CHAPTER- 2

VULNERABILITY ASSESSMENT AND RISK ANALYSIS

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VULNERABILITY ASSESSMENT AND RISK ANALYSIS

2.1 Introduction

District central mainly addresses earthquake as a major natural hazard. Road accidents and chemical/industrial, domestic fires and collapse of structure are important man-made hazards in the district. Mishandling and late response in case of any such hazard can cause disaster situation in the district. There are certain pertinent issues related in district which can cause any of above-said hazard as disaster which needs to be delt with:

High population density, crowded streets, unmatched mix of occupancies, inadequate water supply, poor electrical services, encroachments of *jhuggies* and slums are few examples of ineffective planning which adversely affect the fire response time. Under the present circumstances, a response time of 3 minutes in urban areas and 5 minutes in rural areas is very difficult to achieve. The developmental activities are in full swing in the areas like Burari, Wazirabad, Jagat Pur, Mukund Pur, Jharode Majra Burari, Timarpur, Salempur Majra, Kamal Pur Majra, Sadroha Kala Sadroha Khurd and Nimri sub-urban areas of the district where environmental and fire safety aspects needed to be stressed upon.

2.2 Hazard

A hazard is a physical event that can trigger to a disaster. It has been argued by many researchers that hazard have potential to cause disaster. Generally a hazard converts into a disaster due to lack of preparedness and mitigation, planning & implementation in the modern society where enormous people are living in an unplanned manner. A disaster is an event triggered by natural or man-made causes that lead to sudden disturbance of normalcy of life within society, causing widespread damage to life and property. Destruction can be caused due to occurrence of frequent disasters like earthquakes, fire incidents, cyclones, terrorism, biological wars and chemical explosions. Under this chapter hazards analysis has been carried out to evaluate the level of disaster proneness in the Central district of Delhi.

Table 2.1: Hazard & Vulnerability Profile of District Central

S. No.	Hazard	Reasons	Vulnerability
1	Earthquake	• Seismic Zone IV • Non earthquake resilient buildings • High density of population • Unplanned & unsafe structures • Congested area	High
2	Fire	• LPG leakage • Short Circuit • Jhuggi Clusters • Lack of fire safety installations	High

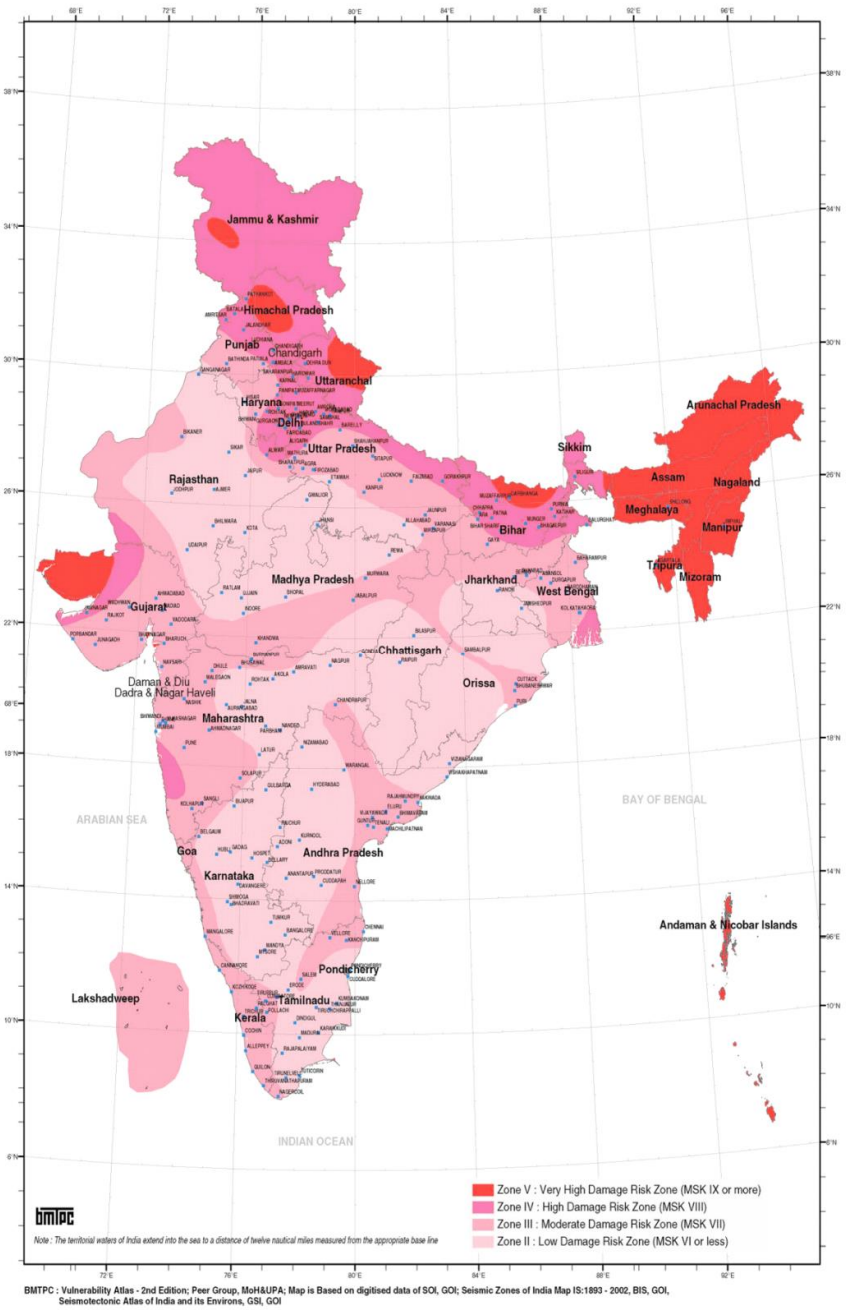
3	Flood	• Yamuna river bed • Habitation in low-lying area • Sudden discharge of water from neighboring states • Poor drainage causes water logging	High
4	Building Collapse	• Old & unsafe buildings • Unauthorized & unplanned structures	High
5	Stampede	• High density of population • Congested areas • Spread of rumors	Medium
6	Terrorist Attack/ Bomb Blast	• Attack by terrorists	Moderate
7	Epidemic	• Poor hygiene & • Sanitary Conditions • Post flood effects	Medium

Geological Hazards: Earthquake

The geology is a potential cause of major natural calamity. Geological details of Delhi envisage that Delhi falls under the Zone-IV and liable to earthquakes of 6 to 7.5 Richter scale which falls under a category of high risk of earthquake as shown in the NDMA guidelines for earthquake (Map-2.1)

Table: 2.2. Geographic Areas of India under different Seismic Zones:

S.No.	**Seismic Zones**	**% of Geographical Area**	**58% of total area of Indian Sub-continent is vulnerable to earthquake**
1	II	41.40%	
2	III	30.40%	
3	IV	17.35%	
4	V	10.90%	



Map 2.1 Geographic area of India in seismic zone

An earthquake is a sudden shaking of the earth caused by the breaking and shifting of rock beneath the earthôs 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. Indiaôs high earthquake risk and vulnerability is evident from the fact that about 59 per cent of Indiaôs land area could face moderate to severe earthquakes.

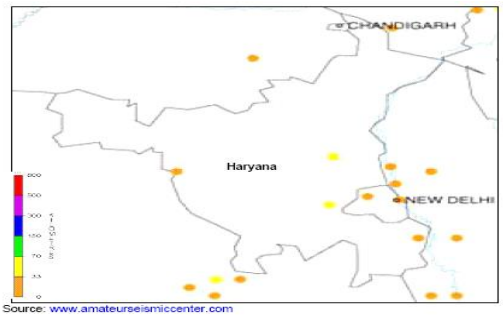
During the period 1990 to 2006, more than 23,000 lives were lost due to 6 major earthquakes in India, which also caused enormous damage to property and public infrastructure. The occurrence of several devastating earthquakes in areas hitherto considered safe from earthquakes indicates that the built environment in the country is extremely fragile and our ability to prepare ourselves and effectively respond to

earthquakes is inadequate. During the International Decade for Natural Disaster Reduction (IDNDR) observed by the United Nations (UN) in the 1990s, India witnessed several earthquakes like the Uttarkashi earthquake of 1991, the Latur earthquake of 1993, the Jabalpur earthquake of 1997, and the Chamoli earthquake of 1999. These were followed by the Bhuj earthquakeof 26 January 2001 and the Jammu & Kashmir earthquake of 8 October 2005.All these major earthquakes established that the casualties were caused primarily due to the collapse of buildings. *(Earthquake guidelines, NDMA)*

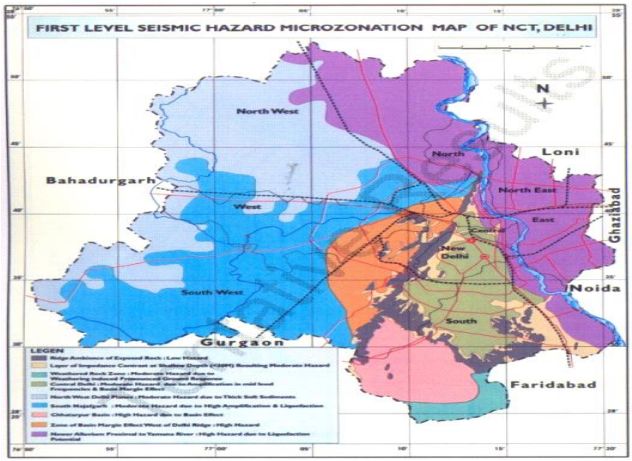
Impact of earthquake in Delhi may compound the expected colossal damage due to liquefaction, physical location and hydrogeology (combination of geology and ground water) details. There is severe threat of liquefaction along the river *Yamuna* areas covering northeast, east and some part of North Central district. A moderate to high threats across the belt running from central district, Central district and South-Central district is also expected. (See Map 2.2)

Delhi lies in the Indo-Gangetic Geosyncline, a down wrap of Himalayan foreland of variable depth that is converted into flat plain by rigorous sedimentation. Gangetic Geosyncline has shown considerable amounts of flexure and dislocation at the northern end, which is bounded by the Himalayan Frontal Thrust on the north. The floor of the Gangetic trough (without all the sediments) shows corrugated inequalities and buried ridges (shelf faults)

Delhi has also sustained earthquake damage in last century. Five earthquakes of Richer Magnitude 5.5 to 6.7 are known to have occurred in the NCT of Delhi or close to it since 1720 AD. For instance, Srivastava and Somayajuluy (1966) mention of (a) Khurja earthquake (M6.7) of 10 October 1956 in which 23 persons were killed in Bulandshahar and some injured in Delhi; (b) M6.0 earthquake of 27 August 1960 near Delhi wherein about 50 persons in Delhi were injured; and (c) an earthquake near Moradabad on 15 August 1966 that killed 14 persons in Delhi. Iyengar (2000) also mentions about damage to one of the minarets of Delhiôs JamaMasjid during the M4.0 earthquakes on 28 July 1994.



Map 2.2: Epicenter around Delhi



And yet, several buildings in Delhi sustained non-structural damage possibility due to peculiar geological and geotechnical features of this area. In the Month of Sept to Nov 2007 minor tremors ranging from 1.6 to 3 on Richter scale have rocked the capital, reminding once again Delhiôs susceptibility to earthquake, one was with epicenter at Bahadur

Garh, Near Central Delhi. Seismic hazard vulnerability strata of Delhi are represented in the map 2.4. Most parts of Central Delhi are moderately **vulnerable** to earthquake. **Map 2.3: Seismic hazard vulnerability strata of Delhi**

The critical areas of concern for the management of earthquakes in Central Delhi include:

- Lack of awareness among various stakeholders about the seismic risk;
- Inadequate attention to structural mitigation measures in the engineering education syllabus; Inadequate monitoring and enforcement of earthquake-resistant building codes and town planning,bye-laws;
- Absence of systems of licensing of engineers and masons;
- Absence of earthquake-resistant features in non-engineered construction in suburban and rural areas;
- Lack of formal training among professionals in earthquake-resistant construction practices; Lack of adequate preparedness and response capacity among various stakeholder groups

Urban Flooding

Urban floods are a great disturbance of daily life in the city. Roads can be blocked; people can't go to work or schools. The economic damages are high but the number of casualties is usually very limited, because of the nature of the flood. Urban flooding is significantly different from rural flooding as 6 organization leads to developed catchments which increases the flood peaks from 1.8 to 8 times and flood volumes by up to 6 times. Consequently, flooding occurs very quickly due to faster flow times, sometimes in a matter of minutes. Encroachments are also a major problem in many cities and towns. Natural streams and watercourses have formed over thousands of years due to the forces of flowing water in the respective watersheds. Habitations started growing into towns and cities alongside rivers and watercourses. As a result of this, the flow of water has increased in proportion to the urbanization of the watersheds. Ideally, the natural drains should have been widened (similar to road widening for increased traffic) to accommodate the higher flows of stormwater. But on the contrary, there have been large scale encroachments on the natural drains and the river flood plains. Consequently the capacity of the natural drains has decreased, which results in flooding.

Improper disposal of solid waste, including domestic, commercial and industrial waste and dumping of construction debris into the drains also contributes significantly to reducing their capacities. It is imperative to take better operations and maintenance actions.

Table: 2.3. Factors Contributing to Urban Flooding

Meteorological Factors	Hydrological Factors	Human Factors
Rainfall Cyclonic storms Small-scale storms	Soil moisture level Groundwater level prior to storm	Land use changes (e.g. Surface Sealing due to urbanization, deforestation) increase runoff and sedimentation

Temperature Snowfall and snowmelt	Natural surface infiltration rate Presence of impervious cover Channel cross-sectional shape and roughness Presence or absence of over bank flow, channel network Synchronization of run-offs from various parts of watershed High tide impeding drainage	Occupation of the flood plain and thereby obstructing flows Inefficiency or non-maintenance of infrastructure Too efficient drainage of upstream areas increases flood peaks Climate change effects, magnitude and frequency of precipitation and floods Urban micro-climate may enforce precipitation events Sudden release of water from dams located upstream of cities/towns Failure to release water from dams resulting in backwater effect Indiscriminate disposal of solid waste

Increasing trend of urban flooding is a universal phenomenon and poses a great challenge to urban planners the world over. Problems associated with urban floods range from relatively 7rganizat incidents to major incidents, resulting in cities being inundated from a few hours to several days. Therefore, the impact can also be widespread, including temporary relocation of people, damage to civic amenities, deterioration of water quality and risk of epidemics.

There has been an increasing trend of urban flood disasters in India over the past several years whereby major cities in India have been severely affected. The most notable amongst them are Hyderabad in 2000, Ahmedabad in 2001, Delhi in 2002 and 2003, Chennai in 2004, Mumbai in 2005, Surat in 2006, Kolkata in 2007, Jamshedpur in 2008, Delhi in 2009 and Guwahati and Delhi in 2010. Urban flooding is a major disaster. Rise in water level of river augmented by poor drainage system can cause serious damage due to water logging. Chronic flood prone areas of the city need to be on high alert during pick rain fall periods. Message regarding Yamuna water level at Old Railway Bridge is being regularly disseminated to district administration. *(Source: NDMA guidelines for urban flooding 2010)*

NDRF's Capacity for Evacuation:

(12 hrs operation within the area of 5 km radius)

Evacuation capacity of 01 NDRF Bn:

12 No. of Inflatable Boats in each NDRF Bn ï 72

Rescue Capacity of each Boat ï 08 (excluding drivers/ rescue personnel)

No. of evacuation trips in 12 hrs ï 24 (time taken in one trip ½ an hr)

No. of people evacuated in 12 hrs ï 72 x 08 x 24 = 13,824

(B) No. of Fibre Boats in each NDRF Bnï 06

Rescue Capacity of each Boat ï 18 (excluding drivers/ rescue personnel)

No. of evacuation trips in 12 hrs ï 24 (time taken in one trip ½ an hr)

No. of people evacuated in 12 hrs ï 06 x 18 x 24 = 2,592

I No. of Boat Assault Universal Type (BAUTs) in each NDRF Bn ï 36

Rescue Capacity of each BAUTï 18 (excluding drivers/ rescue personnel)

No. of evacuation trips in 12 hrs ï 24 (time taken in one trip ½ an hr)

No. of people evacuated in 12 hrs ï 36 x 18 x 24 = 15,552

Evacuation in 12 hrs by one NDRF Bn
= A + B + C = 13,824 + 2,592 + 15,552 = 31,968

[Source: NDMA (2010), Management of Urban Flooding Guidelines]

- **Urban flooding in Central Delhi**

Floods occur when the surface water covers land that is normally dry or when water overflows normal confinements. The most wide spread of any hazard, floods can arise from abnormally high precipitation, storm surges from tropical storms, dam bursts, rapid snow melts, or even burst water mains or overflowing blocked sewers (problems that are becoming more and more relevant to todayôs urban scenarios).

River Yamuna passes through Delhi so there are chances ï no matter how grim ï that floods can affect the city. However floods becomes more relevant in case of Central Delhi District because some of the settlements that fall in the district are on the banks of Yamuna and small seasonal floods also often affect these.

History of Floods in Delhi

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, colonies of north Delhi, namely, Model town, Mukherjee Nagar, Nirankari Colony etc. suffered heavy flood inundation, causing extensive damage to property. The total damage to crops, houses and public utilities was estimated at Rs 176.1 million.

1988: (September)

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

1995: (September)

The Yamuna experienced high magnitude floods following heavy runs in the upper catchmen 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. These persons had to be evacuated and temporarily housed on roadsides for about two months, before they went back to living in the river-bed.

Delhi witnessed the most devastating flood situation in 32 years. More than 7 lakh cusecs of water was released from Hathinikund barrage, Haryana. District North had suffered the most as its vital areas like Jagatpur Village, Yamuna Bank, Qudesia Ghat , Yamuna Bazar Wazirabad, Buddhist Monastery, Aruna Nagar Market,Vijay Ghat, Ram Ghat, Sham Ghat, Kali Ghat,Burari etc are near water bed. The district had already deployed Civil Defence volunteers in the month of August to carry out the search and rescue operations. With the recent alerts in the capital, DDMA (Central) had deployed more CD volunteers as there was a dire need of helping hands.

The Yamuna continued to rise menacingly from 10/09/2010(Friday) and flooded several areas in populous east and north Delhi. According to the Flood Control Department, the Yamuna level rose to 207 metres, 177 cm above the danger mark. The river hit hard both low-income and middle class colonies located close to the river bank. Low-lying areas were inundated. Amid warnings that Delhi could see the most severe flooding since 1978. Around 100 National Disaster Response Force (NDRF) personnel had been deployed to assist the authorities.

2010: (September)

With Haryana releasing a huge volume of water into it, the Yamuna River on 10/09/2010 crossed the danger mark in the capital posing a flood threat. The Yamuna was flowing at 205.00 meters in the evening that day, above the danger mark of 204.83 metres, forcing the authorities to evacuate thousands of people from low-lying areas along the meandering river in the cityôs Central District. The water level on 16/09/10 morning was 205.800 meters.

2013: (June)

Several low-lying areas along the Yamuna were flooded on 18.06.13 as water rose to unprecedented levels reaching 207.2 metres at the Old Railway Bridge. The water level of Yamuna crossed the danger mark of 204.83 metres at on 18.06.13 at 7 AM and it reached 205.58 metres at 7 PM.The water level touched 207.05 meter on 19.06.13 as 9.5 lakh cusecs of water released by Haryana.

Office of DM (Central) had provided rescue, relief and rehabilitation services to the affected people extensively. The victims and their families had been relocated to temporary shelters, away from flooded settlements. Adequate Civil Defence volunteers had been deployed in various affected areas where they assisted in search and rescue, relief as well as rehabilitation work alongwith the district administration. Their duty were divided in 2 shifts comprising of 12 hours each. The volunteers were put on duty to assist in the operation till 15.07.13.

Fogging by the Municipal Corporation had taken place in some of the affected areas, in order to curb the spread of malaria, dengue and other water borne diseases. The victims in the shelters received some benefits by the this Office. Medical ï aid was provided to them free of cost. A lot of people had been benefitted by this service. On the other hand, basic necessities like food and clean water was also taken care of

Table: 2.4. Area of Central district, vulnerable to flooding:

S. No	Vulnerable to flooding		
1	Burari Village	6	Jagatpur
2	Timarpur	7	Mukundpur
3	Bela Road	8	Wazirabad
4	Jharoda Majra Burari	9	ISBT opposite Bus Stand
5	I.T.O	10	Tibetian Monastery area

2.3 Fire Accidents

Fire is also another most frequent hazard in the district. Electrical short circuits or carelessness are major two causes of fire in Delhi. Below data also illustrates that in fact over the time period also fire accidents are increasing.

2.4 Causes of Fire in Central Delhi

The major causes behind the increasing incidents of domestic fire in Central district are electric short-circuit, Kitchen fire, fire caught in garbage disposed, LPG cylinder blast, fault in home appliances etc.

Recurring industrial fire are happening due to lack of proper fire safety norms-industrial units do not follow the fire-safety rules, preparedness and mitigation measures properly, untrained staffs and worker , evacuation plan is not properly developed, lack of awareness about fire safety measures among the people and carelessness, which causes massive fire.

2.5. Collapse of structure

One of the recurrering hazards in Central District, Delhi is collapse of structure building/wall/roof of underconstruction building or residential building especially in unauthorized colonies and walled city. Keeping that in view and to take necessary mitigating and preventive actions Sub-division level Special Task force has been constituted under the chairmanship of concerned SDMs in each of the Sub-division.

Table 2.5. Details of Major Incident's accured in Central District.

Following are the major incident of building collapse / major fire in the Central District in the past 03 years:-

S.No.	Address & Area	Reason of Collapse / fire	Date	Casualty
1.	1810, Bhagirath Place, Chandni Chowk	Could not be ascertained as per report of DFS	13.12.2012	Nil
2.	1549-50, Bhagirath Palace, Chandni Chowk	Short Circuit	27.03.2012	Nil

3.	16/1109-E, Bapa Nagar, Tank Road, Karol Bagh	Under Construction	31.03.2012	1 dead, 3 injured
4.	650, Matke Wali Gali, Sadar Bazar	Kind of fire could not be identified by DFS immediately	27.02.2013	Nil
5.	4443/25, Gali Lotan, Jat Phari Dheeraj	Building old & in a dilapidated condition	09.10.2013	1 dead, 4 injured
6.	4003, Gali Barna, Sadar Bazaar	Building Collapse	01.06.2014	3 dead, 12 injured
7.	House No. 313/4, Gali No. 2, Inderlok, Tulsi Nagar	Building Collapse	28.06.2014	10 dead, 2 injured

In case of disaster at the district level, the District Emergency Operation Centre (EOC) gets activated under Incident Commander (ADM / SDM). The EOC disseminates the information to the Emergency Support Functionaries. EOC also obtains update of the incident situation and establishes a link for continuous communication through dedicated telephone lines and Tetra sets. Incident commander supervises overall management of all functionaries and expedite response whenever required.

In the incident at 1810, Bhagirath Place, Chandni Chowk at around 22:10 hours on 13.12.2012, the ADM (Central) contacted the then Deputy Commissioner (Civil Lines), MCD and asked him to assess the condition of building since as per DFS officials, the building has developed cracks due to fire and is in already a dilapidated condition being more than 80 years old. At around 01:30 hours, it was observed that a portion of the burning building was obstructing the water jet dousing the fire, and fire was also spreading to the adjacent building. The local residents and shopkeepers of the area also requested that the said portion should be demolished so that fire could be controlled / doused off and may not spread to the adjacent building. Therefore, the then Deputy Commissioner (Civil Lines), MCD was contacted at 02:17 hours on 14.12.2012 to send a team of concerned officials to take stock of the situation. The MCD official reached the spot at 03:35 hours and informed that they have only contractual labours and that too only in the day and not in night and they do not have equipment to demolish the building. Meanwhile, with the help of iron cutter broke the shutter of the adjacent building and tried their level best to control / douses the fire. On the next day, till 08:30 AM, no personnel from MCD reached the site for demolition the obstructing portion. A serious problem regarding crowd management was observed as the locals were able to reach DFS personnel and were creating disturbance during the fire fighting operation and directing / diverting them in their work of dousing fire. Another problem faced during the incident that the vehicles of some of the officers of this department were prevented from reaching the site, by police / traffic police in the absence of beacon & siren.

In the fire incident at 1549-50, Bhagirath Palace, Chandni Chowk, the MCD personnel did not reach the site for taking necessary action on the day on which the fire broke out. Further, a serious problem regarding crowd management was observed as the locals were able to reach DFS personnel and were directing / diverting them in their work of dousing fire. If any building catches fire, the fire damages the building to such an extent that it poses danger to itself and the adjacent

buildings. On 27.02.2013, Building No. 1549-50, Bhagirath Palace, Chandni Chowk, Delhi caught fire, however, only the imminently dangerous portion at 5th floor and at terrace was only demolished and rest of the building was left intact posing a threat to the life & property of the neighbours. Despite notice to the then Deputy Commissioner (Civil Lines Zone), North DMC, action taken report on the adjacent buildings from the perspective of safety was not provided to this office.

In the incident at Bapa Nagar, Karol Bagh, the MCD Engineers detected the adjacent buildings development cracks during removal of debris from the site. Therefore, they took some safety measures to ensure that the adjacent building remain safe for the rescue teams. This decision of the MCD and action taken thereafter to secure the adjacent building took almost 18 hours which delayed the rescue operation by 18 hours.

In the incident at Matke wali Gali, Sadar Bazar, serious problem regarding crowd management was observed as the locals were able to reach DFS personnel and were directing / diverting them in their work of dousing fire. The kind of fire was not identified by DFS, as a result, controlled burning was resorted to. The MCD personnel who responded at the incident site were unequipped, so were not able to inspect the building and take necessary action.

In the incident at Gali Barna, Sadar Bazaar the rescue work was collectively carried out by Delhi Fire Service, officials of Sadar-Paharganj zone, North DMC, Delhi Police and DDMA (Central).The rescue work was personally supervised by the ADM (Central) with Deputy Commissioner, Sadar Paharganj zone, North DMC. Most of the obstructive malba has been removed from the site. Delhi Fire Service has given the clearance at 6.30 P.M. that no other person is entrapped or buried under the debris/malba. However, the process of debris removal continued till about 08.30 P.M. As per Commissioner, North DMC letter dated 01.06.2014 they have already directed local police to lodge FIR against the owner and the contractor of the building. They have also placed under suspension Sh. Manoj Nijhawan, Executive Engineer (Bldg.), Sh. V.K. Taneja, Asstt. Engineer and Sh. Jitender Panchal, Junior Engineer for negligence and dereliction of duty with immediate effect. An enquiry into the incident has been instituted. All the officers and Engineers of the Corporation have been directed to strictly ensure that no construction comes up at any place without sanctioned building plan.

In the incident at Tulsi Nagar, Inderlok the rescue work was collectively carried out by Delhi Fire Service, officials of Karol Bagh Zone, North DMC, Delhi Police and DDMA (Central).The rescue work was personally supervised by the DM (Central) with Deputy Commissioner (Karol Bagh Zone) North DMC. The Deputy Commissioner (Karol Bagh Zone) North DMC is being directed to remove malba immediately, complete the rescue operation on warfooting, fix responsibility for the officials who were responsible for allowing this mishap to happen, take legal action on violators, to evacuate the persons living in the adjoining buildings, to assess whether the adjacent building and take necessary action prevent further mishappening.

2.6. Chemical, Industrial and Other Hazards

There is no history of chemical hazard in the district has been noticed but still Central District is prone to Chemical and Industrial hazards. District has listed 4 major hazardous Units within the district where petroleum and gaseous products have been stored, transported and used for various other purposes. (Refer table 2.6).

Table 2.6: List of Hazardous installations

	MAJOR HAZARDOUS UNITS	NATURE OF HAZARDOUS SUBSTANCE USED

1	M/S. HINDUSTAN VEGETABLE OIL CORP. LTD., SUBZI MANDI, NEW DELHI -7.	Vegetable Oil
2	M/s. Delhi Water Works Chanderwal No.1, Behind Old Sectt. , Civil Lines, Delhi -54.	Water Treatment (Handling of Chlorine)
3	M/s. Delhi Water Works, Chanderwal No. 2. Civil Lines, Delhi -7.	Water Treatment (Handling of Chlorine)
4	M/s. Wazirabad Water Works, P.O Timarpur Wazirabad, Delhi -7.	Water Treatment (Handling of Chlorine)
5	Indraprasth Gas Ltd., Metcalfe House	CNG Filling & Storage
6	Indraprasth Gas Ltd., Dheerpur, Burari	CNG Filling & Storage
7	Pragati Power Corporation	Chlorine gas and other petroleum Products
8	New Delhi Railway Station	Railway Accidents
9	Old Delhi Railway Station	Railway Accidents
10	Sarai Rohilla Railway Station	Railway Accidents
11	Sadar Railway Station	Railway Accidents
12	Shivaji Brij Railway Station	Railway Accidents
13	Tilak Brij Railway Station	Railway Accidents

2.7. Hazards from Terrorists/Armed Intrusions/NBC Related Threats

- Central district being a part of National Capital is also under the threat of any form of conventional and contemporary warfare.
- History perceives that generally terrorist attacks takes place in important government building, air ports, cantonment areas, historical monuments, populous places and important public gathering etc. Central Delhi have vulnerable areas such as Red Fort, Jama Masjid, Chandni Chowk, Feroz Shah Kotla Stadium, Rajghat, Delhi Secretariat, Indira Gandhi Indoor Stadium, Ambedkar Stadium, Police Head Quarter, MUNICIPAL CORPORATION Civic Center, New Delhi Railway Station, Jhandewalan Mandir, DJB Head Quarter, ISBT, Karol Bagh, Ghaffar Market etc.
- Being capital city NBC threats are one of the major potential hazard in the district viz-a-viz to state

2.8. Psycho-Social Support and Mental Health Services (PSSMHS)

Psycho-social support in the context of disasters refers to comprehensive interventions aimed at addressing a wide range of psycho-social problems arising in the aftermath of a disaster. A district wise resources list of all skilled and trained manpower, all government and non-government organizations working in the field of PSSMHS shall be prepared. It shall be shared with all the organizations and government functionaries. [Source: NDMA (2010), PSSMHS Guidelines]

2.9. Risk

Risk can be defined as the product of the probability of a defined circumstance occurring and the consequence of the occurrence of said circumstance. From this definition it can be seen that assuming risk may well lead to both positive and negative outcomes. Risk cannot be avoided as long as we do not know what the future holds. Risks also continuously evolve and change. Assuming and managing risk is the essence of any decision-making process. The proper management of risks is one of the biggest challenges that co-operation has to face today. (Dr. Stephan Bieri, UNDP, 2004)

2.9.1. Physical Setup

Terrain, rocks and depth of groundwater do not significantly contribute towards disaster risks.. Central district is largely plain having light texture of soils

represented by alluvial plains. Some areas of the district are comparatively more exposed to the problem of liquefaction due to ipresence of Yamuna River. Anyhow, as entire region falls under Zone IV exposed to a moderate to high level of earthquake.

2.9.2 Socio-Economic Aspect

- The population density is far greater concern during disasters. The composite value of 2.5 (on a scale of 5) reveals overall moderate to high concentrations in the district. Civil Line Sub division consists of agricultural land and village clusters therefore hold rural population density in comparison to the other sub-divisions of the district.
- Residential density is also very high in district. It consists of a large number of squatters, RWAs, slums and walled city area in Kotwali sub-divisions. Therefore this division is also characterized by densely built poor housing structures. These sub-divisions have very small circulations that restrict the entry of many emergency services to enter inside.
- Central district also has a high industrial density. Most of the people are engaged in service and industrial sector. Many squatters and JJ Clusters are also widespread around the industrial areas due to job opportunities and these characteristics make the area more vulnerable to fire hazards. Some of these industries are also engaged in hazardous activities like oil depots, electroplating and other chemical related industries (Economic Census, 2008).

2.9.3 Housing Related Aspects

- The analysis typically comes out with housing concerns, as the housing conditions are bad to worse when it comes to its disaster resistance
- The occupancy rate (persons per room) on an average is very high in the district. This is largely attributed to the shortage of housing and speculation on the housing sector. Central district lies in the area of small-scale industries. There are 14rganizati industrial areas and many other non-conforming areas. Due to large-scale potential of job-opportunities for labour class a sprawl of *jhuggies*, slums and densely built housing clusters are very common.
- As a city-state with the highest per capita income in India it is understood that here purchasing power is good and the analysis supports while proving that in some areas like Karol Bagh, Civil Line, Pusa Road, etc quality of materials used for construction is quite fair but designing and construction part is largely ignored. In addition to that migrants who have settled in the district in search of job opportunities have not used good construction quality and design. There are examples of areas like Burari, Wazirabad and village clusters etc where such practices can easily observed.

2.9.4 Preparedness and Response Aspects

- Preparedness and response measures build capacity of local authority in taking appropriate decisions in case of emergency. Generally local authorities need to take up decisions for conducting search and rescue, communication, transportation, fire fighting, evacuation, and relief and rehabilitation etc.
- The local administrationôs effort in creating public awareness is taking place at large scale .The physical, social, economic, housing and response factors vary significantly across the district but the administration does not have any prioritized initial interventions. The present risk assessment framework provides a

firm basis of delineating the focus areas of intervention in a short time because there the need of know-how is very crucial.

- Medical capacities to manage disasters are another concern area. Although there are beds available the hospitals but all the time occupancy rates remains high. The hospitals do practice large causality management and smooth run of medical resources remains a concern even during the normal operations. They are relatively safe from fire hazards because the fire department is particularly vigilant incase of an institutional building

VULNERABILITY ANALYSIS

Vulnerability Due to Heavy Industrial and organization residential areas

This is a major concern in the district. A large number of fire accidents take place in District Central due to lack of precaution while construction of unauthorized factories and houses. District Central has a large number of unauthorized areas. Unfortunately they neither seek permission from the administration nor take any precaution to prevent calamity. There are a large number of fire accidents in such areas where electricity has been taken illegally from the eclectic poles directly.

Forewarning and Speed of Disaster Onset

In the present scenario, there is no scope of forewarning for any disaster in the district unless it is in the main land of the district. Although warning has been issued for a case like fire accident, the fire fighting teams cannot reach the spot in time due to congested traffic and narrow road. The fruit and vegetable vendors and other small business units occupy most of the roads as well. Besides the poor infra structure facility and heavy traffic in the main roads of district prevent fire fighters entering to the district.

Collapse of Weak Structures

In the recent years large number of cases of building collapse has been visible in District Central. These collapses happen due to illegal construction /weak structures. To manage such incidents become more difficult due to less accessibility of the area and illegal parking of vehicles on the roads.

VULNERABILITY ANALYSIS REGARDING DISABILITIES:-

TYPE OF IMPAIRMENTS AND WARNING SYSTEMS	
Types of Impairments/Disabilities	Warning System
Visual Impairment	• Auditory Signal System/ Alarms • Announcements • Posters written with large characters and colour contrast
Hearing Impairment	• Visual Signal Systems- Red Flag, Symbols • Pictures • Turn lights off-on frequently
Intellectual Impairment	• Special Signals- Red flag, Symbols • Clear and brief announcements by rescue workers
Physical Impairment	• Auditory Signal System/Alarms

	• Announcements

POSSIBLE CONSEQUENCES AND DISABILITIES RESULTING FROM DISASTER		
Types of Hazard/ Disaster	Immediate consequence	Possible impairment/Disability
All natural disasters	• Malnutrition • Vitamin A Deficiency • Psychological shock • Loss of medicines (for diabetes, epilepsy, etc)	• Developmental delay • Visual impairment or blindness • Psychological disorders • Worsened existing disability • Increased risk of developing new disability
Flood	• Drowning	• Respiratory complications
Cyclone/Tornado/ Earthquake	• Trauma • Bodily injury (+/- infection) • Head injury • Burn	• Paralysis, spinal cord injury • Limb loss/amputation • Physical/intellectual disability • Limb deformity

2.10 CAPACITY ANALYSIS

Considering the backwardness of the district it is analyzed that sufficient resources are not available within the district. Material resources, monitory resources and human power are not sufficient to manage any larger calamities.

District Central has decentralized its administration by increasing peopleøs participation in various levels. To take part in this effort it has a large number of Residentøs Welfare Associations (RWA) in the district. The Entire Community Based Disaster Management planning process has been designed in such a way that each RWA territory has to prepare their own plans and sensitize its residents on disaster managements.

At present altogether there are more than 357 RWAs (registered) in the district. Apart from this numerous non-registered RWAs are also working in the field of development.

The Non Governmental Organizations (NGOs) working in District Central plays a significant role in educating the public on various social issues and their rights. Disaster Management is one of the major subjects for them and the District Administration has already started collaboration with such organization for community level disaster management planning.