Annex II

Nomination form for cities and local governments to participate in the campaign

Please send the nomination form and the mayor's letterto isdr-campaign@un.org. Nominations will be accepted on an ongoing basis throughout 2010-11.

City / Local Government (Please indicate the year the numbers were provided.)	
City name	Mumbai
Location (short description)	Mumbai is located on the western seaboard of India, in the state of Maharashtra, between 18° 53' and 19° 19' north latitude and between 72° 47' and 72° 59' east longitude.
Size (year)	437.71 km2
Population (year)	2001 census: 11,914,398 2009: Estimated population 14,383,998 (Govt of Maharashtra)
GDP	2008-09: INR 152,961 (Dept of Economic Statistics, Govt of Maharashtra)
Hazard type(s)	1) Hydrological & Climatological Disasters 2) Geological Disasters 3) Epidemics 4) Human induced disasters 5) Chemical & Industrial Disaster 6) Accident Related Disasters
Name of Mayor / Commissioner / Governor / Community leader	
Mayor - Mrs. Shraddha Jadhav / Municipal Commissioner - Mr. Subodh Kumar, IAS	
Which part of the city administration will be the focal point for the Campaign?	
Mumbai Island City & Mumbai Suburban District	
Contact details Focal Point	
Name	Mr. Mahesh Narvekar
Function	Chief Officer (Disaster Management Cell, Municipal Corporation of Greater Mumbai)
Address	Disaster Management Cell, Basement, Annex Building, Municipal Head Office, Mahapalika Marg, Opp. CST Railway Station, Mumbai - 400 001
Email	narvekar_mahesh@rediffmail.com; ccrsdmp@gmail.com
Telephone	91-022-22694725, 91-022-22694725, 91-022-22704403
Fax	91-022-22694719
Which local institutions will be engaged in the Campaign? (In addition to the local government.)	
In addition to Municipal Corporation of Greater Mumbai (MCGM), 105 local agencies will be engaged in the campaign including police, fire agencies, India Meteorological Department, Indian Railways, Indian Defence Services, Disaster Response Forces, Service Providers (electricity, telecommunications, transport, gas),	

Development Agencies (Mumbai Metropolitan Region Development Authority, Maharashtra Housing and Area Development Authority, Maharashtra Industrial Development Corporation, Maharashtra State Road Development Corporation), Relevant Departments of the Government of Maharashtra (Health Services , Medical Education, Industrial Safety & Health, Food and Drug Administration), Collectorate, Municipal Corporation of adjoining cities (Kalyan-Dombivali, Mira Bhayander, Navi Mumbai), University of Mumbai, Non-Governmental Organizations, Civil Defence, Home Guards and media.

Major Disaster Risks
(Please indicate major disasters that have occurred, prevailing hazards and vulnerable conditions.)

Major Disasters that have occurred in Mumbai:

1. August 17, 2010: Collision of two cargo ships resulting in spillage of nearly 800 tonnes of crude oil off the Mumbai coast. Oil residue was observed in the sand upto six inches deep in the beaches at Uran, Elephanta, Alibaug, Sasavane and Mandwa. Mangroves off Mumbai's coast were blackened and about 1273 hectares of mangroves (60-65 per cent of the total mangrove cover in Greater Mumbai) were completely covered by oil. Fish were contaminated and marine birds suffered from poisoning due to ingestion of oil which covered their feathers and respiratory organ failure.
2. July 14, 2010: Chlorine Gas Leak - more than 55 people taken ill.
3. August 2009: Swine Flu epidemic resulting in 22 deaths
4. November 26, 2008: Terrorist attack leaving 164 people dead and 308 wounded.
5. July 13, 2008: Building collapse resulting in 21 deaths
6. July 18, 2007: Building collapse resulting in 29 deaths
7. July 11, 2006: Serial bomb blasts in suburban trains resulting in 156 deaths
8. July 26, 2005: Unprecedented rainfall of 944 mm in 24 hrs resulting in inundation of over 60 % of the city. Failure of sewage pumps led to backflow of sewage into the storm water. The transport and communication system of the city totally collapsed. At least 419 people (including 81 people killed in several landslides) and 6307 animals lost their lives. In addition, 216 people died due to the various deluge-related epidemics. 2000 residential buildings were fully damaged while 50,000 were partially damaged and 40,000 commercial establishments suffered heavy losses.
9. August 3, 1998: Building collapse resulting in 35 deaths
10. September 16, 1997: Building collapse resulting in 19 deaths
11. April 17, 1997: Building collapse resulting in 18 deaths
12. March 7, 1996: Building collapse resulting in 29 deaths
13. May 17, 1993: Spilling of large quantities of crude oil into the sea on about 80 NM from the shoreline north of Mumbai due to a rupture in a feeder 'riser' pipeline from Bombay High- North Platform resulting in marine pollution
14. March 12, 1993: Serial bomb blasts resulting in 250 deaths
15. December 1992: Communal riots resulting in 900 deaths

B. Prevailing Hazards and vulnerable conditions:
The following hazards have impacted or may potentially impact Mumbai:

1. Hydrological and Climatological Disasters
   a. Floods
   b. Cyclones
   c. Cloud Bursts
   d. Sea Erosion
2. Geological Disasters
   a. Earthquakes
   b. Landslides
3. Chemical, Industrial & Nuclear Disasters
4. Accident Related Disasters
   a. Fires
   b. Oil Spills
   c. Major Building Collapses
   d. Festival related Disasters

e. Air, Road & Rail Accidents
5. Epidemics
a. Malaria
b. H1N1
c. Gastroenteritis
d. Tuberculosis
e. Leptosporosis
Mumbai is also a target for human-induced disasters such as bomb blasts, terrorism and riots.

Vulnerabilities of Mumbai:
1. Concentrated Political, Economic and Other Resources
2. Multiple agencies are responsible for the governance of the city
3. Insular location
4. Physiographic constraints resulting in limited land supply and consequently very high density of population and exorbitant property prices.
5. Large tracts of reclaimed land due to which landfill areas have high risk of liquefaction during an earthquake.
6. Rainfall characteristics which make the city prone to flooding, particularly when heavy rainfall coincides with high tide. There are 266 flooding spots within the city, of which 55 are chronic flooding spots.
7. 170 km long coastline with 57 slum settlements within the high tide line.
8. According to IS-1893 Mumbai lies in seismic zone III and has moderate risk to earthquakes.
9. Economic polarization with 40% of the households in Mumbai below the poverty line.
10. 50-60% of the population living in slums
11. Quarrying of hills
12. High levels of spatial concentration of population
13. 6.3 million commuters travelling on the Mumbai Suburban Railway network - the highest commuter density in the World.
14. Building stock comprising a mix of several different building technologies. Almost 90% of the buildings located in the 'A', 'B' and 'C' wards in Island City are dilapidated - many in a state of imminent collapse.
15. Inadequate transport facilities with no redundancy in the existing systems. The existing transport network is composed of long unidirectional corridors without adequate alternatives to fall back on in case these arterial communication lines are severed.
16. Utilities like water supply, sewerage systems and garbage collection and disposal deficient, and health services are inadequate. Mumbai's water supply depends on several rain fed lakes so increasing rainfall variability could threaten local supply.
17. Presence of hazardous industries – the eastern suburbs has a cluster of two oil refineries, a petro-chemical complex, a fertiliser plant, a thermal power unit, and the Bhabha Atomic Research Centre.
18. Over 750 hazardous substances are stored in different parts of the city.
19. Proximity to Bombay High and the presence of two ports makes Mumbai highly vulnerable to marine pollution.
20. Uncontrolled development has resulted in wanton destruction of mangroves and haphazard and unregulated reclamation of the sea-coast.

Achievements and plans in relation to the ten essentials areas

*A -Make an estimation of the **status** per essential as follows:*
1 - poor/nothing in place, 2 - some progress in place, 3 - in place, well functioning, or N/A
*B - Please describe main areas of **progress** and **achievements**.*
*C - Please identify **activities** and **plans** your city will pay special attention **to improve the current situation** during the campaign and beyond. Additionally, feel free to propose special events or activities your city would like undertake to raise awareness on disaster resilience. Please select the respective Essential(s).*

Essential 1 – Risk reducing organization and coordination in place	Status -3

Progress and achievements –
Risk reducing organization and coordination in place:
A. Greater Mumbai Disaster Management Authority:
The Disaster Management Authority for Mumbai and Mumbai Suburbs was constituted under section 25 (1) of

Disaster Management Act 2005 vide a resolution passed by the Government of Maharashtra on January 19, 2011. The Municipal Commissioner is the ex-officio Chairperson and the Additional Commissioner (Disaster Management), Municipal Corporation Greater Mumbai is the Secretary of the Greater Mumbai Disaster Management Authority. The other members include the Commissioner of Police, Vice President and Additional Commissioner of Maharashtra Housing and Area Development Authority, General Managers of Central and Western Railways and the Collectors of Mumbai City District and Mumbai Suburban District. In addition there are eleven special invitees on this Authority from local agencies involved in disaster management.

B) Emergency Support Functions (ESF):
In April 2009, the Disaster Risk Management Master Plan (DRMMP) project was undertaken by MCGM in collaboration with Earthquake Megacities Initiative (EMI). Through DRMMP, an analytical model based on international standards, mainstreaming Disaster Risk Reduction (DRR) at the local level has been initiated through a coherent set of policies, strategies and actions. The collaborative and participatory planning process adopted aims at ensuring consensus and ownership among the stakeholders and enabling long term institutional sustainability.
The Emergency Support Functions (ESF) concept has been adopted to provide a systematic and efficient system to organize the several stakeholders that are engaged in disaster risk management, to provide them with a methodology for sharing knowledge and resources and to work efficiently to address the challenges of preparing, responding and recovering from any emergency situation. 14 ESFs have been formulated, each of which is headed by a lead agency and is supported by identified support agencies. The ESFs form an integral part of the Emergency Operation Centers (EOC) and each ESF will coordinate its activities from the Municipal Corporation of Greater Mumbai Emergency Operations Center.
In the period immediately after a major disaster or emergency requiring response, the lead agency will take actions to identify requirements and work with the support agencies and other ESF's to mobilize and deploy resources to the affected area in Mumbai. To reduce disaster risk each ESF plans and prepares for emergencies through reviews of the planning assumptions, drills, table top exercises and preparation and reviews of the Standard Operating Procedures.
For developing the ESFs a series of meetings, consultations and discussions took place between the Lead Agencies, Support Agencies, and the MCGM Disaster Management Unit, supported by EMI emergency management experts. These consultations provided a reality-check from the various agencies engaged in each ESF and ensured that all those involved understand and contribute to the development of each ESF.

Plans – On the basis of the ESFs, table top exercises are being conducted and hazard specific Standard Operating Procedures will be prepared which will be validated by conducting mock drills. Thus disaster risk management (DRM) practice will be institutionalized in MCGM and the stakeholders and a competent emergency management system will be established in Mumbai with international standards of practice.

Essential 2 – Budget assigned	Status- 3

Progress and achievements–The estimated budget based on the above tasks and effort is US$2,510,073 .

Plans–
It is planned to put together a team of experts to undertake a scientific analysis of fire hazards and fire risks in Mumbai and to develop a Mumbai Fire Mitigation Plan that would provide the foundations for reducing the fire risk to the population, infrastructure, ecology and economy of the city. Though MCGM has one of the most sophisticated and trained fire brigades in the country, the knowledge of assessing fire hazards and fire risk is highly specialized and will need a sophisticated scientific approach that is not currently available in India. The estimated budget for this project is US$2,510,073

Essential 3 – Risk assessment prepared	Status- 2

Progress and achievements–
Seismic Risk Assessment of Mumbai
Seismic Risk Assessment has been done including evaluation of seismic hazard, vulnerability of structures, exposure and finally loss estimation. A scenario earthquake of moment magnitude 6.5 has been considered. Mumbai will experience MSK intensity VII and VIII for the moment magnitude 6.5 earthquake. Shaking

intensity in a given area reflects the local surface geology, as ground motion intensities vary in part due to these geological properties.
The percentage of loss in total value corresponding to different damage intensities for each building type is obtained from loss functions which are based on the data available from previous earthquakes.
Exposure Analyses based on two main analyses namely, the Population and Property Analysis was carried out. In the population analysis the total population of the region that is exposed to the earthquake was evaluated and distributed grid-wise to different building types, taking into consideration fluctations in population between day time and night time. Several types of damages and losses were calculated included:
1. Physical damaage to buildings by type in aggregate and by ward
2.Corresponding economic losses
3. Social losses including deaths, injuries and displaced people by ward

The losses assume several scenarios for daytime or nightime as population shifts significantly between the two. A framework for earthquake risk management was developed and integrated in the DRMMP.

The Earthquake Risk Assessment provides the elements for preparing the city for earthquake risk, but also to provide the parameters for developing a risk sensitive land development and land management systems.

Similarly, a city-wide scientific analysis of flood hazards for the city was completed that provide physical and social losses at a high resolution for the city. Comparison of risk between wards enables adequate preparation and distribution of resources. The Flood risk assessment management framework is produced and incorporated in the DRMMP

In addition, 154 landslide prone areas have been identified in the city where more than 3 Million citizens live in 19000 informal hutments.

16,000 dilapidated buildings are identified where more than 5 Million people are residing

Plans–
Urban Fire Hazards and Risks Assessment and Mitigation for Mumbai
A. Fire Hazards to be Investigated and Approach
The scope of the project will cover the following sources of fire are of interest to MCGM:
1. Residential and High Occupancy fires
2. Transport of hazardous materials
3. Industrial fires
4. Fire-following earthquake

The project will be undertaken under a Project Implementation Team (PIT) The stakeholders will be organized into a Fire Management Focus Group, which will be headed by an officer designated by the Fire Brigade and which will serve as both a resource and a validation group to the project.

Proposed Tasks
Task 1: Project Organization
Task 2: Discovery and Data collection
Task 3: Data Analysis and Integration in GIS System
Task 4: Hazards Analysis
Task 5: Consequence Analysis
Task 6: Review of Legal, Policy, and Technical Provisions
Task 7: Gap Analysis Relative to International Standards
Task 8: Fire Mitigation Plan
Task 9: Fire Emergency Response Plan
Task 10: Training and Capacity Building
Task 11: Cost Estimation of Implementation of Mitigation Plan
Task 12: Implementation Support
C. Project Schedule and Budget

A total project implementation time of 21 months is planned to complete the project.

Essential 4 – Investment in risk reducing infrastructure	Status- 3

Progress and achievements–
1.BRIMSTOWAD Project
A. Measures initiated to mitigate flooding of rivers:
I) Mithi River (length 17.9 km)
Project cost to date: US$ 93.36 Million
Budget Provision 2011-2012: US$ 15.71 Million (Please include original depth and todays depth)
Measures initiated to mitigate flooding:
a)The river has been deepened by an average of 1.5 meters along its length. Over 300,000 cubic meters of silt and almost 500,000 cubic meters of hard rock have been excavated from the river bed.
b) Construction of a 7.4 km long RCC retaining wall and a 25 meter long and 4.5 meter high weir to discharge water slowly from the river during periods of heavy rainfall.
c) Creation of a holding pond for flood protection in its micro-catchment
d) Widening of the river to widths ranging between 25-100 meters. 5000 structures were demolished for this.

II) Dahisar River (length 12 km)
Project cost to date: US$ 6.17 Million
Measures initiated to mitigate flooding:
a) Widening & Training of 1800 meters.

III) Poisar River (length 7 km)
Project cost to date: US$ 14.82 Million
Measures inititiated to mitigate flooding:
a) Widening & Training of 3550 meters .

IV) Oshiwara River (length 7 km).
Project cost to date: US$ 6.08 Million
Measures inititiated to mitigate flooding:
a) Widening & Training of 3 watercourses.

B. Bridges on Mithi River: Construction of 11 bridges for storm water passage through the Mithi River system is being carried out, of which four bridges are underway.
Budget provision of US$ 4.04 Million.
Date of completion: May 2012

C. Storm water drainage system: It is being upgraded for rainfall intensity of 50 mm/hr with run-off co-efficient one from the present system which has a rainfall intensity of 25 mm/hr and run-off coefficient 0.5.
Budget provision 2011-12: US$ 274.34 Million
The works include:
a) i) Restoration of decades old arch drains in city area to minimize water logging and avoid road subsidence.
Estimated time of completion: 2013
ii)Construction of nallas:
40,440 mtrs. of nallas were constructed in 2010-2011. An additional 31,818 mtrs. of nallas are proposed for construction upto 31 March 2012.
b) Designing and construction of four storm water pumping stations and comprehensive operation and maintenance at sea outfalls to prevent water logging.
Two of the storm water drain pumping stations were commissioned in 2010 for which an expenditure of US $ 32.65 Million (INR) was incurred.
In 2010-11 construction of the remaining two pumping stations will be undertaken. The estimated cost for this project is US$ 26.55 Million and a budget provision of US$ 3.65 Million has been made for these works in 2011-2012.

D. Contour Mapping
For planning and designing an effective drainage system the 1991 contour maps which contain limited information and are obsolete are currently being updated using LiDAR (Light Detection And Ranging) technology. All the ground features will be plotted on a scale 1: 1000 and the topography of the city or terrain will be presented in the contour plan of 0.5m contour interval.

2. Installation of 196 dewatering pumps at 189 flood prone locations during the 2010 monsoon at a cost of US$ 2.65 Million.
3. Improvement of asphalt roads and concretization of roads: budget provision of US$ 110.62 Million for 2011- 12.

4. Area Traffic Control: 257 traffic signals in the city have been improved a budget provision of US $ 2.10 Million is proposed for another 250 projects. In addition, US $ 36.66 Million has been budgeted in 2011-12 for construction of bridges and subways for crossing the road as well as repairs and improvement.

5. Rail Over Bridges: A provision of US $ 11.06 Million has been budgeted in 2011-12 for the construction of two Rail Over Bridges Bridges.

6. Mono Rail Project: To support the public rapid transit system as well as to cover areas not serviced by them and areas where widening of roads is not possible due to structures on either side a light weight Mono Rail is being constructed. As compared to other systems the monorail produces less noise and is eco-friendly (it will reportedly save 200 tons of CO2 per day).

7. Mumbai Metro Project: It is being constructed to provide a rail based mass transit connectivity to people within an approach distance of 1 to 2 km and to serve the areas not connected by the exisiting suburban rail system.

8. To mitigate the problem of urban decay the island city development control regulations have been modified to facilitate their redevelopment.

9. 154 landslide prone areas have been identified in the city where more than 3 Million citizens live in 19000 informal hutments. To date, US $ 17.23 Million have been spent to date for construction of Gabrian wall and retaining walls to protect the hutments from landslides.

10. Slum Redevelopment Scheme: In 1995, the Slum Rehabiliation Authority, an autonomous body, was instituted under the chairmanship of Chief Minister for redevelopment of slums. To date 1463 projects have been sanctioned and 809 projects have been completed.

Plans–
1. Widening, deepening and reconstruction of nallas in M-West and N wards of Mumbai Suburban District.
2. Rehabilitation of old Box/Arch storm water drains in City area.
3. Repairs & Construction of Boran Nalla at Shastri Nagar to Western Express Highway Pipe outfall, Bandra (West) in H/West Ward.
4. Construction of storm water pumping stations at Cleaveland, Love Grove, Britannia Outfall, Reay Road, Gazdharbund and Mogra nullah and Mahul Creek.
5. Rehabililtation of the slum dwellers in flood prone areas.

Essential 5 – Safe schools and health facilities	Status- 3

Progress and achievements–
Safe Schools:
MCGM provides primary education to 469,887 students in 1013 buildings. Since 2007 the Corporation has spent US $ 28.09 Million to repair 57 buildings. Repair of 122 buildings are in progress.
Primary and secondary education is also provided in 1074 private school buildings. It is mandatory that every five years these buildings are certified by structural engineers for structural safety.

For fire safety cooking is prohibited within the school premises. It is obligatory for every school to provide fire extinguishers at appropriate locations and to keep passages and staircases clear.

It is mandatory for all schools to prepare a Disaster Management Plan which involves the staff, student representatives, parent representatives, local police and municipal officers, hospitals, Civil Defence etc.

The objectives of the Disaster Management Plan are:

1. To inculcate a culture of Preparedness.
2. To develop Standard Operating Procedures for the School to meet various emergencies.
3. To evaluate the DM Resource Status of the School.
4. To coordinate the activities of various DM teams for their optimum utilization during an emergency.
5. To institutionalize DM structure in the schools.
6. Identify gaps and improve the Resource Capabilities to face actual disasters.

The plan components include:

a) Hazard Identification

b) Safety assessment - i) Structural assessment ii) Non-structural assessment iii) Resource inventory

c) Response plan - i) Mitigation of hazards identified ii) Evacuation plan iii) Special provisions for handicapped

Mock Drills on various types of disasters are conducted twice a year and the Plan is updated annually.

2. Health Facilities:

The three tier health care system of Municipal Corporation of Greater Mumbai comprising 163 Dispensaries, 182 Health Posts at the primary level, 16 Peripheral hospitals and 5 Specialised Hospitals at the secondary level and the 4 Teaching Hospitals are being strengthened.

US$ 5.53 Million has been allocated in the budget for 2011-12 for modernization and up gradation of dispensaries in order to provide enhanced and uniform primary health care services to citizens in their neighbourhood.

US$2.21 Million has been budgeted for commissioning of an ICU ward at KMJ Hospital at Vikhroli and the establishment of Trauma wards in 3 peripheral hospitals as well as for extensive repairs of 2 hospitals.

A linkage system is being established between the tertiary and secondary health care service level to ensure quality, specialized health care in the peripheral hospitals.

626 new beds are being provided in the peripheral hospitals for which a budget provision of US$ 45.80 Million has been made in 2011-12.

Major hospitals have Emergency Medical Services in place.

Prior to the monsoon fogging and disinfection programmes are carried out.

A central control room and an epidemic control unit at Kasturba hospital is commissioned prior to the monsoons and sufficient quantities of drugs, surgical equipment and insecticides are stocked in the Municipal Health Posts.

1000 beds are reserved for water borne diseases in major and peripheral hospitals.

As an example of the services rendered by major Municipal hospitals the statistics for Lokmanya Tilak Municipal General Hospital (from 5th May 2003 to date) are given below:

1. Total patient attendance – 60,000
2. Observation ward admissions – 38,374
3. Total Surgeries done – 10, 000 - 12,000
4. Mass Casualties have been managed for the following disasters: bomb blast, vehicular/railway accidents, natural calamities, house collapse, explosions, alcoholic poisoning, food poisoning and gang wars
5. Total trauma cases: Major = 2500 – 2800; Minor = 10,000 – 12,000; Total trauma admissions = 17,000 – 18,000

Plans–

1. Development of Health infrastructure in vulnerable areas and promoting prevention through primary health care.
2. Formation of Rapid Response Teams at ward level and at regional level with experts from medical colleges and public health department.
3. Development of Standard Operating Procedures for control of vector and water borne diseases as well as evolution of guidelines and by laws for involvement of stakeholders.
4. Develoment of GIS based alert system and database for studying the pattern of epidemics.
5. Policy and strategy for involving private health sector for notification of dieseases under epidimic act / MMR

act.
6. Preparing Standard Operating Procedures at ward level for relief measures during disasters.

Essential 6 – Risk-compliant building regulation and land use applied	Status- 3

Progress and achievements–

Risk-compliant building regulation applied:

The National Building Code of India (NBC) lays down a set of minimum provisions designed to protect the safety of the public with regard to structural sufficiency, fire hazards and health aspects of buildings. The adoption of the code is done through Development Control Regulations (DCR). Accordingly, DCR MCGM is prepared on the lines of NBC. Any revision in code or new addition in code is adopted by modification in DCR as per section 37of MR&TP 1966 Act.

For fire safety various provisions and requirements from the fire safety point of are enumerated in Development Control Rules based on the National Building Code. It is mandatory to obtain a No Objection Certificate (NOC) from the Chief Fire Officer, Fire Brigade (CFO) for buildings above 29 m in height and special types of buildings such as Industrial Estates, Service Industrial Estates, Industrial (Factory) Building, Storage and Warehouse Buildings, Cinema/ Theatre, Shopping Centre, Residential Hotel Buildings etc. To ensure compliance, a final NOC by the CFO is issued before granting the Occupation Certificate. Subsequent to Occupation/ Completion Certificate, the maintenance and operation of fire protection systems are to be periodically checked by the CFO.

In the case of structural safety and services code provisions whenever there is insufficient evidence of compliance with the provisions of the Regulations or evidence that any material or method of design or construction not conforming to the requirements of the Regulations, the Commissioner may require tests, sufficiently in advance, as proof of compliance. These tests shall be made by an approved agency at the expense of the owner.

Zone 3 Earthquake code provisions are applicable to Mumbai.

Risk-compliant land use applied:

The process of preparation of Development Plan and regulating development of land are governed by the Maharashtra Regional and Town Planning Act 1966. MCGM prepares a detailed Development Plan for the city within the framework of the Regional Plan.

All applications for Development are examined for conformity of the proposed development with the Development Plan and the DCRs. For examining other aspects of development / construction, the administrative system has adopted two pronged strategy. Where expertise and organizational capacity exists within MCGM a No Objection Certificate from the concerned department of MCGM is required to accompany the application of development. Where such capacity does not exist, registered or licensed professional are required to be engaged for designing and supervising the execution of proposed development. In special cases committees are appointed to review individual proposals for development. At present two such committees are in place viz. Heritage Committee and High-Rise Buildings Committee.

To ensure prevention of disasters, proposed developments require clearances from external agencies like Railways, Civil Aviation, Controller of Explosives, Maharashtra Pollution Control Board, Ministry of Environment & Forest etc.

For flood protection every project or proposal owner or developer has to obtain a No Objection Certificate from the Storm Water drain department of MCGM. In the case of development of individual buildings or premises, considering the topography of Mumbai, the minimum formation or ground level of the plot is required to be maintained at 28.04 m Town Hall Datum (i.e. 92') and is reflected in the conditions of Intimation of Disapproval (IOD) to be complied before grant of Commencement Certificate.

Plans–

1. To strictly enforce Indian Standard Building Codes and Practises for new buildings.
2. The Development Plan for Mumbai is being revised and it is planned to incorporate disaster risk reduction strategies.
3. MCGM has incorporated Act for mandatory structural audit to all the structures which have completed 30 years.
4. It is planned to examine slum issues from a broader perspective incorporating the technological with the

socio-political dimensions and risk parameters. This will include:

a. Incorporation of DRR in slum rehabilitation and upgrading, looking at protection through insurance, strengthening existing socio-economic networks, increased participation in disaster management planning and response activities. Special attention will be focused on slum areas at risk for flooding and other natural hazards through participatory processes that will meaningfully engage slum dwellers

b. Strengthening the DRR policies and practices within the Slum Rehabilitation Authority (SRA). This may include training of engineers and planners in DRR, particularly in Risk Sensitive Land Use Planning and Risk Sensitive Urban Redevelopment Planning.

c. Link private sector initiative in slum rehabilitation with provision of livelihood opportunities for slum dwellers to reduce their vulnerability.

Essential 7 – Education programmes and training in place	Status- 3

Progress and achievements -

1. Manuals for awareness generation of the community

a) Manual on First Aid

b) Manual on Mock Drill

c) Manual on School Safety

2. Training Programmes:

a) Disaster Preparedness programmes for schools and college students as well as for citizens. Details af the programmes are given below:

Sr. No.	Year	Particulars	No of Training Programmes	Total Participants
1	2007	D.M. Training	15	961
		Orientation	03	155
		Seminar	02	130
2	2008	Training	18	1236
		Orientation	06	935
		Seminar	01	75
3	2009	Training	53	3726
		Orientation	21	2407
		Seminar	01	45
4	2010	Training	40	3152
		Orientation	16	2520
5	2011(proposed)	Training	11	645
		Orientation	11	1175
		Grant Total	198	17162

b) Incident Command System training programme for Assistant Commissioners & Heads of the Departments.

c) Trainers Training rogramme for Disaster Management Control Room staff.

d) Ham Radio training programme for Disaster Management Control Room staff.

e) Training programmes for Disaster Management are regularly conducted for ward staff, police officials, private security personnel, NGOs and Nehru Yuva Kendra volunteers.

4) Mock drills:

Two mock drills on flood preparedness are conducted annually in each of the 24 administrative wards before monsoon when local police, fire brigade, civil defence, Railways, BEST, NGOs etc. are participating. Besides the Rashtriya Chemicals & Fertilizers, other corporates, Government organisations, police etc. are conducting regular mock drills with all responding agencies frequently. Most of the mock drills are observed by the representatives of National Disaster Management Authority.

5) Mumbai Emergency Management Exercises:
The Municipal Corporation in collaboration with a number of National & International organisations, UNDP conducted the Mumbai Emergency Management Exercises in 2008 and 2010 to strengthen the city's emergency response system through a series of trainings and workshops followed by a table top exercise and a field drill.
The following personnel were trained during this programme
a) Casualty ward nurses from public hospitals
b) Fire department paramedics
c) Life Supporters Institute of Health Sciences paramedics
d) Casualty officers from public & private hospitals
e) Schools superintendents from public & private schools.
f) Superintendents from MCGM / State / Private Hospitals
g) Agency heads of Police, Fire, Emergency Medical Services, Hospitals, Disaster Management Unit & Public Relations Officers and Media leaders.

6) Workshops / Exhibition:
a) A 2 day 'Mega-Exercise and Exhibition on Disaster Management, Tatpar Mumbai 2010' was held on 26th and 27th Feb 2010. Various stakeholders such as Government agencies, NGOs, business organizations and academic institutions displayed their products, programmes or services for Emergency Preparedness.
b) Asia Megacities Forum on "Reducing Urban Risk" was organised in association with National Disaster Management Authority, Government of Maharashtra, EMI and IIT Bombay in 2003 and 2008.

Plans–
1. To continue the above mentioned programmes.
2. City Institute of Disaster Management which will be a centre of excellence in urban disaster management. The objectives of the institute are:
a)To professionalise disaster risk reduction and emergency management in the State of Maharashtra by developing an independent cadre of professionally trained emergency and mitigation managers.
b) To work as a City Resource Center for the city administration in the city through effective knowledge management and sharing of best practices
c) To build working partnership with the Government, National and International universities, NGOs, corporate bodies and other National and International Institutes of eminence.
d) To develop a center of excellence in urban disaster mitigation and management.
Training motivation of health staff through periodic health workshops and seminar.

3. Information, Education and Communication for preparing the community for community participation.

Essential 8 – Ecosystems and natural buffers protected	Status- 2

Progress and achievements–
1. 1. Transport Management System
A. The Mumbai Urban Transport Project (Road Transport Component) was launched in 2003 with a commitment to improve the face of the city's public transport. One of the objectives was to reduce air pollution by easing traffic congestion and increasing vehicular speed on roads, providing 644 eco-friendly buses to Brihanmumbai Electric Supply and Transport (BEST) and installing state-of-the-art traffic signal system in the island city (around 250 junctions).
B. Conversion of a large proportion of the 4700 BEST buses to CNG.(From BEST)
C. Mumbai Metro Project:The metro is aims at becoming Asia's first Green Metro right from the construction stage.With a strong focus on environment, the project will only use technology that is environment-friendly. An environment impact assessment has been undertaken and the feasibility for the LEED (Leadership in Energy and Environmental Design Green Building Rating System, developed by the U.S. Green Building Council) certification is being explored.
D.Monorail Project:The monorail which is a light weight system produces less noise as compared to other

systems and is eco-friendly (it will reportedly save 200 tons of CO2 per day) and hence easily acceptable in dense residential locales. (From MMRDA)

E. Water Transport Project: This project will extend from Borivaliin the north to Nariman Point in the south, along the west coast of the city. In addition to alleviating congestion on the roads, the project is expected to reduce pollution and fuel consumption.

2. Waste Management

A. Scientific closure of the Gorai Dumping Ground (area – 19.6 hectares) where 2.34 million tons of waste had been collected upto an average ht of 26 m till Dec 2007. In the project high standards of compaction, cover, gas collection and leachate control and treatment; air quality, water quality, noise and odour control were ensured. The waste was Isolated from the coastal water body and a f Green Belt developed. The project captures and destroys methane emissions from anaerobic decomposition of the Municipal Solid Waste. It was registered with United Nations Framework Convention on Climate Change (UNFCC) on February 7, 2010. 1.2 million CERs will be generated over a period of 10 years and the total expected revenue generation for CERs is US $ 16.13 Million. MCGM received an advance of US $ 5.91 million for the 50% CER's sold until 2012.

B. Deonar dumping ground:

a. Scientific closing of 65 hectares.

b. 2000 tons per day of waste is being composted in a 55 hectare area.

c. A sanitary landfill and emergency sanitary landfill are other project components.

C. Mulund dumping ground: a bio-methanisation project comprising 5 units of 100 mtpd each has been initiated on 4 hectares.

D. The Kanjur site will be developed scientifically and have waste processing technology, composting, bio-methanisation, pelletisation and waste-to-energy plant.

E. Vermiculture within residential complexes is being encouraged, vegetable market waste is being diverted to gardens for vermiculture (currently 43 metric tons per day of market waste is being disposed at 24 sites) and rag pickers are being employed for house to house collection.

F. Advanced Locality Management programme was initiated in 1997 with the objective of mobilizing citizens in a participative approach in setting up a system for dealing with the problem of solid waste management in an environmental friendly manner. Currently there are 756 ALMs and about 5 tonnes of biodegradable waste is composted per day. Thus approximately 25-30 tons of garbage per day is prevented from reaching the dump yards. MCGM has also established vermi-compost projects on its own, one each in the eastern and western suburbs respectively, to demonstrate to the citizens, the benefits of vermi-culture technology. Organisation of the community, training, initiation and initial funding is done jointly by MCGM and residents.

3. Water Conservation & Management

A. Rainwater harvesting by capturing runoff from the rooftops/terraces and surrounding surface water to increase ground water recharge. In October 2002, MCGM initiated recharging of groundwater by making it mandatory for new buildings, having a plot area of more than 1,000 sq metres to have rainwater harvesting facility. In 2007, the same provision became mandatory for buildings having a plot area of more than 300 sq metres and above. To date 2,370 buildingshave set up such a facility since 2002 and 2938 buildings are in the process of implementing this facility. MCGM has budgeted INR 660 million (US$ 14.25million) in 2010-11 for rainwater harvesting on priority basis in its properties.

B. Recycling of grey water: On June 23, 2010 the law committee of the MCGM unanimously approved by-laws making recycling of grey water mandatory for housing premises with an area of more than 2,000 square meters, or premises that have more than 60 dwellings. The rule will also be applicable for all those buildings, societies and townships where the daily municipal water consumption is above 60,000 liters. It also applies to all new constructions as well as existing structures where the above criteria are applicable and have adequate space to create the wastewater collection and recycling plant. The aim is to limit the usage of municipal water only for potable purposes and save at least 200 million litres of water daily. In addition MCGM is setting up two recycling plants that will help recycle 250 million litres of water every day for non-potable purposes. The Ghatkopar plant will have a recycling capacity of 150 mld and the Bhandup complex will have a capacity of 100 mld. Though a budget provision of INR 52 million (US$ 1.12 million) has been made, it has been decided to implement the programme on Design, Build, Own, Operate and Transfer basis.

4. Cutting of trees is strictly prohibited. If a tree needs to be be cut for development purposes it is mandatory to plant 10 trees to replace it. A tree plantation programme is undertaken annually.

5. Mangroves are being conserved.

Plans–
1. To continue and strictly enforce the above practices.
2. To conserve gardens and open spaces.

Essential 9 – Early warning systems installed	Status- 3

Progress and achievements–
A. For early warning following systems are installed:
1. Doppler Weather Radar on the southern tip of Mumbai on top of tallest building which provides advance & accurate information on the cloud positions, height of the cloud, movement & direction of the cloud, water content, turbulence in the cloud. Six products of Doppler Weather Radar namely Plan Position Indicator(PPI) Reflectivity(Z), PPI Radial Velocity (V), Maximum (reflectivity) Display, Volume Velocity Processing (2), Surface Rainfall Intensity and Precipitation Accumulation are available on the departmental website.
2. To improve the response and determine the spatial and temporal variation of rainfall in real time, a network of 37 automatic weather stations at 31 locations with tipping bucket rain gauges has been setup in the city. The weather station also has a console capable of giving an audible alarm when the rainfall exceeds set up range of rainfall. Rain fall data is transmitted every 15 minutes. Flow Gauges have been installed upstream of Mithi River to monitor water flow and issue warning to the population living downstream.
3. A seismograph has been installed to observe seismic activity.
4. Satellite imageries of clouds are being received and interpreted.
5. Upper air observatory for wind direction, speed, humidity etc. at upper atmosphere levels.
6. For enhancing the forecasting ability synergie workstations have been installed which allow observation of different parameters on one platform.
B. Data received is being interpreted by well experienced professionals to provide early warning on impending rainfall, thundershowers, cyclones, wind speed, turbulence in the sky etc.
To disseminate the warnings well in advance the following measures have been taken:
1. Hot line connection has been installed with 64 different agencies placed throughout the Mumbai.
2. Very High Frequency (VHF) has been installed with 74 different agencies located throughout Mumbai.
3. Three digit toll free Disaster help line with 30 telephone hunting lines has been installed to provide information to the citizens.
4. Electronic display boards have been installed ----- at prominent locations to provide early warning to the citizens.
5. Electronic display boards have been installed in the public transport systems to provide early warning to the citizens.
6. Public Address System on Government vehicles has been installed.
7. Sirens have been installed at 200 locations throughout Mumbai.
8. On receipt of early warning of impending disasters the following actions are taken:
i) All authorities are informed
ii) Warning is disseminated to all Control Rooms.
iii)Warning to the public is relayed through:
a) Print & Electronic Media
b) Media such as FM Radio, TV Channels, Short Messaging Services (SMS), web sites etc.
iv) Co-ordination is estabilished with public transport providers for management of disruption of rail and road traffic, congestion at railway stations and roads, evacuation of stranded passengers.
v) Co-ordination is established with Home Guards and identified voluntary agencies for providing emergency water and food, taking the help of Search & Rescue Teams wherever necessary.
vi) Stranded citizens are evacuated to the nearest transitory shelter.
vii) Emergency medical teams are deployed where people cannot be immediately shifted.

Plans–
1. Plans to provide effective communication installed TETRA Communication system.
2. To develop Geographical Information System (GIS) for command and control.
3. To install high end cameras at flooding spots.
4. To Install video walls in control rooms.

Essential 10–Needs-based (survivors) reconstruction	Status- 3
Progress and achievements– 1. Rebuilding and reconstruction of the Government properties. 2. Financial assistance is given to survivors based on the severity of the damage. 3. The livelihood of survivors is protected as per existing norms. 4. 118 Food packets suppliers have been identified to provide food to survivors 5. 152 Temporary Shelters have been identified 6. 385 Open gardens and spaces have been identified for evacuation 7. 41 Parking lots have been identified for parking vehicles during a disaster	
Plans - 1.	