rooms	
· Central Railway	
· Western Railway	
· Meteorology Department, Colaba	
· Government and BMC hospitals	
IV. Immediate Assistance provided	
i. Transport arrangements made for stranded passengers:	
· Number of private buses with capacity	
· Number of BMC vehicles	
· Number of MSRTC buses with capacity	
ii. Transport arrangements yet to be made for stranded passengers at the following locations:	
iii. Rescue operations going on/completed:	
iv. Number of stranded persons in temporary shelters:	

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V. Public Information System Activated i. Doordarshan ii. AIR iii. Cable TV iv. Public address system at MSRTC depots v. Display boards positioned for traffic management at following locations:	
VI. Immediate requirements	
. i. Assistance for search and rescue	
. ii. Food	
. iii. Water	
. iv. Manpower	

Name:

Designation

Date

Signature

ANNEXURE XVI

Status and Action taken Report for Fire Brigade

Item of Information	Details & Remarks
I. Status	
i. Nature of event	
ii. Estimates of number of locations affected and names of these locations	
iii. Overall assessment of impact:	
· Number of persons needing evacuation from following locations	
· Estimated loss of lives:	
· Estimated number of injured:	
· Estimated number of houses/structures/area damaged:	
IV. Damage to infrastructure:	
· i. Power supply	
· ii. Water supply	
II. Actions Taken	
i. Communications established with:	
· BMC	
· Police	
· BEST	
· Civil Defence and Home Guards	
· Government and BMC hospitals	
III. Immediate Assistance provided	
i. Fire fighting operations on/completed	
ii. Number of fire tenders pressed into service:	
iii. Rescue operations going on/completed:	
iv. Number of persons evacuated from following locations:	
v. Number of ambulances pressed into service:	
IV. Public Information System Activated	
On-site Information Centre established	
V. Immediate requirements	
· i. Assistance for search and rescue	
· ii. Ambulances	
· iii. Manpower	

Name:
 Designation
 Date
 Signature

ANNEXURE XVII**Status and Action taken Report for BEST**

Item of Information	Details & Remarks
I. Status	
i. Nature of event	
ii. Estimates of number of locations affected and names of these routes	
iii. Overall assessment of impact:	
· Estimated persons stranded	
· Names of roads blocked/congested	
II. Actions Taken	
i. Communications established with: · BMC · Fire Brigade · Police · Central Railway · Western Railway	
III. Immediate Assistance provided	
i. Transport arrangements made for stranded passengers: · Number of BEST buses with capacity · Number of MSRTC buses with capacity	
IV. Public Information System Activated	
i. Public address system at BEST depots	

Name:

Designation

Date

Signature

ANNEXURE XVIII

Status and Action taken Report for Medical Assistance activities

Item of Information	Details & Remarks
I. Status	
i. Nature of event	
ii. Estimates of number of locations affected and names of these locations	
iii. Overall assessment of impact:	
· Estimated persons affected:	
· Estimated loss of lives:	
· Estimated number of injured:	
II. Damage to infrastructure:	
· i. Hospitals	
· ii. Power supply	
III. Actions Taken	
i. Communications established with:	
· Fire Brigade	
· Police	
· Railway Hospitals	
· Government and BMC hospitals	
IV. Immediate Assistance provided	
i. On-site emergency treatment organised	
· Number of doctors	
· Number of para-medicos	
· Number of people treated	
ii. Received at hospitals	
· Names of hospitals	
· Number of people received	
· Persons treated at OPD	
· Persons admitted	
· Deaths before admission	
· Deaths after admission	
iii. Number of ambulances pressed into service:	
iv. Preventive measures undertaken:	
V. Public Information System Activated	
i. Doordarshan	
ii. AIR	
iii. Cable TV	
VI. Immediate requirements	
i. Special drugs/medicines	

Name:

Designation

Date

Signature

ANNEXURE XIX

Status and Action taken Report for Police

Item of Information	Details & Remarks
I. Status	
i. Nature of event	
ii. Estimates of number of locations affected and names of these locations	
iii. Overall assessment of impact:	
· Estimated loss of lives:	
· Estimated number of injured:	
· Names of roads blocked/congested	
II. Actions Taken	
i. Communications established with:	
· BMC	
· Fire Brigade	
· BEST	
· Civil Defence and Home Guards	
· District Control Rooms	
· Central Railway	
· Western Railways	
· Meterology Department, Colaba	
· Government and BMC hospitals	
III. Immediate Assistance provided	
i. Transport arrangements made for stranded passengers:	
· Number of private buses with capacity	
· Number of police vehicles	
ii. Rescue operations going on/completed:	
iii. Names of roads closed for traffic:	
iv. Number of towing vehicles/cranes pressed into service:	
IV. Public Information System Activated	
i. Doordarshan	
ii. AIR	
iii. Cable TV	
iv. Display boards positioned for traffic management at following locations:	
V. Immediate requirements	
· Assistance for search and rescue	
· Ambulances	
· Manpower	

Name:
 Designation
 Date
 Signature

VOLUME I**ANNEXURE XX****Status and Action taken Report for Central Railway & Western Railway**

Item of Information	Details & Remarks
I. Status	
i. Nature of event	
ii. Estimates of number of locations affected and names of these locations	
iii. Overall assessment of impact:	
· Estimated persons stranded/affected:	
· Estimated loss of lives (only in case of railway accident):	
· Estimated number of injured (only in case of railway accident):	
· Central Railway (Main line) services fully operational/completely paralysed/sections paralysed from _____ to _____	
· Central Railway (Harbour line) services fully operational/completely paralysed/sections paralysed from _____ to _____	
· Western Railway services fully operational/completely paralysed/sections paralysed from _____ to _____	
II. Outstations train traffic	
· i. Up-trains held up at the following stations:	
· ii. Number of down trains cancelled:	
III. Damage to infrastructure:	
· i. Railway power supply	
· ii. Signalling system	
· iii. Railway tracks	
IV. Actions Taken	
i. Communications established with:	
· BMC	
· Fire Brigade	
· Police	
· BEST	
· Central Railway / Western Railway	
· Metrology Department, Colaba	
ii. Facilities for setting up emergency food and water supply for stranded	
iii. Number of additional trains running	
V. Public Information System Activated	
i. Doordarshan	
ii. AIR	
iii. Cable TV	
iv. Public address system at railway stations	
VI. Immediate requirements	
i. Assistance for search and rescue	
ii. Medical assistance	
iii. Ambulances	
iv. Fire Brigades	
v. Police	

Name:

Designation

Date

Signature

VOLUME I**ANNEXURE XXI****Consolidated Report on the Status and Actions taken**

Item of Information	Details & Remarks
I. Status	
i. Nature of event	
ii. Estimates of number of locations affected and names of these locations	
iii. Estimates of number of BEST routes affected and names of these routes	
iii. Overall assessment of impact:	
· Estimated persons stranded/affected:	
· Number of persons needing evacuation from following locations	
· Estimated loss of lives:	
· Estimated number of injured:	
· Names of roads blocked/congested:	
· Estimated number of houses/structures/area damaged:	
· Central Railway (Main line) services fully operational/completely paralysed/sections paralysed from _____ to _____	
· Central Railway (Harbour line) services fully operational/completely paralysed/sections paralysed from _____ to _____	
· Western Railway services fully operational/completely paralysed/sections paralysed from _____ to _____	
· Up-trains held up at the following stations:	
· Number of down trains cancelled:	
III. Damage to infrastructure:	
i. Road transport	
ii. Power supply	
iii. water supply	
iv. Telecommunication	
v. Drainage systems	
vi. Railway power supply	
vii. Signalling system	
viii. Railway tracks	
ix. Hospitals	

<p>III. Actions Taken</p> <p>i. Communications established with:</p> <ul style="list-style-type: none"> . BMC . Fire Brigade . Police . BEST . Civil Defence and Home Guards . District Control Rooms . Central Railway . Western Railway . Metrology Department, Colaba . Government, Railway and BMC hospitals 	
<p>IV. Immediate Assistance provided</p> <p>i. Transport arrangements made for stranded passengers:</p> <ul style="list-style-type: none"> . Number of BEST buses with capacity . Number of private buses with capacity . Number of additional trains (Central) . Number of additional trains (Western) . Number of BMC vehicles . Number of police vehicles . Number of MSRTC buses with capacity <p>ii. Transport arrangements yet to be made for stranded passengers at the following locations:</p> <p>iii. Rescue operations going on/completed:</p> <p>iv. Number of stranded persons in temporary shelters:</p> <p>v. Number of persons evacuated from following locations:</p> <p>vi. Emergency water and food arranged at (location and number)</p> <ul style="list-style-type: none"> . Railway stations . Bus stations . Temporary shelters . On-site <p>viA. Facilities provided to BMC for setting up emergency food and water supply for stranded passengers at railway stations</p> <p>vii. Fire fighting operations on/completed</p> <p>viii. Number of fire tenders pressed into service:</p> <p>ix. Injured shifted to hospitals at (names and number of people shifted, for railway accidents)</p> <p>x. Number of ambulances pressed into service:</p> <p>xi. Onsite emergency treatment organised</p> <ul style="list-style-type: none"> . Number of doctors . Number of para-medicos . Number of people treated 	

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xii. Received at hospitals · Names of hospitals · Number of people received · Persons treated at OPD · Persons admitted · Deaths before admission · Deaths after admission xiii. Preventive measures undertaken: xiv. Names of road closed for traffic: xv. Number of towing vehicles/cranes pressed into service: xvi. Names of NGOs assisting at the site:	
V. Public Information System Activated i. Doordarshan ii. AIR iii. Cable TV iv. Public address system at railway stations v. Public address system at BEST depots vi. Public address system at MSRTC depots vii. Display boards positioned for traffic management at following locations: viii. On-site Information Centre established (for Fire Brigade)	
VI. Immediate requirements	
i. Assistance for search and rescue	
ii. Food	
iii. Water	
iv. Medical assistance	
v. Ambulances	
vi. Fire Brigades	
vii. Police	
viii. Transport	
ix. Special drugs/medicines	
x. Manpower	

Name:

Designation

Date

14. PLAN DISSEMINATION THROUGH COMMUNITY EDUCATION

For Greater Mumbai DMAP to be effective it must be disseminated at three levels ;

- Central government departments, multilateral agencies (aid agencies), defence services, state level officials
- To the municipal authorities, district authorities, government departments, corporate sector, NGOs and other agencies and institutions within Greater Mumbai and
- Through mass media to the general public.

The content of the plan should be explained through well designed and focussed awareness programmes.

The responsibility for dissemination of the plan will be vested with Municipal Commissioner, at BMC, as well as through awareness programmes organised by each of the agencies participating in disaster management. The Municipal Commissioner will also involve NGOs in preparing suitable public awareness material to be distributed to the public.

The awareness programmes will be prepared in the local languages to ensure widespread dissemination. Media will be extensively used for public awareness programmes. These will include

→

- Newspapers
- TV
- Local cable networks
- Radio
- Publicity material.

Schools, colleges and other public institutions will be specifically targeted.

In addition to dissemination of literature related to the DMAP, the Municipal Commissioner will ensure that disaster response drills are conducted by the ward officers and other agencies on a regular basis, especially in the disaster prone areas to maintain the readiness of communities and departments, as regards operational procedures, personnel and equipment and orderly response.

15. Ward Level Response Plan

This document forms a sub-part of Mumbai Disaster Management Plan prepared for micro-level disaster management action plan at the ward level. When the disaster situation is localised at ward level and can be managed locally, the ward level plan will come into operation. However, a disaster situation may cover a major part of the city which would call for co-ordination of activities not only at the city level but also at specific ward level. Under such conditions, the ward level plan in the affected wards would be in operation along with the Mumbai Disaster Management Plan.

The response structure given in the ward plan essentially limits itself to micro-level intervention. When more than one ward are affected, BMC control room which is the co-ordinating 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., while the inter-ward co-ordination will be the responsibility of BMC Control Room.

Responsibilities of Ward Officer on receipt of warning or occurrence of disaster

On the receipt of warning or occurrence of the disaster, every Ward Officer will be required to be in preparedness by undertaking the following :

- Establish a Ward Control Room with the following :
 - Direct telephone contact with BMC Control Room
 - A supervisor of the rank of S.E./J.E to be in-charge of control room.
 - Labourers from conservancy staff to be kept in readiness for undertaking any emergency work
 - Required equipments such as :
 - digging tools
 - choke clearing equipments
 - ropes
 - tree-cutting saws
 - portable search lights
 - batteries
 - megaphones
 - gas cutters
 - J.C.B
 - proclaim
 - R.C.C. beam cutters
 - generators
- The ward officer will act as Site Officer responsible for co-ordination of field activities of various line departments. The ward officer will also be responsible for providing support to line agencies so as to enable them to operate efficiently. As the Site Officer, he would be in constant touch with BMC Control Room and the field officers from

Police (Law and Order)	:	DCP/ACP
Police (Traffic)	:	Divisional Police Inspector
Fire Brigade	:	Station Officer
Railways	:	Station Masters
BEST (Transport)	:	Assistant Traffic Superintendent
BMC Hospitals	:	Medical Officer casualty wards
MTNL	:	Area Manager
BEST/BSES/TEC	:	Station Engineer
Revenue, GOM	:	Tehsildar rank/Collector

- The ward officer should ensure that all BMC officers on disaster duty use the official shoulder bands with BMC emblem for easy identification.
- The ward officer will provide all information as given in the ward plan to the field officers of the line departments.
- The ward officer will be directly responsible for the execution of the following tasks through BMC staff:
 - rescue operations during house collapses in co-ordination with fire brigade
 - ensure transport of injured to hospitals on priority
 - transport of dead to the hospitals/corpse disposal
 - anti-flooding operations
 - clearing of debris
 - salvage operations
 - clearing of uprooted trees
 - repairs to damaged roads, water supply and drainage
- The ward officer will provide and co-ordinate arrangements for
 - transportation/shifting of stranded or affected persons through BMC vehicles, private vehicles and MSRTC buses
 - temporary shelters with emergency food and water.
 - issue of passes and identification stickers for vehicles on relief duty
 - issue of passes and identity cards to relief personnel including the persons from NGOs

[Requisitioning of private transport vehicles, temporary shelters can be done through the Collectorate]

- The ward officer will ensure through the Medical Officer (Health)
 - Preventive medicine and anti-epidemic actions
 - Providing special information required regarding precautions for epidemics
 - Supervision of food, water supplies, sanitation and disposal of waste
- Damage assessment will be carried out as per the pro forma
- The ward officer will enlist the support of NGOs and private sector for response operations. The NGOs active in the ward along with their expected role is given in the Annexure to each ward plan.
- The ward officer will report to BMC Control Room on the field activities including deployment and reinforcements of staff and resources and communicate additional requirements.
- Set-up Information Centre at the site

Responsibilities of DCP/ACP on receipt of warning or occurrence of disaster

The DCP' office will be responsible for the following field activities in co-ordination with the ward officer :

- Shifting of the injured to the hospitals on a priority and providing bandobast for crowd control at the hospital
- Cordoning of area to restrict movement of on-lookers, vehicular and pedestrian traffic.
- Guarding of property/valuables in affected area
- Providing easy access to rescue and relief personnel/vehicles
- Ensuring proper identification , inquest procedure and Corpse disposal

- Panchanamas will be prepared as per police procedure
- Crowd control especially outside Railway stations, bus stations and schools
- Police bandobast near railway stations, bus stations and schools
- Extensive mobile patrolling
- Arrangements for transportation/shifting of stranded or affected persons through police vehicles and private vehicles.
- Law and order and control of anti-social elements
- Use of public address system to provide information to the public. Sign boards may be used to provide information and declare areas out of bounds.
- Enlist support of Mohalla Committees for maintaining peace and for rumour control
- Information centre to organise sharing of information with mass media and community
- Communicate to police control room details on the field activities including deployment and reinforcements of staff and resources and communicate nature of additional requirements.

Responsibilities of Divisional Police Inspector (Traffic) on receipt of warning or occurrence of disaster

The Divisional Police Inspector (Traffic) in co-ordination with the Ward Officer will be responsible for the following field activities :

- Control and monitor traffic
- Extensive patrolling especially covering railway stations, bus stations and schools
- Diversion of traffic on alternate routes as and when necessary.
- Provide information about traffic flow along various corridors, especially heavy traffic or congested roads
- Co-ordination with BEST to ensure additional buses are deployed along desired routes
- Mobilising towing cranes and towing of stranded/breakdown or those vehicles obstructing movements
- Use of P.A system to provide information and direction to the public
- Setting up of sign-boards and display boards at strategic locations to give information regarding traffic movement
- Enlist support of RSP, NCC, NSS, NGOs and voluntary organisations for traffic management
- Provide and co-ordinate arrangements for transportation/shifting of stranded or affected persons through police vehicles and private vehicles.
- Communicate to traffic control room details on the field activities including deployment and reinforcements of staff and resources and communicate nature of additional requirements.

Responsibilities of Fire Brigade Station Officer on receipt of warning or occurrence of disaster

The Fire Brigade Station Officer in co-ordination with the Ward Officer will be responsible for the following field activities :

- Fire fighting operations in the affected area
- Rescue operations
- Transport of injured to the hospitals on a priority
- Evacuation of persons from the affected area
- Ensure safety from electrical installations or power supply at disaster site
- Clearing of roads or pathways due to uprooted trees
- Salvage operations
- Co-ordinate with BMC for rescue operations in house collapses
- Communicate to fire brigade control room details on the field activities including deployment and reinforcements of staff and resources and communicate nature of additional requirements.

Responsibilities of Ward wise officer/Collector on receipt of warning or occurrence of disaster

The Ward wise officer/Collector in co-ordination with the Ward Officer will be responsible for the following field activities:

- Assessing the requirements for transit camps on the occurrence of disaster
- Assisting the ward officer in requisitioning vehicles and temporary shelters
- Setting up of transit camps and pandals for temporary accommodation.
- Arranging for food distribution
- Arrangements for dry rations and family kits for cooking
- Arrangements for clothing
- Providing gratuitous relief
- Enlist support of NGOs and private sector for resources and manpower for transit camps
- Communicate to district control room details on the field activities including deployment and reinforcements of staff and resources and communicate nature of additional requirements.

Responsibilities of Medical Officer (Casualty) on receipt of warning or occurrence of disaster

The Medical Officer (Casualty) in co-ordination with the Ward Officer will be responsible for the following field activities:

- Providing emergency treatment for the seriously injured at the hospital
- Organising on-site treatment of injured with tagging and triage and transfer of injured
- Emergency supplies of medicines and first-aid
- Post-mortem and corpse disposal
- Demarcate an area in the hospital for receiving patients, tagging and triage
- If necessary, setting up poison centre within the hospital or at disaster site
- Co-ordinate with blood banks for emergency supply of blood
- Setting up an information centre at the hospital
- Communicate to BMC control room details on the field activities including deployment and reinforcements of staff and resources and communicate nature of additional requirements.

Responsibilities of Railway Station Master on receipt of warning or occurrence of disaster

The Railway Station Master in co-ordination with the Ward Officer will ensure that the following field activities are undertaken:

- Crowd control through Railway Police
- Continuous updated information through public address system on
 - the running of trains
 - measures being undertaken
- Information on location of temporary shelters organised by BMC for railway passengers
- Providing facilities at railway station to ward office for provision of emergency food and water to passengers
- Monitoring level of water on the railway tracks and keep BMC Control room informed.
- Co-ordinating with engineering branch staff posted at the flood prone locations at railway tracks
- Co-ordination with ward officer regarding passenger data and alternate transport
- In case of railway accidents:
 - Rescue and evacuation
 - Shifting of injured to hospitals
 - Co-ordination with railway hospitals, BMC hospitals and government hospitals
 - Provide information on alternate travel arrangements for outstation passengers

- Communicate to Railway control room details on the field activities including deployment and reinforcements of staff and resources and communicate nature of additional requirements.

Responsibilities of BEST Assistant Traffic Superintendent on receipt of warning or occurrence of disaster

The BEST Assistant Traffic Superintendent in co-ordination with the Ward Officer will be responsible for the following field activities :

- Keep standby buses in readiness for deployment
- Co-ordination with Railway Station Master and Divisional Police Inspector (Traffic) for information regarding traffic movement and passenger data
- Co-ordinate with MSRTC for transport arrangements of stranded passengers
- Deployment of additional buses along certain routes to clear passenger traffic
- Diversion of routes if and when necessary
- Providing information to the public at bus depots regarding the cancellation, re-routing, delays of buses, temporary shelter locations of BMC and the measures being undertaken.
- Communicate to BEST control room details on the field activities including deployment and reinforcements of staff and resources and communicate nature of additional requirements.

Responsibilities of BEST/BSES/TEC Station Engineer on receipt of warning or occurrence of disaster

The BEST/BSES/TEC station engineer in co-ordination with the Ward Officer will be responsible for the following field activities :

- Cutting off power supply if necessary
- Alternative arrangements for power supply for lighting
- Illumination of affected area as well as the periphery
- Restoration of power supply
- Keeping emergency gangs in readiness for repair work
- Repairs to damaged power infrastructure
- Attending to calls of power breakdowns or short-circuits
- Co-ordinating with fire brigade in case of fires or short-circuiting
- Communicate with respective control rooms the details on the field activities including deployment and reinforcements of staff and resources and communicate nature of additional requirements.

Responsibilities of MTNL Area Manager on receipt of warning or occurrence of disaster

The MTNL Area in co-ordination with the Ward Officer will be responsible for the following field activities :

- Restoration of telephone lines
- Keeping emergency gangs in readiness for repair work
- Repairs to telecommunication infrastructure
- Communicate with Head Office the details on the field activities including deployment and reinforcements of staff and resources and communicate nature of additional requirements.

DETAILS OF RECEIVING STATIONS

Tata Hydro-Electric Power Supply Co. Ltd

List of Power Stations in Mumbai Corporation Area and Their Location

Sr.No.	Address	Rec.Stn. (Tel No.)	Police Stn. (Tel. No.)
1.	Carnac Receiving Station, 34, Sant Tukaram road, Carnac Bunder, Mumbai - 400 009.	3436441	Pydhonie
2.	Parel Receiving Station, G. D. Ambedkar Marg, Parel, Mumbai - 400 012	4130228	Kala Chowki
3.	Mahalaxmi Sub Station, 490, Senapati Bapat Marg, Lower Parel, Mumbai - 400 013.	4946987	N. M. Joshi Marg
4.	Dharavi Receiving Station, Labour Camp, Matunga, Mumbai - 400 019.	4072575	Dharavi
5.	Salsette Receiving Station, Lake Road, Bhandup, Mumbai - 400 078.	5643748	Bhandup 5641301
6.	Saki Sub Station, 42, Saki Vihar Road, Mumbai - 400 072.	8325323	Saki Naka 8323997
7.	Borivali Receiving Station, Dutta Pada Road, Borivali (East) Mumbai - 400 066.	8861731 8863303	Borivali (E) 8059007
8.	Malad Sub Station, Malad- Marve Road, Malad (West) Mumbai - 400 095.	8823607 8822557	Malad 8821319
9.	Versova Sub Station, Link Road, Andheri, (West) Mumbai - 400 058.	6268905 6319372	Oshiwara 6323861 6325327
10.	Vikhroli Sub Station, Eastern Express Highway, Vikhroli (East) Mumbai - 400 067.	5171970 5171530	Vikhroli 5782240 5782492
11.	Chembur Receiving Station, Inside R. C. F. Chembur, Mumbai - 400 074.	5581996 5582027	Ref. 5560127 5140707

RELIANCE ENERGY LIMITED

List of Power Stations in Mumbai Corporation Area and Their Locations

Sr.No.	Address	Rec.Stn. (Tel No.)	Police Stn. (Tel. No.)
1.	Receiving Aarey (Mafco) Mahananda Dairy, W. E. Highway, Goregaon (East), Mumbai - 400 063.	8400441 8402034 8402037	Aarey 8401355 8401672
2.	Receiving Aarey 220 kv Aarey Colony, Near Marol Maroshi Road, Mumbai - 400 065.	8414387 8429401 8421665	Aarey colony
3.	Receiving Airport Opp. P & T Colony, Jun. of Sahar Road, & Airport Road, Andheri (East) Mumbai - 400 099.	8221711 8325172 8350856	Sahar 8221748 8300711
4.	Receiving Ambivali Compound of Laxmi Ind. Estate, Link Road, Andheri (West) Mumbai - 400 058.	6294170 6294171 6291986 6261313	Oshiwara 6323861 6323862
5.	Receiving Andheri Near Bus Depot, Opp. Cafe Alpha, S. V. Road, Andheri (West) Mumbai - 400 058.	6282100 6283270 6249603	D. N. Nagar 6287607 6232117
6.	Receiving Anik Near Hindustan Petroleum Gate, Near Port Trust Railway Crossing, Mahul, Mumbai - 400 071.	5557296 5557287 5516291	R. C. F. 5563412 5560127
7.	Receiving Bandra Linking Road, Opp. Bandra Talkies, Bandra (West) Mumbai - 400 050.	6424978 6424482	Bandra 6423021 6400917
8.	Receiving Bhayandar Pavanputra, Near Bhayandar Pump, Bhayandar (East)	8180464 8180463	Bhayander
9.	Receiving Bombilwadi Ice Factory Lane, off Hill road, Bandra (West), Mumbai - 400 050.	6423102 6430085 6423494	Bandra 6423021 6400917
10.	Receiving Borivali Western Express Highway, Opp. Special Steel, Borivali (East) Mumbai - 400 066.	8861392 8861135 8861675	Kasturba 8057239 8059007
11.	Receiving Borosil, Borosil Glass Factory, Marol Maroshi Road, M. I. D. C. , Andheri (East), Mumbai - 400 093.		M. I. D. C. 8368353 8394205

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12.	Receiving Cama Cama Industrial Estate, Near Petrol Pump, W. E. Highway, Goregaon (East), Mumbai - 400 063.	8766895	Goregaon 8721900 8724309
13.	Receiving Chakala Near German Remedies, A. K. Road, Andheri (East) Mumbai - 400 093.	8382615 8382617 8328321	Andheri 8221562 8221447
14.	Receiving Chembur Near R. C. F. Garden, Near Deonar Depot, S. T. Road, Chembur, Mumbai - 400 088.	5563384 5563385	Chembur 5221613 5227563
15.	Receiving Chinchbunder Jun. of Linking Road & Chinch Bunder Rd. Malad (West) Mumbai - 400 064.	8802646 8802674 8802672	Chichacali
16.	Receiving Chincholi Jun. of Chinchavali road & S. V. Road, S. V. Road, Malad (West) Mumbai - 400 064.	8747884 8747886 8747887	Malad 8821147 8824946
17.	Receiving Chunabhatti R. C. F. Complex, E. E. Highway, Chunabhatti, Mumbai - 400 022.	5242059 5242580 5242578	Nehru Nagar 5224291 5224647
18.	Receiving Dahisar Near Post Office & High School, Shailendra Nagar, Dahisar (East), Mumbai - 400 068.	8956829 8920737 8957436	Dahisar 8932040 8951370
19.	Receiving Dindoshi Western Express Highway, Opp. Patel Verica, Near Gokuldham, Goregaon (East), Mumbai _ 400 097.	8402411 8402410	Dindoshi 8700784 8400781
20.	Receiving Ghodbunder Near BSES 220 kv Receiving, Near Raj Bucket factory, Godbunder Village.	8118568 8118567 8118670	Kashi Mira
21.	Receiving Gorai Near Gorai Bus Depot., L. T. Road, Borivali (West), Mumbai -400 092.	8636839 8634521 8634539	Borivali 8010145 8016606
22.	Receiving Goregaon S. V. Road. Near Sidharth Nagar, Goragaon (West), Mumbai - 400 062.	8721312 8722743 8723327	Goregaon 8721900 8724309
23.	Receiving Juhu Cooper Hospital Compound, N. S. Road No. 1, Juhu, Mumbai - 400 049.	6208904 6208987 6250946	Juhu 6183856 6184308

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24.	Receiving Juhu North Juhu Bus Depot, Opp. Church, Vile-parle (West), Mumbai - 400 049.	6237690 6237696 6237688	Juhu 6183856 6184308
25.	Receiving Kala Nagar Kala Nagar, Near Drive-In-Theatre, Behind BMRDA Office, Bandra Kurla Complex, Bandra (East), Mumbai - 400 051.	6423692 6423696	Kherwadi 6423500 6423417
26.	Receiving Kalina Kalina, Opp. Two Star Hotel K K Road Santacruz East Mumbai - 400 055.	6174513 6174514 6174515	Vakola 6113257 6182936 6182756
27.	Receiving Kandivali Station Road Opp. Telephone Exchange Kandivali (West 9) Mumbai - 400 067.	8072227 8079957 8071102	Kandivali 8056603 8050904
28.	Receiving Kandivali Ind. Estate Behind Petrol Pump Link Road, Charkop Mumbai - 400 067.	8053242 8053246 8053247	Malvani 8820497 8822557
29.	Receiving Kurla Opp. Wadia Estate Bailbazar Kurla (West) Mumbai - 400 070.	5143759 5141175 5143304	Kurla 5142868 5145478
30.	Receiving M. I. D. C. Near E. S. I. S. Hospital Opp. M. I. D. C. Police Station Near Telephone exchange, Marol Mumbai - 400 093.	8221692 8210982	M I D C 8368352 8394205
31.	Receiving Malad Near N. I. Highschool S. V. Road, Malad (West) Below Staff Quarters Mumbai - 400 064.	8080961 8081062 8072207	Malad 8821147 8822946
32.	Receiving Meghwadi Nr. MHB Colony Janata Nagar, Jogeshwari (East), Mumbai - 400 060.	8391137 8300389 8391147	Meghwadi 8221651 8210806
33.	Receiving Mira Mira M. I. D. C. OPP. Pesticide Company Mira, Mumbai.	8113474 8113744 8111121	Kashi Mira
34.	Receiving Poisar Samata Nagar, Near Mahendra Co. W. E. Highway Kandivali East Mumbai - 400 101.	8876138 8876141	Samata Nagar 8876119 8877624

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35.	Receiving Saki Near Park Devis Company Andheri Kurla Road Ad. Petrol Pump Mumbai - 400 072.	8322125 8323365 8353383	Saki Naka 5785160 5783936
36.	Receiving Santacruz Near Electricity House Prabhat Colony Santacruz (West) Mumbai - 400 055.	6183340 6183061	Vakola 6113257 6182936 6182756
37.	Receiving Seepz Inside Seepz Compound, Near Jewellers, Marol, Mumbai - 400 096	8364544 8364546 8322043 8322094	M. I. D. C. 8368352 8394205
38.	Receiving Shimpoli Jun. of L. T. Road & S. V. Road, Borivali (West) Mumbai - 400 092.	8059392 8056991 8051144	Borivali 8010145 8016606
39.	Receiving Shivaji Nagar Dumping House, Old Slaughter House, Shivaji Nagar, Govandi, Mumbai - 400 088.	5584652 5584653	Shivaji Nagar
40.	Receiving Tagore Nagar Tagore Nagar, Near BMC Pumping Station, Hariyali Village, Vikhroli (East), Mumbai - 400 079.	5781420 5786947 5781396	Vikhroli 6782240 5782492
41.	Receiving Tilak Nagar Near Sahakar Cinema, Amar mahal, Chembur, Mahul, Mumbai - 400 089.	5221248 5227933 5225271	Tilak Nagar 5227293 5229345
42.	Receiving Versova Lokhandwala Complex, Near BMC Pumping Station, Versova, Andheri (West), Mumbai - 400 061.	6323690 6323691 6323692 6323693	D. N. Nagar 6287606 6232117
43.	Receiving Vihar Road Near Ansa Industrial Estate, Saki Vihar Road, Saki Naka, Mumbai - 400 072.	5783623 5785428 5785134	Saki Naka 5783936 5783936
44.	Receiving Vikhroli Opp. Shreyas Cinema, LBS Road, Kulupwadi, Ghatkopar, Mumbai- 400 086.	5150770 5152558 5152747	Vikhroli 5782240 5782492
45.	Receiving Vile Parle Western Express Highway, Opp. Centaur Hotel, Vile Parle (East) Mumbai - 400 057.	6148548 6148506 6148306	Vile Parle 6117308 6117317

Note :- Receiving Stations at Sr. Nos. 8, 20, & 33 are situated beyond Brihan Mumbai Corporation Area.

MAHARASHTRA STATE ELECTRICITY BOARD

Receiving Stations in Bhandup Area :-

No.	Receiving Station Capacity	Rec. Stn. Tel. No.	Police Stn. Tel. No.
1.	South Bhandup	30 MVA	5913500 5681442
2.	North Bhandup	30 MVA	5643981
3.	Bhandup East (Lok Priya)	20 MVA	5614084
4.	Amforge	20 MVA	5690515

Receiving Stations in Mulund Area :-

No.	Receiving Station Capacity	Rec. Stn. Tel. No.	Police Stn. Tel. No.
1.	P. M. G. P.	20 MVA	5904458 5782492 5782240
2.	Sarvodaya	20 MVA	5603365 5684535
3.	Mulund EHV	100 MVA	5645656

WARD WISE DETAILS OF FLOODING LOCATIONS

Ward	Flood prone slum areas	Other flood prone low-lying areas and roads
A ward	Machhimar Nagar	Jn. of Anandilal Poddar road & Queens road (Maharshi Karve road)
	Shivshakti Nagar	Dinshaw Mullah Jn. M.K.road
	Ambedkar Nagar	Metro Cinema Jn.
	Ganesh Murty Nagar part I & II	M.G.road near Gymkhana
	Geeta Nagar	Lokmanya Tilak marg near Police Commissioner's office.
	Azad Nagar	Jn of market road and D.N.road, A.daundkar marg.
	Sudam Nagar	Mint road near Kabutarkhana
	Sunder Nagar	Ramjibhai Kamani road Jn. Shoorji Vallabhdas marg.
	Dhobhighat	Jn. of Veer Nariman road and Vitthaldas thakersy road.
		Aram, Capital cinema near Zunka Bhakar kendra.
		S.B.S.road from Regal cinema to Kushrow Baug.
		S.B.S.road Jn. N.A.Sawant marg.
		Radio club.
		Wode house road (Jn of Fazal road & Khatau road)
		General jagannath Bhosle marg.
		Nathalal Parikh marg and M.K.road, Cooperage road Jn., Tata garrriage, Benet Villa.
B ward	Nil	Masjid Railway Station.
		P. D'Mello Road, Kakliji Chowk junction.
		Mohd. Ali Road. Mandvi Post Office.
		Jinabhai Mulji Rathod Marg.
		Sandhurst Road low level.
C ward	Nil	Trimbak Parshuram Street, Jn. Durgadevi Road.
		Durgadevi Road, Jn. Ist & IInd Pathan Street.
		Bri Usman Marg, Nalbazar Market
		S.V.Road, Gol Deol.

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Ward	Flood prone slum areas	Other flood prone low-lying areas and roads
		Yagnik chowk
		Kalbadevi Road ben Dadisheth Agiyasi lane & Dr. Veigas Street
D ward	Jan]ta Nagar, M.P. Mill compound, Tardeo	Petit Hall, N. Sea Road.
	M.P. Mill compound , Tardeo.	Kashinath Compound, Nepeansea Road.
	Jaiphalwadi Zopadpatti, Forget street.	Oomar Park, Bhulabhai Desai Road.
	Simla House Zopadpatti.	Breach Candy, B.D. Road.
	Vitthal wadi, Namdeo wadi, sherichi wadi.	Band Stand Chowpatty.
		Nana Chowk
		Tardeo Circle
		Earth quake, Tardeo Road.
		Grant Road Station, Noshir Bharucha Marg.
		Apsara Cinema, Alibhai Premji Junction, Lamington Road
		R.R. Road Jn. Khetwadi Back Road.
		Kalewadi / Kandewadi, J.S.S. Road.
		Alankar Cinema, S.V.P. Road Jn. Of Pathe Bapurao Marg and Adjoining area of Khetwadi.
E ward	Mahatma Phule Nagar	Sankli Street jn. Sankli Street No. 3
	Khalipha Chawl	Anandrao Nair Marg, Opp. Maratha Mandir
	Sankhli street	Sheth Motisha Lane, Byculla Police Station
	Bakri Adda	Chamar Lane, Byculla Police Station
	Nariyal Wadi	Nesbit Road, Low Level, Burhani College
	Bhandarwada	Maulana Azad Road jn. Maulana Shaukat Ali Road
	Transit Camp, Tank Pakhadi	Sitafalwadi, Mazgaon, Dr. Mascarhans Road jn. Sant Sawata Marg
	Mominpura	
	Hans Road, Transit Camp	
	D.P. Wadi	
	Anandrao Vakil Chawl	
	Undriya Street Water Galli	
F/N ward	Plot No.9,10 and vicinity Wadala	Road No. 26-A, Gandhi Market
	Santoshmata Nagar, Ramnagar and vicinity wadala	Road No. 26, Road No.6, Mukhyadhyapak Bhavan
	Nityanand Nagar, Wadala	Vachharaj Lane
	Sadashiv Wadi, Wadala	R.A.Kidwai Marg, Gate No. 4

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Ward	Flood prone slum areas	Other flood prone low-lying areas and roads
	Ajmat Nagar, Wadala	
	Sundar Kamla Nagar, Sion	
	Shivaji Nagar, B.D. Rd., Extn.	
	Sion Fort	
	Aazad Nagar Wadala	
	Punjabi Slum Colony	
	Raoli Mat. Home	
	Indira Nagar	
	Chindiwala Colony	
F/S ward	Nil	Dadasaheb Phalake Road (Gautam Nagar)
		Dr. B. A. Road, Hindmata
		Dr. B. A. Road, St. Xavier Street
		Dr. B. A. Road, jn. D. L. Road, Sardar Hotel
		Zakeria Bunder Cross Road No. 1,2,3
		R. A. Kidwai Road jn. Road No. 26
		Sewree Cross Road, Gate No. 7
		J. B. Road, F/South office
		Mahadeo Palav Road, Near railway Bridge
		Godrej / Gas Company Lane
G/N	Transit Camp No. 2 & 3, near Sion Station (near Dhobighat)	Mahim Causeway
	Muslim Nagar, jn. of 90' and 60' Road	Ambedkar Road, Matunga Labour Camp
	Gopinath Colony, off. Sant Rohidas Marg	Meghwadi, T. H. Kataria Marg
		Chronic Spots :
		Dadar Station (West)
		Matunga Station (West)
		Mahim Station Railway Side
G/S ward	Nariman Bhat Nagar	B. D. D. Chawls, N. M. Joshi Marg
	Janata Colony, Worli	Currey Road, Low Level
	Golphadevi, Worli Koliwada	Fitwala Road
	Madraswadi (Mahatma Phule Nagar)	Balusheth Madurkar Marg
	Markandeyshwar nagar	G/South Ward Office, N. M. Joshi Marg
		Pandurang Budhkar Marg, Near Globe Mill Pumping Station
H/E ward	Dawri Nagar, Vakola, Santacruz (E)	Vakola-Kalina Section :
	Chaitanya Nagar, Vakola, Santacruz (E)	Anand Nagar, Vakola
	Golibar, Ambewadi slum, Khar (E)	Agripada, Vakola

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Ward	Flood prone slum areas	Other flood prone low-lying areas and roads
	Ghas Bazar slum, Naupada, Bandra (E)	Datta Mandir Road, Vakola
	Chamada wadi open plot 116, Bandra (E)	Kalina- Kurla Road, Kalina
	Indira Nagar slum, Govt. Colony, Opp. Kala Mandir, Bandra (E)	Air India Road, Kalina
	Valmiki Nagar slum, Bharat Nagar, Bandra (E)	Sunder Nagar, Kalina
		C.S.T. Road , Kalina
		Hanuman Tekdi section :
		J. P. Road
		Prabhat Colony, Road No.2 Near B.S.E.S. Ltd. Office
		Khar Subway
		Kherwadi section :
		Gate No. 18, Naupada, Bandra (E)
		Jn. of service road and Anand Kanekar Marg, Bandra (E)
		Bapuji Stall Road, Bandra (E)
		Apex Nalla, Kherwadi Road, Bandra (E)
		Chamada wadi open plot No. 116, Bandra (E)
		Shastri Nagar market, Bandra (E)
		Near Govt. Colony , Bldg. No.7, Bandra (E)
		Near Govt. Colony, Bldg. No. 10, Bandra (E)
		Near Walmiki Nagar, River Over Bridge, Bharat Nagar, Bandra (E)
		Navpada Dhakka, Bandra (E)
H/W ward	J.J. Colony	Bazar Road
	3rd Road Khar	Khar Railway Station Road
	South Avenue	Khar Subway
	Main Avenue	Ramkrishna Marg
	North Avenue	Milan Subway
	17th Road Khar	
	Nutan Nagar, Bandra-West	
	Mira Baug, Santacruz-West	
K/E ward		
K/W ward	Khadda Hutment	M.A. Road, Near Andheri Station
	Nehru Nagar Hutment	Dhobighat, Near Irla
	Keoni Gaothan	Kripa Nagar

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Ward	Flood prone slum areas	Other flood prone low-lying areas and roads
	Amboli Village	V. M. Road, Near Conservancy Chowky
	Vaishali Nagar	Bajaj Road, Bapu Vashi Road
	Azad Nagar	Juhu Road, Centaur Hotel
	Indira Nagar	Juhu Road, Palmgrove, Gandhi Status
	Kripa Nagar Dhobighat	Gulmohar Road, jn. Wirwlvss Road
	Irla Gaothan	Santacruz garage, S.V. Road
	Gilbert Hill	Link Road, jn. Andheri Versova Link Road
L ward	Almeda Baug slum, behind Sheetal cinema, Kurla (W)	S.G. Barve marg, Jn of L.B.S. marg, Kurla (W).
	Taksha sheela nagar, Kurla (E)	Sonapur lane, Kurla (W).
	Slum along Patel wadi nalla, Kurla(W)	Sunder baug lane, Kurla (W).
	Bhartiya nagar, Achanak nagar, along railway track, Kurla(W)	Kajupada pipe line junction with Kale marg, Kurla (W).
	Following slums at Parigh khadi along the banks of the Mithi river :	
	Lokmanya nagar	Vidya vihar rd, Kirol road, near Premier Co. Kurla (W).
	Uday nagar	Pipe line road, Kurla (W).
	Milind nagar	Akash lane, Kurla(W)
	Muran nagar	Kurla station, Kurla (W).
	Tanaji nagar	Shivshrusthi, 60' D.P. rd, Kurla (E).
	Kranti nagar	Chunabhatti along railway line, Kurla (E).
	Jarimari	Swadeshi mill, Kurla (E).
	Kismat nagar	
M/E ward	Matang Rushi Nagar	Deonar Municipal Colony
	Walmiki Nagar	Bharat Nagar, Transit Camp, Near Mankhurd Railway Station (West)
	Ekta Nagar	
M/W ward	Postal Colony	Amar Mahal Jn. Eastern Express High Way
	P.L.Lokhande marg	V. N. Purav Marg
	Vatsalatai Naik nagar	R.C. Marg
	Sindhi colony	10th Road
	Collector's colony	15th Road
	Munjaj nagar	N.G. Acharya Marg
		Shell Colony Road

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Ward	Flood prone slum areas	Other flood prone low-lying areas and roads
N ward	Narayan Nagar, L.B.S.marg, Ghatkopar (W)	L.B.S. Road junction Chiragnagar, Ghatkopar (W)
	Kirol village, Vidyavihar (W)	Gangawadi signal (Gangawadi nallah) L.B.S. marg, Ghatkopar (W)
	Laxmi nagar, Ghatkopar Andheri Link road, Ghatkopar (W)	Damodar park, L.B.S. marg, Ghatkopar (W)
		Pooja hotel, M.G. road, Ghatkopar (E)
		90 feet junction & Hingwala lane (During high tide only)
		Seven pipe culvert, Pant nagar, Ghatkopar (E)
		Market road, Pant nagar (During high tide only) Ghatkopar (E)
		Rajawadi 'D' colony (Heavy rains), Vidya vihar (E)
		Premier road, Vidya vihar (W)
		R.N.Gandhi school, 7th road, Rajawadi, Vidyavihar(E)
		Garodia nagar, Ghatkopar(E)
		Chittaranjan nagar, Ghatkopar(E)
		7 th Rajawadi road, Ghatkopar(E)
P/N ward	Valani - Malad West	In Malad (West) :
	Malawani - Malad West	Underai Road Jn. of S.V.Road
	Kachpada - Malad West	S.V.Road (Near Shankar temple)
	Kurar Village - Malad East	S.V.Road (Near Natraj Market)
	Pushapa Park - Malad East	Mamlatdarwadi Main road Junction of S.V.Road
	Bandongari - Malad East	S.V.Road (Near N.L.High School
		Marve Road (Near Nutan School)
		Marve Road (Near Rahul Apartment)
		Sunder Gulli junction of Link road
		Link Road (Guddiya Pada)
		Adarsh Road junction of Ramchandra lane
		Ayojan Nagar
		Nahar Nagar (Near Culvert)
		Sainath Road (Near sub-way)
		Somwar Bazar (Near Maruti Temple)
		N.L.Road (Near Ganga Niwas)

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Ward	Flood prone slum areas	Other flood prone low-lying areas and roads
		Valnal Hutment colony
		In Malad (East) :
		Dhanajiwadi
		Khot kuwa wadi (Near P.S.C.)
		Rani Sati Road (Khatiya wadi chowk)
		Subhash lane Junction of Daftari road
		Junction of Dattamandir road to Khanwala lane
		Subway Malad Western Railway
		Kurar Village (Jain Mandir)
		Jitendra Road (Near Tabela)
		Rani Sati Road (Dahyabhai Patel Road jn.)
		Ramesh Nalla (Hanuman nagar nalla)
		Jn. of Kedarmal road
		Vaishetpada road No.2
		Govind nagar, Chincholi Phatak near Dhobi Ghat.
P/S ward	Prem Nagar (Siddharth Rameshwar Nagar), Goregaon (W)	Garden Hotel, Link Road, Goregaon (W)
	Bhagat Singh Nagar 1 & 2, Goregaon (W)	Haral Kutir, Near Chincholi Bunder Road, Goregaon (W)
	Ettbhatti, Goregaon (E)	Pawan Baug Nalla and S.V. Road, Goregaon (W)
	Santosh Nagar, Goregaon (E)	Sunder Nagar, S.V. Road, Goregaon (W)
		In Boundary of Aarey Road & Station Road, Goregaon (W)
		B.E.S.T. Depot, Goregaon (W)
		Motilal Nagar, Goregaon (W)
		Near B.E.S.T. Colony, Goregaon (W)
		Sharma Industrial Estate, Goregaon (W)
		Nirlon Industrial Estate & Walbhat Road, Goregaon (E)
		Walbhat River & Highway, Goregaon (E)
		I. B. Patel Road, Goregaon (E)
		Near Railway Station, Goregaon (E)
		Kotkar nalla, Gogate Wadi, Goregaon (E)
		Chincholi Goregaon- Mulund Link Road, Goregaon (E)

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Ward	Flood prone slum areas	Other flood prone low-lying areas and roads
		Ram Mandir Road, Goregaon (W)
		Unnat Nagar Municipal School, Goregaon (W)
		Gaondevi Slum Link Road, Goregaon (W)
		Udyog Nagar, Service Road
		Chronic flooding spots :
		Sunder Nagar Nalla jn. of Pawan Baug Nalla, Goregaon (W)
		M.G. Road, Goregaon (W)
		Jawahar Nagar Road No. 2 & 3, Goregaon (W)
		S.V. Road & Jawahar Nagar Road No.2, Goregaon (W)
		Jawahar Nagar Road No. 1, Goregaon (W)
		Shrirangs Marg & Siddharth Nagar Road No.2, Goregaon (W)
		M.G. Road jn. of Link Road, Goregaon (W)
		Ram Mandir Road, Goregaon (E)
		I.B. Patel Road jn. of J. P. Nagar Road, Goregaon (E)
		Squarier Colony, Near Railway Crossing, Goregaon (E)
		Chincholi Railway Crossing, Goregaon (E)
		Nandadeep Nalla, Goregaon (E)
		Service Road Nalla, Goregaon (E)
R/N ward	Babali Pada, Near subway, Dahisar (E)	Behind Laxminarayan Temple Road and Behind Gagangiri Building, Eksar, Borivali (W)
	Near Matru Mandir School, Shivaji Road, Dahisar (E)	Roshan Nagar, Roshan Nagar Road, Off Chandawarkar Road, Borivali (W)
	Gahartan Pada, Near Vaishali Nagar, Dahisar (E)	Gorai - II, Sector No. 2, 3, 5, 6, R. D. P. - 1 Road, Borivali (W)
	Rawal Pada, Dahisar (E)	Mhatre Nala at Ravaji Premji Apt. Mhatre Wadi, S.V. Road, Borivali (W)
	Jai Santoshi Maa Nagar, Rawal Pada Road, Dahisar (E)	Main Kasturba and 7th Carter Road, Borivali (E)
	Maroti Nagar Back side, Shiv Vallabha Road, Dahisar (E)	
	Shiv Vallabha Road, Near Western Express Highway, Dahisar (E)	

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Ward	Flood prone slum areas	Other flood prone low-lying areas and roads
	Kokani Pada, Maroti Nagar Road, Dahisar (E)	
	Kaju Pada, Kaju Pada Road, Dahisar (E)	
	Devi Pada, Near Western Express Highway, Borivali (E)	
	Lalji Pada, Behind Magathane Depot, W. E. Highway, Borivali (E)	
	Sukarwadi, M. G. Road, Borivali (E)	
	Nutan Nagar, Harijan Wada, L. T. Road, Borivali (W)	
	Babhai Gaonthan, L.T. Road, Borivali (W)	
	Ambedkar Nagar, Link Road and Kasturpark Road Junction, Borivali (W)	
R/S ward	Ram Nagar, Kandivli (West)	Poisar Nalla (Poisar village to laljipada)
	Sunder Nagar, Kandivli (West)	Dahanukar wadi, Kandivli (West)
	Sai Nagar, Kandivli (West)	Babrekar Nagar, Kandivli (West)
	Laljipada, Kandivli (West)	Ganesh Nagar, Kandivli (West)
	Santosh Nagar, Iraniwadi, Kandivli (West)	Sai Nagar, Kandivli (West)
	Ekta Nagar, Mahavir Nagar, Kandivli (West)	Charkop Sector 1 & 2 , Kandivli (West)
	Babrekar Nagar, Kandivli (West)	Bunderpakhadi, Kandivli (West)
		Ram Nagar, Kandivli (East)
S ward	Ekveera Nagar, Kanjur (E)	Fitwel Industries, L.B.S. Marg, Vikhroli (W).
	Jai Santoshi mata Nagar, near last Bus Stop of Bus No. 353, Vikhroli(E)	Junction of Vikhroli-Jogeshwari Link Road and L.B.S.Marg, Gandhi Nagar, Junction.
	Harlyali Village, Vikhroli(E)	Opp. Kanjur Railway Station (W), Laxmi Udyog Bhavan
		Opp. Bombay Oi1 Mill, L.B.S. Marg, Bhandup (w)
		Maharashtra Nagar, Quarry Road, Bhandup (w)
		Along Kokan Nagar, near Culvert. Bhandup (W)
		Gamdevi Road and Khot Road junction, Bhandup (W)
		Bhattipada, National High School, Bhandup (W)
		Kastury Vidyalaya, Village Road, Bhandup (W)

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Ward	Flood prone slum areas	Other flood prone low-lying areas and roads
		Usha Nagar, Village Road, Bhandup (W)
		Sub-way, Filterpada, Powai near Powai Garden
		Jolly Board Co., near Mansukh Dyeing Co., Kanjur (E)
T ward	Ashok Nagar, Sarojini Naidu Road, Mulund (West)	Subway Across Central Railway Tracks at Mulund.
	Lande wadi, Opp. Dindayal Upadhyaya Margm Mulund (West)	Sarojini Naidu Road, near Shanti Industrial Estate, Mulund (West)
	Gavanpada Gaothan, Near Mukund Society, Mulund (East)	Landewadi, Mulund (West)
	Nanepada Gaothan, Opp. Nanepada Road, Mulund (East)	Railway Station, Mulund (East & West Side)
		Panch Rasta Jn., Mulund (West)
		Devidayal Road, Mulund (West)
		P. K. Road, Mulund (West)
		Indira Steel yard, Mulund (West)