

7. ADDITIONAL STUDIES

7.1 DISASTER MANAGEMENT PLAN

7.1.1 Introduction

Disaster means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or manmade causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of property, or damage to, or degradation of environment and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area.

Disaster Management Plan (DMP) gives a broad idea of Emergency preparedness in case of an accident. Thus an appropriate DMP shall be prepared in consultation with the project proponent, architect, service consultant and maintenance staff. DMP envisages the need for providing appropriate action so as to minimize loss of life/property and for restoration of normalcy within the minimum time. Adequate manpower, training and infrastructure shall achieve this. An appropriate fire protection system is also developed to meet any emergency.

The emergencies are classified as demolition and construction hazard, natural hazard and Man-made hazard. Disaster risk reduction begins throughout our local communities. For greatest impact, these steps must be grounded in local knowledge and communicated broadly.

7.1.2 Objectives of Plan

This plan is developed to make best possible use of resources to:

- ✚ Rescue the victims and treat them suitably.
- ✚ Safeguard others (evacuating them to safer places).
- ✚ Contain the incident and control it with minimum damage.
- ✚ Identify the persons affected.
- ✚ Preserve relevant records and equipment needed as evidence incase on an inquiry.
- ✚ Rehabilitate the affected areas.

The following important elements in the disaster management plan (DMP) are suggested to effectively achieve the objectives of emergency planning:

- ✚ Reliable and early detection of an emergency and careful planning.

- ✚ The command, co-ordination, and response organization structure along with efficient trained personnel.
- ✚ The availability of resources for handling emergencies.
- ✚ Appropriate emergency response actions.
- ✚ Effective notification and communication facilities.
- ✚ Regular review and updating of the DMP
- ✚ Proper training of the concerned personnel.

In order to handle disaster/emergency situations, an organizational chart entrusting responsibility to various plant personnel has been prepared along with their specific roles during an emergency. The possible composition of the management team is given in Figure 7.1.



FIGURE 7.1. DISASTER MANAGEMENT TEAM

7.1.3 Roles And Responsibilities of Management Team

7.1.3.1 Construction Hazard

During the construction time good construction practice and safety requirement should be enforced by the contractor at site. The construction manager can be the co-ordinator for the emergency management. Depending on the severity of the injury/ disaster outside medical help can be obtained. Before commencement of the work the hospital facilities should be identified and the address and phone numbers to be available to the contractor

as well as the construction manager. Proper measures should be taken to ensure safety at heights. Fencing/railing should be provided at construction openings to prevent physical injuries and fall of construction workers.

Natural Hazard:

During natural hazard the emergency plan to be implemented with the help and guidance from the district collector, who is the co-ordinator for such activity. Disaster Management Team (DMT) will also be responsible for disaster mitigation and disaster recovery. The primary mass disaster potential for the area is fire and water damage. Fire has an immediate response that can be delivered by the occupants or nearby Fire service Department. In terms of water damage this can occur via storm damage to roofs and/or flooding. In these instances access to tarpaulins and sand bags are critical. Coordination of these efforts is through the DMT.

Manmade/ Operational Hazard:

During the phase project proponent and maintenance staff becomes the co-ordinator for the emergency activity and the emergency cell will be acting in accordance with the disaster management plan (DMP).

Insurance: Key to the management of any disaster is having adequate insurance in place to:

- Reduce the loss in terms of assets if a disaster happens; and
- Reduce lost income in the event that the facility becomes unavailable or partly unavailable.

7.1.4 Levels of Disasters

Based on severity of the disaster, degree of material and physical losses and assistance requirements different levels of disasters are being identified. The activation of the plan will be dependent on the declared level of disaster.

Level 0 (L₀) - This is a level during peace and normal times; time will be utilized for monitoring, prevention and preparatory activities. Capacity building of key departments, mock rescue, rehearsals, testing evacuation plans is rehearsed during this level. Similarly, response and recovery mechanisms are reviewed at state, district, level.

Level I (L_I) - At this level, district machinery can manage the disaster; state and central governments will monitor the progress and remain alert to activate other mechanisms if needed.

General inundation, crop losses, livestock losses, minor property losses and disrupted normal life due to disaster/incident.

Level II (L_{II}) - At this level, active participation of state departments, mobilizing resources at the state level and close monitoring in coordination with district machinery is warranted. Mobilizing rescue and recovery teams consisting of paramilitary forces may be required at this level. In addition to losses identified in LI, human and livestock losses and substantial property losses such as damaged homes, damaged infrastructure and isolation of an area due to the severity of the disaster are part of Level II.

Level III (L_{III}) - This is critical and highest level. State and district machinery would need active assistance from the union government. Mobilizing rescue and recovery teams consisting of paramilitary forces may be required at this level. Early warning mechanisms both at state and central government play significant role in identifying situations that may be declared as Level III disasters. Similar levels of losses are identified in LI and LII at higher proportions.

Activation of the plan would vary depending on the level of disasters and intensity as identified; however, at all levels, certain activities especially preparedness, prevention and capacity building are round the year functions. Based on the information received from competent agencies like IMD, district administration and the degree of intensity, the State Executive Committee (SEC) in consultation with Revenue (Disaster Management) Department will identify the level of disaster and notify the impacted districts.

7.1.5 Hazard Vulnerability Risk Analysis

7.1.5.1 Basic Terminology

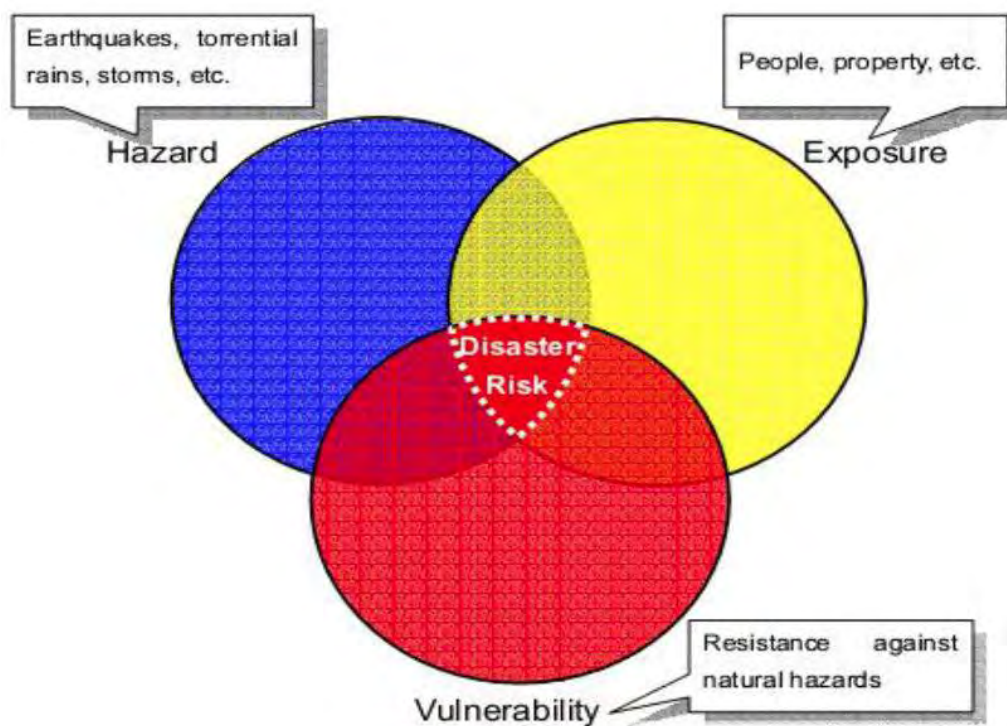
1. **Hazard** - Hazard is an event or occurrence that has the potential for causing injury to life or damage to property or the environment. The magnitude of the phenomenon, the probability of its occurrence and the extent and severity of the impact can vary. In many cases, these effects can be anticipated and estimated.
2. **Vulnerability** - Vulnerability is the degree to which a population, individual or organization is unable to anticipate, cope with, resist and recover from the impacts

of disasters. Vulnerability is a function of susceptibility (the factors that allow a hazard to cause a disaster) and resilience (the ability to withstand the damage caused by emergencies and disasters and then to recover)

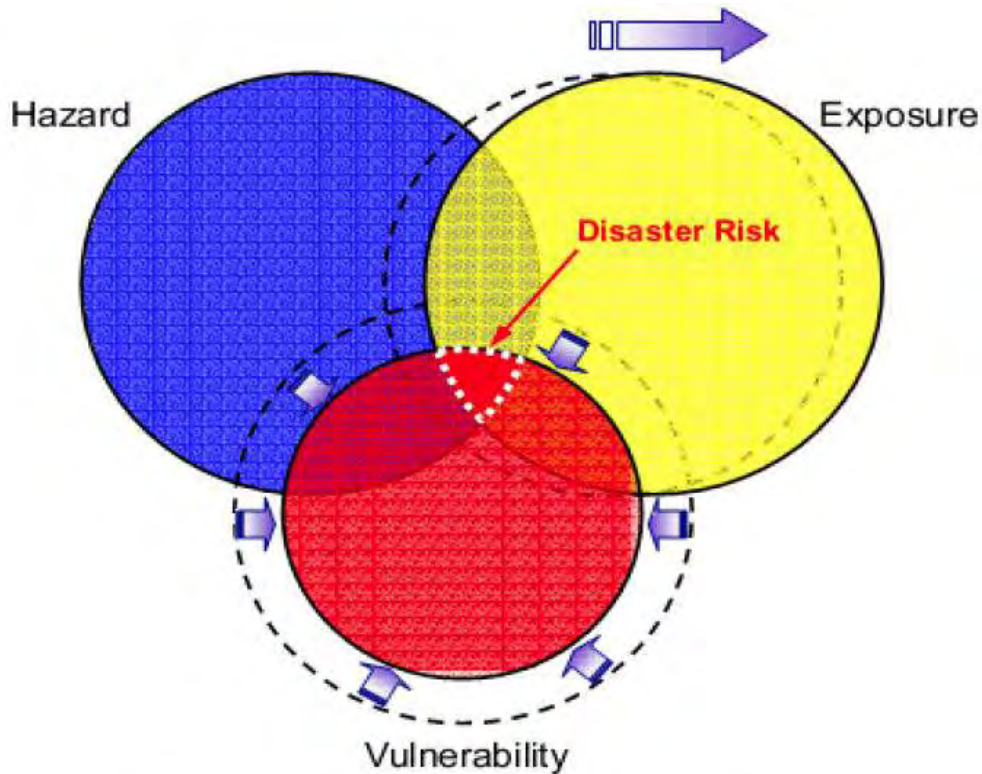
3. **Risk** - "Risk" is defined as the expectation value of losses (deaths, injuries, property, etc.) that would be caused by a hazard. Disaster risk can be seen as a function of the hazard, exposure and vulnerability as follows;

Disaster Risk = function (Hazard, Exposure, Vulnerability)

To reduce disaster risk, it is important to reduce the level of vulnerability and to keep exposure as far away from hazards as possible by relocating populations and property. Growing exposure and delays in reducing vulnerabilities result in an increased number of natural disasters and greater levels of loss.



Mechanism Behind the Emergence of Natural Disasters



Mechanism of Natural Disaster Reduction

7.1.6 Types of Hazard

7.1.6.1 Natural Hazard

Earthquake

An earthquake is a sudden shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface and followed by a series of vibrations. Earthquakes can cause buildings and bridges to collapse, telephone and power lines to fall, and result in fires, explosions and landslides.

Seismicity in Delhi

Delhi is located in zone IV which has fairly high seismicity where the general occurrence of earthquakes is of 5 - 6 magnitude, a few of magnitude 6 - 7 and occasionally of 7 - 8 magnitude. Delhi thus lies among the high-risk areas.

Geological Survey of India (GSI) reports mention that the bedrock depth is 60 m in the Patel Road area, 15 m in Connaught Place Central Park, 40 - 50 m near Rajghat and 150 m

and beyond in the Yamuna river bed. Similarly, the depth is reported to be 80 - 100 m in the Aurobindo marg-Hauz Khas area.

TABLE 7.1 RECENT EARTHQUAKES IN DELHI

Date	Latitude °N	Longitude °E	Magnitude
June 6, 1992	28.65	76.69	2.8
February 16, 1993	28.63	76.35	2.6
March 27, 1993	28.63	77.20	3.6
SEPTEMBER 6, 1993	28.64	77.14	2.5
December 3, 1993	28.60	77.40	3.5
July 28, 1994	28.51	77.25	2.8
October 15, 1994	28.59	79.92	2.8
November 16, 1994	28.50	76.95	2.9
March 18, 1994	28.62	77.25	2.7
March 28, 1994	28.60	77.10	1.6
April 4, 2004	28.60	77.20	1.5
April 5, 2004	28.70	77.30	1.9
April 21, 2004	28.60	77.30	1.5
June 06, 2004	28.60	77.00	2.0
October 08, 2004	-	-	5.6
December 26, 2004	-	-	9.3
March 5, 2012	-	-	5
November 12, 2013			3.3



FIGURE 7.2 SEISMIC ZONING OF INDIA

Earthquake Resistant Construction

Promotion of Earthquake resistant construction mainly includes construction safety, quality control and proper inspection. Previously there were no specific guidelines on earthquake resistant constructions and seismic strengthening. Due to the very fact, most of the buildings till 1990s were built without any safety measures. But in the present scenario, there are building byelaws and guidelines to construct earthquake resistant structures.

As per the National Disaster Management Authority of India, the Geographical areas which fall under seismic zones II, III, IV and V are vulnerable to potential impact of earthquakes, landslides, rock falls or mudflows. Proposed project site come in the Seismic Zone IV (High), the risk involves due to earth quake is high. Therefore all the structures in this zone shall be built in accordance with Earthquake-resistance.

I) For the Safety of Walls

- ❖ The mortar used in foundations and walls
- ❖ Size and placement of door, window openings in walls
- ❖ Length of the wall between the transverse walls
- ❖ Provision of horizontal seismic bands
 - a. Plinth level
 - b. Door and window lintel level

II) Provision of vertical steel bars

- ❖ In every corner / junction of walls
- ❖ The door and window jamb

III) For the safety of roofs or floors

- ❖ Rooftops / storey precast or precast

1V) General guidance for masonry

- ❖ Too much window openings make a wall weaker. The use of smaller size (less than 18 inches / 45 cm) in width between the two further increases the damageability.
- ❖ Richer mortar of cement and sand of 1:4 (cement 1 part with 4 parts of sand) causes the strongest earthquake shaking masonry against compared with 1:06 mortar by a factor of 2.5 to 3.0. Also 1:06 mortar is stronger than lime cinder
- ❖ Use of clay mud mortar produces the weaker masonry. The strength in dry condition reduces to less than 50 percent when the walls get wet during rains. Therefore, the use of a good plastering is essential to protect such masonry during the rainy months.
- ❖ The most important requirement of seismic safety is the provision of seismic bands on all floors in all external and inner walls. These bands sustain the integrity of the entire building as a unit under earthquake shaking and also increases the stability of walls.

A great disaster may occur if

- A. An earthquake of sufficiently large magnitude,
- B. Occurrence of the earthquake close enough to a population Centre, and
- C. The population Centre having buildings which are not earthquake resistant.

7.1.6.2 Flood Hazard

An overflow of a large amount of water beyond its normal limits, especially over what is normally dry land.

Floods in Delhi

The flow of Yamuna within Delhi is by and large influenced by discharge from Tajewala Headwork 240 kms upstream. In the event of heavy rain in the catchment area excess water is released from Tajewala. Depending upon the river flow level downstream, it takes about 48 hours for Yamuna level in Delhi to rise. The rise in water level also causes backflow effect on the city's drains. The city also experiences floods due to its network of 18 major drains having catchment areas extending beyond the city's limits.

1978: (September) River Yamuna experienced a devastating flood. Widespread breaches occurred in rural embankments, submerging 43 sq km of agricultural land under 2 meters of water, causing total loss of the kharif crop. In addition to this, Colony of north Delhi, namely, Model town, Mukherjee Nagar, Nirankari Colony etc. suffered heavy flood inundation, causing extensive damage to property.

1988: (September) River Yamuna experienced floods of very high magnitude, flooding many villages and localities like Mukherjee Nagar, Geeta Colony, Shastry Park, Yamuna Bazaar and Red Fort area, affecting approximately 8,000 families.

1995: (September) The Yamuna experienced high magnitude floods following heavy runs in the upper catchment area and resultant release of water from Tajewala water works. Slow release of water from Okhla barrage due to lack of coordination between cross state agencies further accentuated the problem. Fortunately, the flood did not coincide with heavy rains in Delhi, and could be contained within the embankments. Nonetheless, it badly affected the villages and unplanned settlements situated within the river-bed, rendering approximately 15,000 families homeless.

List of Affected Area

As per the Flood Control Order-2014 following areas of Delhi are vulnerable to drainage congestion (Urban Flooding)

S.No	Block	Location/Area
1.	Kanjhawala	Tikri Kalan, Rohtak Road Area near Mundka Village, Bakarwala Village, Nangloi Jat & Shivram Park, Shahabad Daulatpur Diary Colony, Daryapur Village, Bawana Village, Ishwar Colony.
2.	Alipur	Kaushik Enclave (Burari), Tomar Colony (Burari), Sindhi Colony, Jindpur, Palla, Sarup Nagar, Mukhmelpur, Jhangola, Shardanand Colony Wazirabad Village, Milan Vihar, Hiranki, Sangam Vihar, Sant Vihar, Jivan Vihar, Chandan Park, Rajeev Colony, Bhalswa Jhuggi Colony.
3.	Mehrauli	Tajpur, Jaitpur, Madanpur Khadar, Okhla, Mithapur Extn., Jamia Nagar, Sarai Kala Khan, Mithapur Harijan Basti, Gagan Vihar/Om Vihar, Jaitpur Extn. Nangli Rajapur, Ahizrabad. Jasola, Jogabai, Chijrabad, Chilla, Beslol Pur Khadar.
4.	Shahdara	Kondli-Gharoli Area, Gandhi Nagar, Geeta Colony, Lalitapark, Dallupura & Adjoining Area of Ashok Nagar.
5.	Najafgarh	Najafgarh Near Jharoda Road, Roshanpura, Harijan Basti (Kakraula), Mansa Ram Park (Near Matiyala Village), Vijay Enclave, Mahavir Enclave, Palam Village, Bijwasan Village, Rawta, Jharoda Kalan, Malikpur, Jhuljuli, Sarangpur, Galibpur.
6.	Apart from above, the following DDA areas are also vulnerable :- 1. Jwala Puri (Pira Garhi) 2. Ordnance Depot (Shakur Basti)	

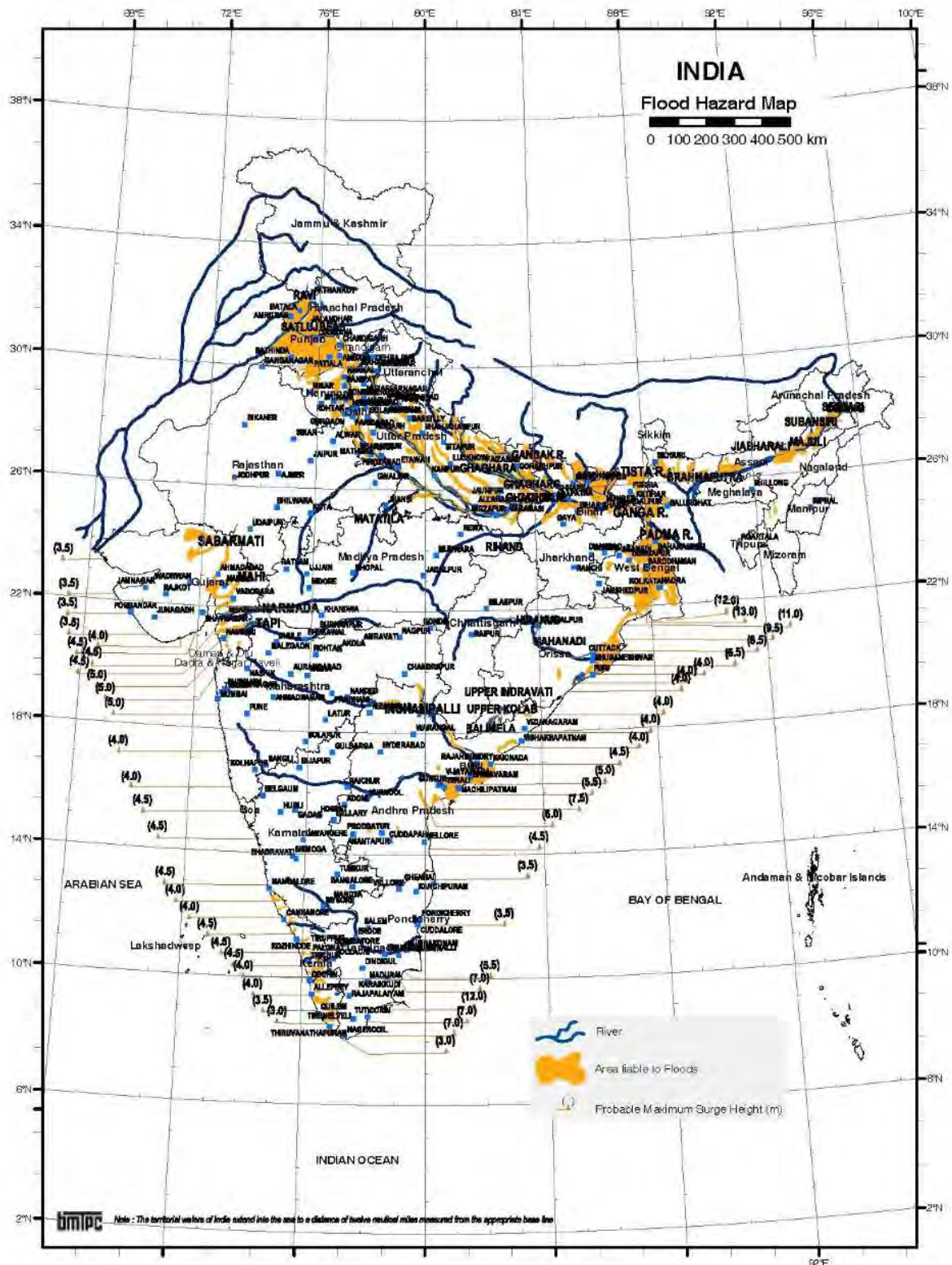


FIGURE 7.3 FLOOD VULNERABILITY ZONES OF INDIA

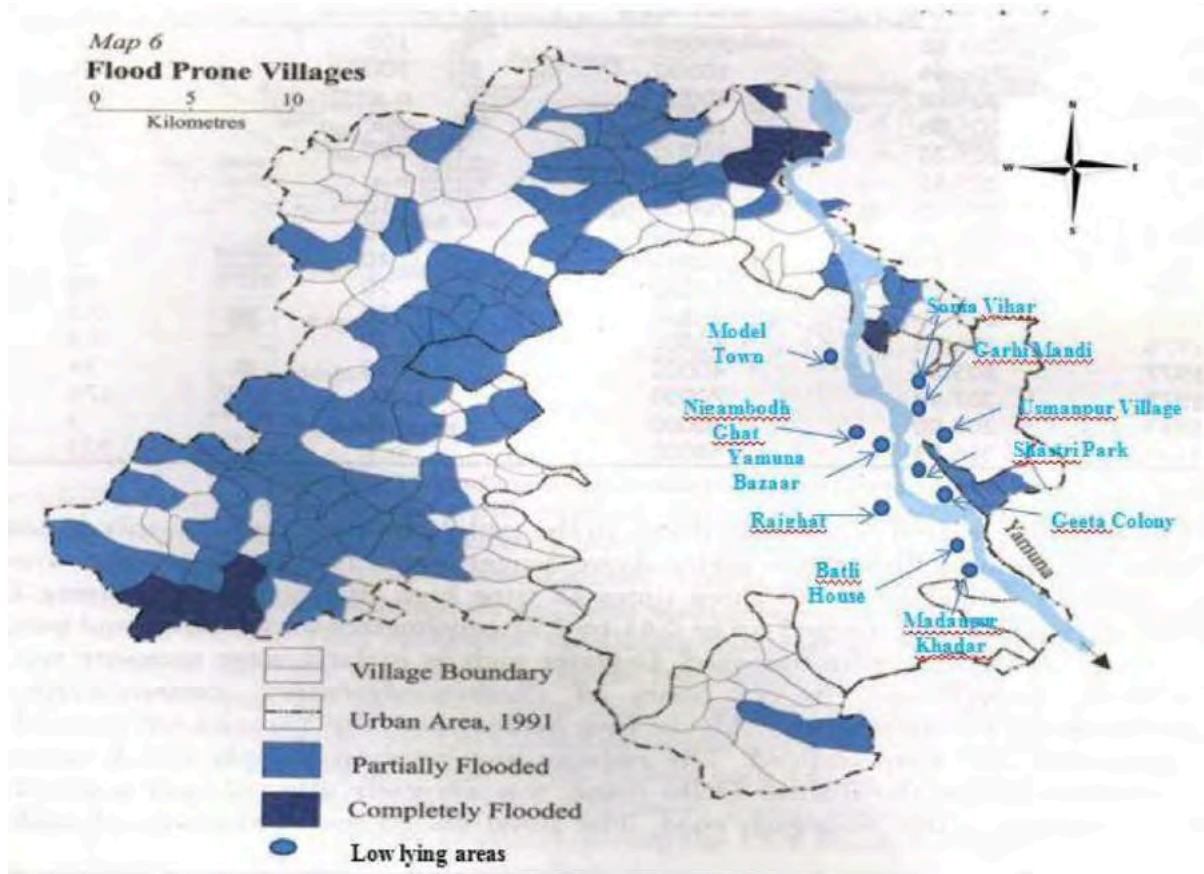


FIGURE 7.4 FLOOD VULNERABILITY ZONES OF DELHI

Prevention & Mitigation Measures

- ❖ Increasing the elevation of the proposed building
- ❖ Flood proofing of the building such as flood walls and all air ventilation and openings shall be above the expected water level
- ❖ A natural depression suitably improved and regulated, if necessary or by diversion of a part of the peak flow to another river or basin, where such diversion would not cause appreciable damage.
- ❖ Channel and drainage by “V” channel, to reduce water retention within the channel and increase the water flow.
- ❖ Creating a spider drainage system with main drainage lines along the peripheral of the boundary is recommended to keep the buildings and assets away from storm water lines. There by the normal to heavy rainfall would be diverted to other outfalls which would be connected to the public storm water drain.

- ❖ Adequate rain water harvesting structure to be constructed and proposed project site excess run off will be disposed through the existing storm water drain it is located nearby the project site.

7.2 MAN MADE HAZARD

7.2.1 Fire Hazard

Fire hazards, for the purpose of this study, include fires due to LPG as well as short circuit of electrical systems.

Major Causes of Fire

	1993-94	1994-95	1995-96	1996-97	1997-98
Electricity short circuit	5848	6473	70.40%	7433	7268
Carelessness	1701	1728	18.37%	1896	1466
Miscellaneous	308	504	0.75%	356	387
Spark M/Heat	156	258	1.73	203	160
Fire Works	139	146	1.68%	198	59
Unknown	138	184	1.49%	181	166
Naked Flame	105	133	4.59%	351	288
Intentional	75	986	0.90%	121	109
Incendiarism	45	16	-	22	16
Spontaneous	13	1	-	0	0
Radiation	10	4	-	1	0
Lighting	6	0	0	1	0
Children Playing with fire	6	2	0.00%	1	0

Source: Delhi Fire Service Department, 2001

Vulnerable locations

- ❖ Storage areas of flammable / explosive material in the vicinity of populated areas
- ❖ Using improper practices of storage of cooking fuel such as LPG, kerosene etc.
- ❖ Multi-storied buildings, especially in cities, with inadequate fire safety measures
- ❖ Narrow lanes, congested, overcrowded buildings, old buildings with poor internal wiring.

Fire Safety Provision

Fire protection is one of the most essential services to be provided. The principal objective of the rescue and firefighting services is to save lives. For this reason, the provision for means of quick dealing with an accident or incident occurring at, or in the

immediate vicinity of, any building, assumes primary importance because it is within this area that there is the greatest opportunity of saving lives. This must assume at all times the possibility of, and need for, extinguishing a fire which may occur either immediately following an accident or incident, or at any time during rescue operations. In the design component of the project, adequate measure is being taken as per the provisions of the National Building Code, 2016. The firefighting system will comprise the following,

A. Fire hydrant system

- ✚ Number of Exit, location and there width should conforms to the requirements of NBC 2016
- ✚ Adequate fire water storage tank capacity to be provided.
- ✚ Hose reel assembly should be provided covering each floor
- ✚ Manual fire call points should be provided
- ✚ Alternative and independent power system should be provide to fire pumps.
Emergency Lighting system

B. Fire hydrant system

- ✚ Select appropriate extinguisher for type of fire.
- ✚ Pull pin from squeeze handle.
- ✚ Test extinguisher by squeezing handles briefly.
- ✚ Approach fire aiming nozzle at base of fire.
- ✚ Squeeze handles and operate extinguisher in a sweeping motion.

C. Public Address System

As per appendix D.5 of part IV of NBC, every high rise building should have a public address system with 2 way communication to conduct evacuation in a systematic manner & to communicate any messages to occupants on every floor from the control room.

D. Escape Route

As per section 8.2.5 of part IV of NBC, the escape route should be marked with a sign board on the corridor & passage to guide evacuation. Normally, the escape route sign board must be written in luminous paint for easy identification. This is to guide every occupant of the building who is bound to panic in the event of accident.

E. Portable fire extinguishers

Section: As per section 7.10.4 part IV of N.B.C.

First Aid Firefighting appliances are provided & installed in accordance with latest IS: 2190-1992 in the existing blocks. In the proposed blocks shall also be provided as per code.

F. Water fire extinguishers

- Two extinguishers per compartment/floor of building will be provided.
- As per requirement laid down in National Building Code of India, adequate capacity of the underground tank and overhead tanks will be provided.

G. MOEPA (Manually Operated Electric Fire Alarm)

Manually operated electric fire alarm (MOEPA) shall be provided near escape point in all building including machine rooms as per clause 9.3.9 of UBBL (Unified Building Bye Laws) - 2016 and the same shall conform to IS: 2189/1999.

H. Sprinkler System

Section: As per section 7.10.7 of part IV of NBC.

- The Automatic sprinkler system shall be installed in all the office building, having basements as per clause 9.3.9 of UBBL - 2016 in accordance with BIS: 15105/2002
- Sprinkler system is a must for basement parking & other risk areas where large quantities of combustible materials are stored.
- Each sprinkler should cover 6.96 m² area.
- The capacity of water tank shall be calculated on the basis of sprinklers.
- Sprinklers may connect to main water tank & pump, but capacity of the tank & pump shall be increased to that proportion.
- Detectors shall be installed as per IS 2189/ 1988.

I. CO₂ Type

- For area where electrical fire is expected

J. Hose Reels

- Hose reels are used on fires involving wood, paper and textiles only, they are not to be used on live electrical appliances or flammable liquids.

- ✚ A hose reel containing 30 m length of 20 mm bore terminating into a shut nozzle of 5 mm outlet connected directly to raiser shall be provided as per clause 9.3.9 of UBBL-2016 in all building. This shall conform to IS: 884/1998.
- ✚ To release the hose reel, turn the valve on this will charge the hose and release the nozzle (if fitted with a nozzle release lock).
- ✚ The hose can then be pulled out to the fire, the nozzle operates like a garden hose in most cases by twisting the nozzle, and the nozzle can be adjusted to give a spray pattern or a straight jet.

K. Alternate Power Supply

As per appendix D-1.5 of part IV of N.B.C. a stand by generator should be installed to supply power for staircase lighting, corridor lighting, fire pump, pressurization fan & blowers, in the event of disconnection of failure of main supply.

L. Fire Control Room

As proposed on the building plans a fire control room in each high rise building shall be established at entrance floor in accordance with the provisions contained in clause 9.3.10 of UBBL-2016. Trained personal shall be appointed round the clock to look after the fire protection arrangements in the building.

Emergency Response for Fire

A. Basic Actions

- ✚ Immediate action is the most important factor in the emergency control because the first few seconds count.
- ✚ Take immediate steps to stop Gas leakage / fire and raise alarm simultaneously.
- ✚ Stop all operations
- ✚ Electrical system except the lighting and firefighting system should be isolated. If the feed to the fire cannot be cut off, the fire must be controlled not extinguished.
- ✚ Start water spray systems in the areas involved in or exposed to fire risks.
- ✚ In case of leakage of gas without fire and inability to stop the flow, take all precautions to avoid source of ignition.
- ✚ Block all roads in the adjacent area and enlist police support for the purpose, if warranted.

B. Action in the Event of Fire

- ✚ Basic actions as detailed above.
- ✚ Extinguishing fires: A small fire at a point of leakage should be extinguished by enveloping with a water spray or a suitable smothering agent such as CO₂ or DCP. Fog nozzles should be used.
- ✚ Firefighting personnel working in or close to un-ignited vapour clouds or close to fire, must be protected continuously by water sprays. Fire fighters should advance towards the fire downwind if possible.

7.2.2 Demolition Construction Hazard

The Demolition and construction work will be outsourced to private contractors. These proposals are to enable third parties to understand the nature of the works and the various Demolition and construction activities associated with the development/expansion/construction.

This Demolition Management Plan is subject to third party approvals and therefore amendments are likely. Formal approvals and activity methodology approaches will be addressed in detailed submissions to the design team and the proponent. Liaison with the neighbors and interested parties will continue throughout the project, as information is updated and as the project develops. Particular attention will be paid to ensure that the neighbors are kept informed of progress and future works on the project. The information provided in this document is an overview of the key project activities

This Plan will be used as the background for the detailed demolition method and risk assessments and will be included in all specialist trade contractor portions of the works.

Project Overview: Explained in chapter II of EIA Report

The key elements for management are as

- The commitment of the proponent to manage, control and where possible mitigate our impact on the local community and infrastructure.
- Many of the issues identified will be further developed and dealt with in our more detailed site based method statements.
- Method statements will be prepared and agreed for all major site operations in advance of the relevant works commencing.
- This will be particularly important for demolition, piling, excavation and structural works.

Environment Management plan for Demolition

Objective:

The prime objective is to implement EMP during demolition of the proposed buildings are:

- To demolish the existing towers adopting the standard safety measures and segregate the debris in to recyclable and non-recyclable for proper disposal and management of wastes;
- To demolish the building considering the safety so as to ensure the protection of the worker, general public, and adjacent property;
- To investigate and find suitable sites for the disposal of the debris and dispose the materials in the designated sites
- To separate out the potential hazardous materials and dispose with proper environmental management and safety,
- Transport and dispose materials which cannot be reused and recycled in safety manners;
- Clearance of the site for the construction of the new building
- The existing building is situated in the busy premises. So the proposed mitigation measures will mitigate the impacts of the proposed demolition activities.

Demolition Process

Demolition of existing building involves several activities of them foremost step would be a detailed pre-demolition preparatory works such as desired equipments, manpower, rubble disposal site removing hazardous or regulated materials, obtaining necessary permits from the authority, submitting necessary notifications, disconnecting utilities, and development of site-specific safety and work plans for the workforce, a detail minute by minute planning of strategic stage-wise demolition among others. Extra care should be taken while the demolition is in progress.

Preparatory works to be complied

Following works should be completed before the start of demolition process

- Surveying of site
- Demolition schedules to be developed including the demolishing, segregating, etc.
- Identification of the sites for disposal of debris (non-recyclable debris)
- Inform the local peoples, pedestrians about the works (by notice or hoarding board)

- Utility service especially electricity must be terminated by cutting and capping utility lines or by rerouting them.
- Inform the surrounding offices and other residential buildings about the demolition activities, a formal letter to the near about offices from the side of the building.
- Occupational and Safety plan to be prepared and implemented measures to be used
- Installing barriers for site protection and pollution (from dust, noise and aggregates) especially on the east side (facing the road) of the existing DHM building. Removal of hazardous materials from the site if any
- Preparation of plan along with strategy to implement
- Scheduling and Planning for transportation of debris not coinciding with peak traffic movement (identifying the route and inform to the pedestrians and traffic)
- During the demolition, manual works will be preferred. However the Mechanical work (use of excavators etc.) will also be done as per requirement, but considering safety measures and informing the Management.

Key steps the demolition work will be as follows:

- First, everything will be removed from all interior surfaces like the official documents, lab instruments and equipments from the equipments section etc.
- Next, all interior doors will be removed, retaining them in their jambs for convenience when they are reused.
- The next step will be removal of all plaster from walls and ceilings by manually as well as mechanically.
- The next step is to remove the roof shingles for loading into a separate roll-off container that could be sell in market that melts them, uses a magnet to remove the nails.
- All ferrous, aluminum, and copper metal is separated and recycled, including some of the newer copper-insulated wiring.
- All of the reusable material and appliances will be collected for reused purpose.
- The materials that could be sold will be collected.
- The debris materials for dispose will also be collected.

Potential Environmental Impacts due to demolition

To identify the issues and potential impacts from the demolition activities, series of consultations have been done with the officials around the Building. Meanwhile it was

requested to concerning Govt. organizations if there are any issues to be addressed regarding the demolition through a formal letter.

Key Issue raised during the consultation by Stakeholders

- ✓ Dust and Other Pollution
- ✓ Noise Pollution and Vibration
- ✓ Disturbance to pedestrians during the demolition
- ✓ Disturbance to the existing public utilities infrastructures
- ✓ Security of the demolished materials and existing neighboring offices
- ✓ Stockpiling of deconstructed Materials
- ✓ Possible impacts for the
- ✓ It will be better to transport the demolition materials except the peak hours
- ✓ Prevent the unexpected incidence during the demolition activities
- ✓ Prevent the effect to the neighboring buildings (Some of the issues are about the construction of new building. So such issues are avoided)

Prioritization for the assessment among issues identified and raised

- **Beneficial Impacts:**

- Clearance of area for new proposed building
- Employment generation
- Scenery attraction
- Revenue Generation for the Government Possible

- **Adverse Impacts:**

Impacts during the Demolition Phase I.

- **Physical Impacts:**

- Air, Noise and Dust pollution
- Land and Water Pollution
- Disposal of demolished materials and other wastes
- Disturbance to the local population in the vicinity and pedestrian
- Vibration Impacts - Impacts from the Parking and vehicle movement

- **Socio-Economical and cultural Impacts**

- Safety for the laborers
- Traffic jam and inconvenience to pedestrian
- Accident for transportation of dispose materials

- **Impacts during the Transportation and Disposal of Waste**

- Impacts due to the frequent transportation of waste materials
- Dust and noise associated with transportation

- Occupational Health and Safety
- Site selection for waste disposal

Environmental Impact Mitigation Measures:

The issue, impacts and mitigation as well as the responsible agencies are as follows

TABLE 7.2 ENVIRONMENTAL MANAGEMENT PLAN - CONSTRUCTION PHASE

Potential Source & Impacts	Mitigative Measures	Responsibility
Land and Water Pollution	• Identify proper location to dispose wastewater from demolition and other activities in consultation with respective bodies • Dispose the waste water in identified location considering the environment and safety • Prohibit the contamination of groundwater • In case of hazardous waste store in safe place and make the provision for management • Before the dumping of the demolition waste, make an agreement with the municipality and concerned agencies to dispose the debris • Dispose at the designated site identified in coordination with municipality	Contractor / supervision by proponent
Safety for the Demolition Workers	• Make mandatory the use of safety gears (helmets, safety belts, masks, gloves and boot) by workers depending on nature of work. • Necessary planning and safety approach will be made for rescue during emergency. • The Proponent will have to check whether the provisions made in the plan are implemented according to plan. • Workers will be provided with first aid and health facilities at the site. • There will be provision for group accidental insurance for the workers. • Child labour is strictly prohibited in all the activities executed by the contractors • penalty for non-compliance to be tied with payment withholding and/or termination of contract • Respective provisions will be included in the contract document with contractor.	Contractor / supervision by proponent

Impacts on the existing public utilities near to the building	Public utilities like road, electric poles, telecom poles will not disturbed from the demolition activities	Contractor / supervision by proponent
Air, Noise and Dust Pollution during the Dismantling of the building activity	- Prior information to the adjacent buildings, offices regarding the demolishing process, scheduling of the activities etc. - Water spraying at the demolition site - Fencing / Install barriers(GI sheets, geo-net) especially at the eastern side of the building facing the road) to shield from dust and aggregates - Avoid usage of machines/equipment with loud noise; - Do not accumulate and burn waste at the site - Carry out demolition activities in stages, give adequate notice and information of activities to the adjoining stakeholders	Contractor / supervision by proponent
Disturbance to the local Population and pedestrians	- Install corresponding signs, hoarding boards, organization of bypasses, - Install barriers(GI sheets, geo-net)especially at the eastern side of the building facing the road) to shield from dust and aggregates - Provide adequate lighting at demolition site for the night to prevent accident	Contractor / supervision by proponent
Vibration Impact	- Precaution will be taken while using the machines and equipment, during demolition - Contractor will aware the operator for careful handling of machines and equipment and heavy vehicles like excavators and dump trucks during mechanical demolition - The contractor will inform the surrounding offices and community in prior to operations that bear the risk of nuisance and accidents.	Contractor / supervision by proponent
Traffic and pedestrian road congestion	- The transportation vehicles will be parked within the premises of demolition site - Prohibit the parking of the transportation vehicles outside the demolition site	Contractor / supervision by proponent

Impacts due to the disposal of waste materials	- The solid waste will be segregated at source level and collected in a separate container - The biodegradable wastes will be dumped into a pit located away from the water body and non - degradable waste will be recycled to some extent. - The debris will be disposed at designated spoil site considering all the environment factors - The waste management area (solid, liquid, debris) is designated before the demolition in consultation with Municipality.	Contractor / supervision by proponent
Impacts due to the Transportation from the Demolition Area	- The transportation of the waste and other materials should be in safe manner considering the rule of road traffic. - The schedule for the transportation should be made not to coincide during peak traffic hours, - Safety measures to be considered while transporting the materials - Covering of the trucks with plastic sheets to prevent dust pollution and other hazards	Contractor / supervision by proponent
Accident for transportation of dispose materials	- The transportation of the waste and other materials should be in safe manner considering the rule of road traffic. - The Occupational safety measurement as per the previous mitigation measures:	Contractor / supervision by proponent
Site selection of waste disposal	- The waste from the demolition activities will be disposed on the prescribed area in consultation with municipality authority. - The waste disposal should not be near to the any type of water resource or environmentally sensitive area - Disposal area should be far from the community and settlement - The contractor should consult with the Municipality authority and dispose as designated by the Municipality authority - The disposal of waste should not further deteriorate the surrounding environment.	Contractor / Approved by proponent

Site selection for the disposal of waste and debris	- The disposal area will be selected with the consultation of Municipality authority - The disposal area will not be the environmentally sensitive area - The disposal area will be far away from the water source and community area	Contractor / Approved by proponent
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TABLE 7.3 ENVIRONMENTAL MONITORING PLAN TO AVOID RISK AND DISASTERS

Issues/ Parameter	Monitoring	Responsibility
Prior to demolition:		
Fencing of the core demolition area prevent dust and noise pollution Install barriers(GI sheets, geo-net to shield from dust and aggregates	Dust level at demolition site, observed	Contractor / proponent
Prior information to the adjacent offices regarding the demolishing process, scheduling of the activities etc.,	Notice letters / Consultation with the neighboring offices and buildings	Contractor / proponent
During Demolition		
Water spraying at the demolition site	Dust level at demolition site, water sprinkling practice	Contractor
Avoid usage of machines/equipment with loud noise;	Observation of the noise level from the used machines	Contractor
Cracks caused by vibration due to demolition activities need to be monitored closely and alternative be sought where problem arises.	Case filed or observation around the demolition area	Contractor
Prohibit the contamination of ground water	Observe/testing the water quality of groundwater	Contractor
Dispose the waste water in identified location considering the environment and safety	Observe/testing the water quality of groundwater	Contractor
Install corresponding signs, hoarding boards, organization of bypasses,	Observation	Contractor

The Operational Phase Risk and hazard analysis and Management is described below.

7.3 RISK AND VULNERABILITY ASSESSMENT

Risk Analysis

Risk has been defined by the United Nations as a measure of the expected losses due to a hazard event of a particular magnitude occurring in a given area over a specific time period. The level of risk depends upon the nature of the hazard, the vulnerability of the elements which it affects and the economic value of those elements. As communities grow larger, more established and more complex, experience has shown that the level of risk which they face increases. Risk Analysis means the identification of undesired events that lead to the materialization of a hazard, the analysis of the mechanisms by which these undesired events could occur and, usually, the estimation of the extent, magnitude, and likelihood of any harmful effects.

Vulnerability Analysis

The vulnerability of a particular element of society is defined as the degree of loss which it would suffer as a result of a specific hazard event. The nature of vulnerability and its assessment vary according to whether the element involved represents people and social structures, physical structures, or economic assets and activities. The vulnerability of an area is determined by the capacity of its social, physical and economic structures to withstand and respond to hazard events. The concept of vulnerability implies a measure of risk combined with the level of social and economic ability to cope with the resulting event in order to resist major disruption or loss. In this part, on the basis of nature of hazards, socio-economic parameters and institutional arrangements and community preparedness Strength, Weakness, Opportunity Threats (SWOT) risk and vulnerability assessment has been conducted.

Vulnerability Matrix of Delhi											
District	N	NW	C	W	SW	ND	S	SE	NE	SH	E
Earthquake											
Flood											
Fire											
Building Collapse											
INDEX											
Districts											
N: North, NW: North West, C: Central, W: West, SW: South West, ND: New Delhi, S: South, SE: South East, NE: North East, SH: Shahdara, E: East											
Vulnerability:											

	High
	Moderate
	Low
	Nil

TABLE 7.4 PREVENTION & MITIGATION MEASURES

Key Aspect	Mitigation Measures
Prevention or mitigation for disaster risk reduction	❖ Hazards, Risk, and Vulnerability Assessment ❖ Human resource development ❖ Launching demonstration projects ❖ Safety education in educational institutions ❖ Documenting lessons from previous disasters and ensuring their wide dissemination ❖ Preparing DM plans, regular updating, and mock drills ❖ Strengthening early warning systems ❖ Mainstreaming of disaster risk assessment, mapping and management into development plans and programs ❖ Revision of building codes and standards for rehabilitation reconstruction practices both for urban and rural areas ❖ Retrofitting techniques ❖ Rapid visual surveys for safety evaluation of buildings ❖ Training and skill development for masons and other artisans ❖ Promoting community-based DM taking into account specific needs, regional diversities and multi-hazard vulnerabilities ❖ Preparedness and response plans at all levels ❖ Community-based DRR and DM plan
Effective preparedness and response	❖ Emergency response capabilities – EOCs, infrastructure, equipment upgrades and adoption of best available technologies ❖ Strengthening of the Fire and Emergency Service through revamping, institutional reforms, and modernization ❖ Comprehensive revamping of Fire and Emergency Services with institutional reforms and modernization ❖ Adoption and adaptation of emerging global good practices

	❖ Rigorous training and HRD of first responders ❖ Early warnings, maps/ satellite data/ effective dissemination of information ❖ Table-top exercises, simulations, and mock drills to improve operational readiness of the plans ❖ Rescue equipment at all levels ❖ Systems to provide basic services in emergencies ❖ Housing and Temporary shelters ❖ Medical care for casualties, health care and sanitation ❖ Power and fuel supply management ❖ Transportation systems and network
Recovery and Build Back Better	❖ Post-Disaster Needs Assessment systems and expertise ❖ Credible damage assessment mechanisms and expertise ❖ Studies on past disasters and recovery to draw useful lessons

Source: National Institute of Disaster Management (NIDM)

7.3.1 The Key Elements of Emergency Preparedness:

Once the likelihood of a disaster is suspected, action has to be initiated to prevent a failure. The project in-charge, responsible for preventive action will identify sources of repair equipments, materials, labour and expertise for use during emergency. The multiple floors of a high rise building create the cumulative effect of requiring great numbers of persons to travel great vertical distances on stairs in order to evacuate the building.

The Building in-charge will notify the occupants for the following information:

-  Early Warnings (Through an alarm or Voice communication system)
-  Exit routes (Adequate means of egress).
-  Safety areas (Assembly points)
-  Nearest infrastructure facilities (Medical aid / Fire aid)
-  Occupant Familiarity with the plan through and Practice (Sign ages / Evacuation plan)

7.3.2 Emergency Communication System

An efficient communication system is absolutely essential for the success of any disaster management plan. Different types of alarms to differentiate types of emergencies should be provided. In case of failure of alarm, placards/boards of various colors should be used to indicate the situations. If everything fails, a messenger should be used for sending the information and the various placards mentioned would also be used. This has to be worked out in consultation with local authorities involving police and fire department, hospital department considering the following points.

- ✓ Identify the relevant officials to be involved for the first, second and third level of information
- ✓ Preparation of the telephone directory of these officials and making available to all concerned
- ✓ Allotment of toll free number to a central communication center
- ✓ Provide wireless communication tools to safety and security and communication officers
- ✓ Empowering central communication center with latest communication equipment and tools

7.3.3 Emergency Planning Committee

To ensure coordinated action, an Emergency Planning Committee will be constituted. An Emergency evacuation plan based on local needs and facilities available will be prepared. The broad content of plan will include following:

- ✓ Demarcation of the areas to be evacuated with priorities.
- ✓ Safe area and shelters.
- ✓ Security of property left behind in the evacuated areas.
- ✓ Functions and responsibilities of various members.
- ✓ Setting up of joint control action.

An elaborate safety arrangement is designed for the proposed project as per the requirement of National Building Code Part-IV.

Assembly areas for all type of buildings are allocated in their respective landscape area which is sufficient for the emergency period.

7.3.4 Evacuation Path

The road straight to the entrance gate is quite wide and no hazardous installation besides the road. This road can be taken as the evacuation path.

The occupants of the fire floor and floors above and below should immediately use the exit stairs to descend to a floor level that is least a few floors below the Fire Floor. It is never appropriate to use the elevator during building emergency. Buildings shall have written evacuation procedure for all emergencies.

7.3.5 Infrastructure

Following infrastructure & systems should be provided to meet emergencies.

- a) First aid boxes
- b) Gas masks
- c) Telephone line with STD facility
- d) Emergency lighting system
- f) Stretchers
- g) Transport facility
- h) Fire-fighting machinery

7.3.6 Emergency Services

This includes fire-fighting system, first aid center, hospital etc. Alternate sources of power supply for operating fire-pumps, communication with local bodies, fire-brigade etc. should also be clearly identified. Adequate number of external and internal telephone connections should be installed.

7.4 RECORD KEEPING AND REPORTING

Records will be maintained for regulatory, monitoring and operational issues. Log book of Equipment inspection and calibration records, Vehicle maintenance and inspection records, incident records, Maintenance of Corporate Social Responsibilities towards the society even after the completion of construction of the project work and during the Operation/maintenance phase.

TABLE 7.5 FACILITIES NEAR TO THE BUILDING IN CASE OF NATURAL DISASTER

S. NO	Description	Distance	Direction	Contact No
1.	AIIMS Hospital	0.9 km	ESE	+91 11 2658 8500
2.	Safdarjung Hospital	0.5 km	ESE	+91 11 2616 5060
3.	Aashlok Hospital	0.4 km	S	+91 11 4616 5901
4.	Primus Super Speciality Hospital	1.6 km	NW	+91 11 6620 6630
5.	Dr. B. R. Sur Homoeopathic Medical College, Hospital and Research Centre	2.3 km	NW	+91 11 2410 5298
6.	Sadhu Vaswani Mission Medical Centre	2 km	W	+91 11 2411 4316
7.	C.G.H.S. Maternity & Gynae Hospital	1.8 km	SW	+91 11 2617 5490
8.	Shreeji Clinic for Children	1.5 km	E	+91 98111 98727
9.	Police Control Room	-	-	100
10.	Ambulance	-	-	101
11.	Delhi Fire Station	0.3 km	S	+91 11 2617 3583
12.	Safdarjung Fire station	1.4 km	NE	+91 11 2461 1111
13.	Fire Station Naraina	7.9 km	NW	91 11 2579 8798
14.	Hari Nagar Fire Station	8.9 km	NW	+91 11 2514 1433
15.	Coastal security helpline	-	-	1093

