EARTHUAKE CONTINGENCY PLAN FOR DHAKA CITY

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AFD	Armed Forces Division
AMI	Anjumane Mofidul Islam Bangladesh
Ansar & VDP	Bangladesh Ansar and Village Defence Party
BA	Biman Airlines
BDR	Bangladesh Rifles
BCAA	Bangladesh Civil Aviation Authority
BCG	Bangladesh Coast Guard
BDRCS	Bangladesh Red Crescent Society
BFRI	Bangladesh Forest Research Institute
BGSL	Bakhrabad Gas Systems Limited
BGMEA	Bangladesh Garment Manufacturers and Exporters Association
BIP	Bangladesh Institute of Planners
BIWTA	Bangladesh Inland Water Transport Authority
BKMEA	Bangladesh Knitwear Manufacturer and Exporters Association
BLRI	Bangladesh Livestock Research Institute
BMA	Bangladesh Medical Association
BMD	Bangladesh Meteorological Department
BP	Bangladesh Police
BPDB	Bangladesh Power Development Board
BR	Bangladesh Railway
BRTA	Bangladesh Road and Transport Authority
BRTC	Bangladesh Road and Transport Corporation
BSS	Bangladesh Sangbad Sangstha
BTMEA	Bangladesh Textile Mills Association
BTCL	Bangladesh Telecommunication Company
BTRC	Bangladesh Telecommunication Regulatory Commission
BTV	Bangladesh Television
BUET	Bangladesh University of Engineering & Technology
BWDB	Bangladesh Water Development Board
CAAB	Civil Aviation Authority Bangladesh
CBOs	Community-Based Organizations
CC	City Corporations
CCP	Bangladesh Centre for Communication Programs
CDA	Chittagong Development Authority
CDC	Communicable disease Control
CME	Centre for Medical Education
CMMU	Construction, Maintenance and Management Unit
CPA	Chittagong Port Authority
CPP	Cyclone Preparedness Programme
CWASA	Chittagong Water Supply and Sewerage Authority
DCC	Dhaka City Corporation
DPDC	Dhaka Power Distribution Company Ltd.

DESCO	Dhaka Electric Supply Company Ltd.
DFP	Department of Films and Publications
DG Fisheries	Directorate of Fisheries
DGoF	Directorate General of Food
DG Livestock	Directorate of Livestock
DGHS	Directorate General of Health Services
DMB	Disaster Management Bureau
DMC	Department of Mass Communication
DOA	Department of Architecture
DPHE	Bangladesh Department of Public Health Engineering
DRR	Directorate of Relief and Rehabilitation
DWASA	Dhaka Water Supply and Sewerage Authority
EMS	Earthquake Magnitude Scale
FAO	Food and Agricultural Organization
FBCCI	Federation of Bangladesh Chambers of Commerce
FSCD	Bangladesh Fire Service & Civil Defence
IAB	Institute of Architects Bangladesh
IFRC	International Federation of Red Cross and Red Crescent Societies
IOM	International Organization for Migration
IRC	International Rescue Committee
JICA	Japan International Cooperation Agency
GSB	Geological Survey of Bangladesh
HBRI	Housing & Building Research Institute
IAB	Institute of Architects Bangladesh
IEB	Institute of Engineers Bangladesh
IFRC	International Federation of Red Cross and Red Crescent
INGOs	International Non-Government Organizations
JGTDSL	Jalalabad Gas Transmission & Distribution Co. Limited
LGA	Local Government Agencies
LGD	Local Government Division
LGED	Local Government Engineering Department
LGRD	Local Government and Rural Development
LGRDC	Local Government Rural Development and Cooperatives
MinCom	Ministry of Commerce
MoC	Ministry of Communications
MoCAT	Ministry of Civil Aviation and Tourism
MoF	Ministry of Finance
MoFDM	Ministry of Food and Disaster Management
MoFL	Ministry of Fisheries and Livestock
MoHA	Ministry of Home Affairs
MoHFW	Ministry of Health and Family Welfare
MoHPW	Ministry of Housing and Public Works
MoI	Ministry of Information
MoL	Ministry of Land
NGOs	Non-Government Organizations
NHA	National Housing Authority
NIPSOM	National Institute of Preventive and Social Medicine

OHCHR	Office of the High Commissioner for Human Rights
PDB	Power Development Board
PetroBangla	It is a successor of Bangladesh Mineral Oil and Gas Corporation
PGCL	Power Grid Company of Bangladesh Ltd
PIB	Press Institute of Bangladesh
PID	Press Information Department
PSTN	Public switched telephone Network
PWD	Public Works Department
R&H	Roads and Highways
RAB	Rapid Action Battalion
REB	Rural Electrification Board
RAJUK	Rajdhani Unnyan Kortipakha
REHAB	Real Estate & Housing Association of Bangladesh
RHD	Roads and Highways Department
TGTDCL	Titas Gas Transmission and Distribution Co. Ltd
SoB	Survey of Bangladesh
UNDP	United Nations Development Programme
UN HABITAT	United Nations agency for human settlements
UNHCR	UN High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNRC	Resident Coordinator of United Nations
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
VDP	Village Defence Party
WFP	World Food Programme
WHO (DERG)	World Health Organization (Disaster Emergency Response Group)

EXECUTIVE SUMMARY

The overall goal of the city level Contingency Planning Process is to develop a comprehensive geo-hazard risk reduction "Contingency Planning" strategy that is linked to an easy implementation framework. The framework should be able to address the current needs and issues, which would be implementable at all levels from national, city and agency levels and cover all the phases of disaster risk management from preparedness to response.

The project on Contingency planning with regard to earthquake hazard is comprised of two main Tasks:

- *Task I:* Determine status of contingency planning and design of interim contingency plan
- *Task II:* Turn interim contingency plans into final versions (using maps for selected urban areas that highlight earthquake-vulnerable school/hospital/emergency response and control buildings etc.)

Planning requires the active participation of the stakeholders in planning stage as well as in implementation stage of activities including the post- disaster stage when a review process to be undertaken to identify the effectiveness of plan operations and new challenges. Time becomes more valuable once an emergency occurs, so planning before the emergency is very important, when workloads may be less and institutions involved are more flexible in accommodating the needs. Earthquake happens without any early warning and although stakeholder community in Bangladesh is quite capable of responding to events such as floods, cyclones etc, there is a need for conducting contingency planning in advance. One reason for conducting contingency planning is because it will facilitate a ***rapid emergency response*** by allowing planners more time for advance preparedness measures for response. In advance of an earthquake emergency the planners will be able to:

- Consider different risk scenarios to identify spatial planning needs to suit the distribution of risk
- Consider the likely consequences of an emergency before it occurs
- Conduct capacity assessment to Identify the key resources, both human and physical, which may be available to respond to the emergency
- Identify the critical areas for immediate action

- Build and train the emergency response teams in advance
- Define the policy changes/revisions, new strategies and approaches for responding to emergency in advance

All of these measures allow constructive intervention immediately after the emergency. Team building is particularly useful, as the ability to act as a team may be critical to the success of the initial emergency response. Another benefit to contingency planning is that, before an emergency, there is comparatively more time to consider all the aspects of problems that are likely to arise. Once the emergency has occurred, it may be very difficult to bring all of the players together to discuss the needs. Agreement on policies in the contingency planning stage may help clarify applicability and resolve contradictions that may occur. It will help in filling the policy gaps in providing institutional mandates where needed. ***Rapid decision making*** on operational issues after an emergency is important because delays may cost lives.

The Contingency Planning also serves as a tool for ***maintaining control over events or limiting the risk of loss of control***. Because of the scale of the problems that they pose, earthquakes sometimes provoke erratic or unpredictable responses. Well-intentioned but ill-equipped agencies may rush to help, leading some agencies to over-react to the emergency. The risk of inappropriate responses is much lower when clear plans are in place. The contingency planning process also allows identification of projected needs that may arise as a result of an emergency and the resources that will be immediately available to meet those needs. One benefit of a realistic contingency plan is that it may encourage donors and other development agencies to make arrangements to supplement additional resources for enhancement of available resource base of the agencies involved in plan implementation.

Although the objective of contingency planning is usually the production of a contingency plan, many useful outputs of contingency planning come from the ***process*** through which the plan is developed. Therefore, there are many advantages in a plan prepared through a participatory process through involvement of all major potential actors, agreeing on the broad policies and working groups filling the details of the plan. The final measure of the success of contingency plan should not be a Plan. It does not mean that the plan is not important but the plan should not be a rigid one. The plan should be a measure of the quality of the process and success indicator essentially should be the process as a good planning process will result in a good plan. Even though the earthquake that occurs may be very different from the one planned for, the plan will still be useful. A good contingency plan ensures better preparedness for any emergency that may occur, even one that is very different from the scenario in the plan.

CHAPTER 1: GENERAL ASPECTS OF DHAKA CITY EARTHQUAKE CONTINGENCY PLAN

1.1. THE NEED FOR DHAKA CITY EARTHQUAKE CONTINGENCY PLAN

Being the capital of Bangladesh, Dhaka is the primal city in terms of its political, cultural and economic importance. It is the centre of the country's all administrative and economic activities. The population of Dhaka city (areas under the jurisdiction of the Dhaka city corporation) stands at approximately 6.7 million. The city, in combination with localities forming the wider metropolitan area, is home to an estimated 12.3 million as of 2007. The population is growing by an estimated 4.2% per annum, one of the highest rates amongst Asian cities.

In the generalised tectonic map of Bangladesh, Dhaka is near by the *Modhupur Fault* and *Plate Boundary Fault 3*. The earthquake risk of the Dhaka City is growing with every passing moment because of the unabated growth of human settlement and industrial and other economic activities. The rapid increase in vulnerability of the city is evident from the rapid urbanization, population growth, population migration and development of major economic zones in and around Dhaka. Major causes behind such ever increasing earthquake risk being the haphazard urbanization and sub-standard construction of buildings, residential houses and other infrastructures without any consideration of underlying earthquake hazards. Major reclamation efforts in and around Dhaka increases the potential for liquefaction. During sustained strong shaking, poorly consolidated, water saturated sediments can liquefy and loose their ability to support loads. The foundations and supports of structures built on liquefiable sediments can fail, causing damage or destruction during major earthquakes. Much of the country is of loose sandy soil and most of it remains in saturated condition round the year, thereby increasing the vulnerability to liquefaction in case of sustained ground motions. Possibility of fire outbreaks in an event of an earthquake as a secondary hazard is another source related to possible high economic losses.

On the Contrary, present capacities in disaster management in Bangladesh are largely centred on emergency response and post disaster recovery, which is evident from the flood and cyclone events of high magnitude. But there is a need for a comprehensive geo-hazard risk reduction "Contingency Planning" strategy for low frequency high magnitude events, which occur without warning. Such Contingency Planning efforts should be linked to an easy implementation framework to be able to address the related issues.

Government and Institutional structures, policy and legal framework are some vital features in ensuring clear delineation of aspects of contingency plan preparation and implementation. This is an important step towards longer-term investment in plan preparation and in effective implementation. To achieve further benefits from such an endeavour appropriate spatial planning at all levels is also needed to ensure that the

disaster preparedness is considered early on in the physical planning process. Review of existing legislations and present organizational structure for natural disaster reduction policy making is essential for addressing the need for simplification of procedures, identify future planning strategies and to identify immediate response actions for their effective implementation.

In these circumstances, a Contingency Plan is needed for ensuring better response towards earthquake hazard. ***Contingency Planning is a forward planning process, in a state of uncertainty, in which scenarios and objectives are agreed, managerial and technical actions defined, and potential response systems put in place in order to prevent, or better respond to, an emergency or critical situation.***

Contingency Planning Tasks

- *Task I:* Determine status of contingency planning and design of interim contingency plan
- *Task II:* Turn interim contingency plans into final versions (using geo-hazard vulnerability map)

Realizing this, the Ministry of Food and Disaster Management (MoFDM) through the Comprehensive Disaster Management Program (CDMP) is implementing a project on "Earthquake Risk Assessment and Preparedness in Dhaka, Chittagong and Sylhet City Corporation areas", which is supported by UNDP, UK Department for International Development – Bangladesh (DFID-B) and the European Commission (EC). In August 2006, the European Commission signed a contribution agreement with UNDP Bangladesh for providing technical assistance to facilitate the preparation of earthquake risk assessments and contingency plans within Dhaka, Chittagong and Sylhet cities. The development of contingency plan for earthquake hazard preparedness and mitigation is assisted by Asian Disaster Preparedness Center (ADPC) in association with the National Society for Earthquake Technology – Nepal (NSET) that aims at developing a comprehensive geo-hazard risk reduction "Contingency Planning" strategy that is linked to an easy implementation framework by accomplishing the following two tasks as shown in the *Box 2*.

1.2. LEGAL PROVISIONS, AUTHORITY AND PLANNING RESPONSIBILITY FOR DEVELOPMENT AND IMPLEMENTATION OF THE DHAKA CITY EARTHQUAKE CONTINGENCY PLAN

According to the Standing Orders on Disaster (SOD), Disaster Management Bureau under Ministry of Food and Disaster Management (MoFDM) is responsible for:

- Advising the government on all matters relating to disaster management;

- Maintaining liaison with different government agencies, aid-giving agencies, NGOs and Voluntary Organizations and ensure their maximum cooperation and coordination in all matters of disaster management;

Under this mandate, the Disaster Management Bureau developed the draft *National Plan for Disaster Management 2007-2015*, where a Disaster Management Planning Framework has been incorporated. Within this framework, there are a few hazard-specific management plans, such as Earthquake Management Plan. It is also indicated that this type of plans is multi-sectoral and being divided into two components: risk reduction and emergency response. The earthquake Contingency Plan for Dhaka City has been prepared under the broad framework of the above legal provisions and plans; and, is meant for enhancing the effectiveness of earthquake emergency response.

1.3. AIM OF THE DHAKA CITY EARTHQUAKE CONTINGENCY PLAN

The Aim of the Dhaka City Earthquake Contingency Plan is to create an efficient and effective collaborative approach to Emergency Response & Management at City level with the participation of all city level stakeholders considering seismic hazard which has a potential to create an impact within Bangladesh of various magnitudes and intensity.

Optimization of efforts by first responder agencies in order to:

1. Save lives
2. Provide humanitarian assistance
3. Restoring the lifeline facilities and utilities to bring normalcy within a fastest possible time

Box 3

Dhaka City Earthquake Contingency Plan Promotes:

1. Appropriate command and control mechanism
2. Efficient, effective collaboration & coordination,
3. Partnerships,
4. Trust, mutual respect and understanding among all stakeholders,
5. Arrangements for sharing of resources and experience that will result in a highest level of safety and security of citizens of Bangladesh

Box 4

Through this planning it is aimed at developing process to ensure maximum utilization of available resources, optimisation of efforts by first responder organization in order to do following as shown in *Box 3*.

A strong Dhaka City Earthquake Contingency Plan is considered to be a one that is built on a foundation for DRM that promotes following as shown in *Box 4*.

1.4. GOAL AND OBJECTIVES OF DHAKA CITY EARTHQUAKE CONTINGENCY PLAN

The ultimate goal of this earthquake Contingency Plan is to minimize adverse effects (loss of lives and properties, damage and disruption of critical facilities etc.) of potential earthquakes in the city by establishing and implementing a system of preparedness activities through efficient and effective contingency planning process.

Following major objectives are envisioned to achieve the goal:

- Establish a comprehensive geo-hazard risk reduction "Contingency Planning Strategy" that is linked to an easy implementation framework by ensuring appropriate spatial planning at all levels so that disaster preparedness is considered early on in the decision planning process.
- Define Earthquake Contingency Management relationships city level and create effective coordination mechanisms among all stakeholders at city level
- Identify the earthquake contingency management roles and responsibilities of Ministry of Food and Disaster Management, DMB, first responder agencies, humanitarian assistance providers, life line and utility agencies, at city and agency levels based on their existing mandates, and assigned duties and responsibilities for disaster response
- Provide an organizational structure to integrate those roles and responsibilities into a collaborative national capability to facilitate preparedness, response and recovery to ensure management of earthquake emergencies
- Establish and maintain a fully operational contingency planning process with necessary manpower and resources and ensure clear delineation of the process for contingency plan preparation, review , revision within government and other relevant institutional structures

Following are additional objectives:

- Define the tasks that support the National Disaster Management System, such as vulnerability and risk assessment, data base management, partner relationships, capacity building, public awareness creation for mainstreaming disaster management into development practice

- Help enhance essential support services such as Emergency Operations Center, S&R capacities, Medical First Responder teams, procurement of rescue equipment, establishment of emergency services, training and education opportunities etc.
- Institutionalize an operational Incident Command System (ICS), organizational structure for earthquake emergency management and the concept of operations be incorporated in all Disaster Preparedness and Response Plans, Standing Orders on Disasters as a first step in establishing the National Contingency Management System (NCMS) in Bangladesh
- Extend the organizational structure to facilitate coordination with Academia, NGOs, INGOs, media, private sector and donor agencies etc. to support an effective, contingency management capacity

1.5. SCOPE OF THE DHAKA CITY EARTHQUAKE CONTINGENCY PLAN

This plan details ***Emergency Response Functions*** immediately following a damaging earthquake. It describes the **response system** in place for responding to the situation created and needs required due to the event of a major earthquake in Dhaka City, and also describes a holistic **response structure**, which should be activated from the national level to the affected community. It also provides a **framework for coordination and optimum utilization** of national resources and **mechanism for obtaining support** as arranged by the government, from internal organizations(such as from ministries, line agencies, departments, NGOs, private sector etc.) and international assistance. It covers four specific areas respectively as given below.

- General information that identifies legal provision, authorities & responsibilities, planning objectives and scope for response in the situation related to earthquake hazard;
- Coordination mechanism and extended functions of relevant agencies for the specific earthquake response within the authority of the government. The Response structure is divided in to 9 functional clusters and each cluster is headed by one institution and supported by several institutions. It outlines the SOPs, tasks to be accomplished by the respective institutions (ministries and agencies,) and the type of support to be provided to them by others at the national level;
- Support interventions needed for plan implementation;
- Reporting structure for Readiness by concerned first responder institutions

The Contingency Plan for each functional cluster also identifies the preparedness actions to be carried out for better response during the earthquake events (during the pre-disaster

period) and review process and actions for planning for long term recovery (during the post disaster period).

1.6. PLANNING ASSUMPTIONS

This Dhaka city earthquake contingency plan has been developed with following assumptions in the background:

- Earthquakes are impact type events and provide no warning preventing any pre-event response activities
- Earthquakes within the city will cause large numbers of deaths and injuries and extensive damage and destruction of buildings, emergency facilities and infrastructure as outlined in *Chapter 1* of this plan
- There is likelihood of secondary effects following an earthquake or aftershocks which may include tsunami, fire, flood, liquefactions, subsidence, damming of rivers, landslides, and dam failure, release of hazardous and toxic chemicals
- Strong aftershocks will continue for several days resulting in further building collapse
- Large numbers of persons (hundreds of thousands) will be in need of shelter, welfare, relief assistance, medical care etc.
- Access will be severely restricted due to debris, landslides, collapsed bridges etc.
- Many national and international response and humanitarian organizations other than the government institutions will also be involved during response and recovery to earthquake disaster

1.7. PLAN IMPLEMENTATION STRATEGIES

The following strategy will be adopted in plan implementation as shown in Box 5:

- Set up a system for regular reporting and updates on the readiness of first responder institutions
- Plan & development of national capabilities to translate earthquake risk reduction into Preparedness and Response Plans
- Establish a consistent, collaborative national approach to the Mitigation of impacts of earthquake disasters
- Propose a mechanism to integrate disaster management into national education system
- Propose a mechanism to build the capacity of government and non-government partners by providing training and education on earthquake risk reduction
- Develop a mechanism to improve the relationships among government and non-government organizations during preparedness, response and recovery phases
- Transfer knowledge and state of the art of technologies necessary to support institutional operations and implement operations plans
- Ensure a system for linking contingency planning process with the earthquake hazard and risk assessment system and studies
- Ensure continued functioning and monitoring of the contingency planning process established during the development of this national earthquake contingency plan
- Develop plans, programs and establish mechanisms for raising awareness of common people, professionals and authorities on earthquake contingency plans to ensure wide dissemination and effective implementation

Box 5

1.8. PLAN LIMITATIONS

- The Dhaka City Earthquake Contingency Plan will not, and cannot, address all circumstances
- Bangladesh is prone to many other types of hazards such as floods, cyclones etc and Dhaka City Earthquake Contingency Plan should be incorporated with other Contingency Plans to create a Multi-hazard contingency management framework.
- The Plan assumes that the line agencies will have mandatory provisions and national capacity to deal with assigned tasks. Mandatory provisions for First Responder Organizations, line agencies, ministries, local governments, District authorities etc has to be granted through appropriate policy and legal instruments.
- The relevant Ministries are responsible for provision of resources to carry out earthquake emergency management functions by relevant institutions. Especially institutions involved may need additional resources in terms of qualified manpower, technical as well as financial resources to undertake assigned tasks.
- The Dhaka City Earthquake Contingency Management process is linked to a specified time lag to become fully functional as an integrated system
- The Plan requires that the National Emergency Operations Center is to be established on priority basis to have service functions for a 24/7 schedule with duty officers in place with clearly identified notification protocols.
- The Plan cannot ensure that emergency assistance to communities will arrive in time following a rapid on-set disaster such as earthquake unless the government will have emergency declarations in time. It will depend on effective emergency management system which depends on application of advanced state of the art technology.
- Capable and committed staff with appropriate financial resources, facilities, equipment and supplies is required to implement an effective, long-term program based on the Action Plan.

Box 6

1.9. INTENDED USERS OF THE PLAN

The direct users of this Dhaka City Earthquake Contingency Plan will be the First, Second as well as Third level Responder Agencies in order to save human-lives, provide humanitarian assistance, and restore the lifeline facilities and utilities respectively.

The term 'First Responder' refers to those agencies and individuals who in the early stages of an incident are responsible for the protection and preservation of life, property, and the environment, including emergency response providers as well as emergency management, search and rescue, fire safety, public health, clinical care, and other skilled support personnel (such as equipment operators) that provide immediate support services during emergency operations. In this contingency planning process, the following agencies are identified as First Responder Organizations as shown in Box 8.

First Responder Organizations

- Armed Forces Division (AFD)
- Fire Service & Civil Defense (FSCD)
- Directorate General of Health Services (DGHS)
- Disaster Management Bureau (DMB)
- Department of Relief and Rehabilitation (DRR)
- City Corporations

Box 7

In addition to above, the second level will consist of the utility and life line institutions (water supply, electricity, gas supply, telecommunications, waste disposal etc) transportation systems (road, air, rail, and sea), Para military forces and Police which will be engaged in security, law and order functions. Third Responder Organizations are the others such as line Ministries, Departments, City Development Authorities, NGOs/ INGOs, electronic and paper Media, Community Based Organizations (CBOs), Civil Society Organizations (CSOs), Academia, Development Partners will be the passive users of the plan as they will be providing support services for plan implementation. The ultimate beneficiaries would be the communities at risk to bring normalcy within a fastest possible time.

CHAPTER 2: EARTHQUAKE THREAT IN BANGLADESH AND IDENTIFICATION OF RISK SCENARIO RELATED TO DHAKA CITY

2.1. INTRODUCTION

Over the past decades, urbanization in Bangladesh has been rapidly taking place without proper guidance. As a result many of the urban centers have developed haphazardly. These urban centers are fast growing and influence the economic developments of the country. It is therefore essential to have a realistic understanding on the nature, severity and consequences of likely damage/loss that a possible event of earthquake could cause. A strong earthquake affecting a major urban center like Dhaka, Chittagong, or Sylhet may result in damage and destructions of massive proportions and may have disastrous consequences for the entire nation.

A low to moderate level of earthquake may cause Sevier damages to the life and property that may go beyond the existing capacity of Dhaka City Corporation (DCC). Considering likely earthquake threat in Bangladesh, the Comprehensive Disaster management Programme (CDMP) under the Ministry of Food and Disaster Management of the Government of Bangladesh (GoB), took initiative to develop likely scenarios of earthquake for Dhaka, Chittagong and Sylhet. This report presents the likely building collapse, debris generation, fire hazards and casualties during different level of earthquakes in these three cities and current preparations/ capacity of Dhaka City Corporation to cope with the situation.

2.2. NATURE OF THREATS

Geographically Bangladesh is located close to the boundary of two active plates: the Indian plate in the west and the Eurasian plate in the east and north. In the past there where several earthquakes that caused severe damages to life and properties. Some of the major earthquakes around the region includes the 1548 earthquake, the 1664 earthquake, the 1762 earthquake, the 1869 Cachen earthquake (Ms 7.5), the 1885 Bengal earthquake (Ms 7.0), the 1897 Great Assam earthquake (Ms 8.1), and the 1918 Srimangal earthquake (Ms 7.6) (Earthquake in website “Banglapedia”; Oldham, 1883; Ambraseys, 2004; Bilham and Hough, 2006 etc). However, recently Bangladesh did not experience with any large earthquake since 20th century for about 100 years. The 1918 earthquake is thought not to be a characteristic one, since the magnitude is small for the plate boundary fault. This may mean that Bangladesh has a high risk of large earthquake occurrence in near future. Several

major active faults, e.g. the plate boundary fault (the northern extension of subduction fault) and the Dauki Fault, are inferred in Bangladesh. These faults must generate large earthquakes over M 8. However, the nature, detailed location, and the faulting history on these faults are not well known yet (Morino, 2009).

2.3. POTENTIAL DAMAGE IN DIFFERENT SCENARIOS OF EARTHQUAKE

Three different scenarios have been developed to identify the possible damage to infrastructures, buildings, transportation and number of casualties. The scenarios are least, moderate and worst case as assumed based on different magnitude of earthquake. Following are the scenarios of elements at risk in Dhaka city.

Buildings Damage

During an earthquake at 7.5 Mw originated from Madhupur fault, about 166,570 buildings will be moderately damaged. This is about 51.00 % of the total number of buildings in the city. It is estimated that about 75,218 buildings that will be damaged beyond repair. If the magnitude of the earthquake is 8.0 Mw, about 93,605 buildings will be at least moderately damaged which is about 29.00 % of the total number of buildings. During an earthquake originated from under the city at 6.0 Mw will moderately damage about 136,434 buildings and about 53,989 buildings will be damaged beyond repair.

Collateral Hazards

There might be several hazards due to earthquake which may affect structures as well as may cause damage to human life and increase economic losses. These collateral hazards include fire, debris generations etc. Following are the possible fire hazards and debris generation that may appear due to earthquake in Dhaka.

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. For this scenario development, possible estimation has been made using Monte Carlo simulation model to get the number of ignitions and the amount of burnt area.

During an earthquake of 7.5 Mw originated from Madhupur Fault, there will be 920 ignitions that will burn about 4.12 sq. mi 9.04 % of the city area. It is estimated that the fires will displace about 701,134 people and burn about 1,577 (millions of dollars) of building value. Similarly an earthquake originated from Plate boundary fault-2 will be responsible for 918 ignitions that will burn about 4.08 sq. mi 8.95 % of the city area. It is

also estimated that the fires will displace about 726,606 people and burn about 1,665 (millions of dollars) of building value. The earthquake if originated from under the city of 6.0 Mw will be responsible for 920 ignitions that will burn about 4.22 sq. mi 9.26 % of the city and the fires will displace about 730,857 people and burn about 1,563 (millions of dollars) of building value.

Debris Generation

Estimated the amounts of debris that will be generated by the earthquake are categirized into two general categories:

a) Brick/Wood

b) Reinforced Concrete/Steel.

This distinction is made because of the different types of material handling equipment required to handle the debris.

During an earthquake of 7.5 Mw originated from Madhpur Fault a total of 30,599.00 million tons of debris will be generated. Out of this, Brick/Wood comprises 22.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 1,223,960,000 truckloads (@25 tons/truck) to remove the debris generated by the earthquake. Similarly an earthquake originated from Plate boundary fault-2 will generate a total of 19,147.00 million tons of debris of which Brick/Wood comprises 19.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 765,880,000 truckloads (@25 tons/truck) to remove the debris generated by the earthquake. The earthquake if originated from under the city of 6.0 Mw, will be responsible for generation of a total of 21,059.00 million tons. Out of this, Brick/Wood comprises 23.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 842,360,000 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

2.4. POTENTIAL CASUALTIES IN DIFFERENT SCENARIOS OF EARTHQUAKE

In order to take necessary preparation by different agencies, during earthquake study under CDMP, the numbers of people that will be injured and killed by the earthquake have been estimated into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening

- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimations are for two times of day: 2:00 AM and 2:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum and the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum. Following are the description on the casualties in the city of Dhaka in different time on different scenarios.

During an earthquake at 7.5 Mw originated from Madhupur fault at night time, about 18 thousand people will be killed immediately after the earthquake. About 9 thousand people will require hospitalization and can become life threatening if not promptly treated, about 50 thousand people will require hospitalization but are not considered life-threatening and about 150 thousand people will require medical attention like first aid or some kind of treatment. Similarly about 2 thousand people will be killed, one thousand need to be hospitalized on a critical condition, seven thousand need to be hospitalized on moderate injuries and about 24 thousand people will require medical attention if there is an earthquake at 8.0 Mw from plate boundary Fault-2. During an earthquake originated from under the city at 6.0 Mw, about 13 thousand people will die immediately, about seven thousand people will need to be hospitalized on a critical condition, about 38 thousand people will require taking admission in hospital with moderate injuries and about 110 thousand people will require medical attention.

Table: Casualties in Dhaka during different cases in Different Time

Time and Case	Level of casualties			
	Level 1	*Level 2*	*Level 3*	*Level 4*
2 AM				
Case 1	*152,307*	*50,905*	*9,028*	*17,884*
Case 2	*23,965*	*6,952*	*1,139*	*2,251*
Case 3	*110,753*	*37,265*	*6,671*	*13,216*
2 PM				
Case 1	*137,582*	*45,810*	*8,221*	*15,892*
Case 2	*32,021*	*9,433*	*1,572*	*3,021*
Case 3	*91,863*	*30,759*	*5,586*	*10,804*

Source: Hazus calculation based on database, engineering geology and seismic hazard

An earthquake at 7.5 Mw originated from Madhupur fault at day time, will kill about 16 thousand people immediately after the earthquake. About 8 thousand people will require hospitalization and can become life threatening if not promptly treated, about 46 thousand people will require hospitalization but are not considered life-threatening and about 137 thousand people will require medical attention like first aid or some kind of treatment. Similarly about 3 thousand people will be killed, one thousand five hundred need to be hospitalized on a critical condition, nice thousand five hundred need to be hospitalized on moderate injuries and about 32 thousand people will require medical attention if there is an earthquake at 8.0 Mw from plate boundary Fault-2. During an earthquake originated from under the city at 6.0 Mw, about 10 thousand people will die immediately, about five thousand five hundred people will need to be hospitalized on a critical condition, about 30 thousand people will require taking admission in hospital with moderate injuries and about 92 thousand people will require medical attention.

2.5. POSSIBLE AVAILABILITY OF HOSPITAL BED AFTER AN EARTHQUAKE

During scenario development for three cities, available hospital beds and other facilities are considered. Based on these, following is a likely scenario of hospitals to cope with the situation.

In Dhaka there are about 59,849 hospital beds available for use. On the day after an earthquake of 7.5 Mw, it is estimated that only 26,171 hospital beds (44%) will be available for use by patients already in the hospital and those injured by the earthquake. After one week, 57% of the beds will be back in service. By 30 days, 73% will be operational. After an earthquake at 8.0 Mw only about 28,265 hospital beds (47%) are available for use by patients already in the hospital and those injured by the earthquake. During this situation after one week, about 63% of the beds will be back in service and by 30 days, 80% will be fully operational. In least case during an earthquake at 6.0 Mw about 38,489 hospital beds (64%) will be available for use by patients already in the hospital and those injured by the earthquake during first day. After one week, 78% of the beds will be back in service. By 30 days, 88% will be operational.

2.6. ESSENTIAL FACILITIES DAMAGE IN DHAKA CITY CORPORATION AREA

There will be severe damage to essential facilities like Hospital, schools, police stations after different level of earthquakes. An earthquake at 7.5 Mw originated from Madhupur fault will be responsible for damaging about 197 hospital or clinics in Dhaka city and 10 will be totally damaged. About 90 schools will be totally damages. However 21 police station and 4 fire service stations will be moderately damaged.

Table: Expected Damage to Essential Facilities in Dhaka City Corporation Area

Classification	*Total*	*Facilities*		
		At Least Moderate Damage >50%	*Complete Damage >50%*	*With Functionality >50% on day 1*
Dhaka : Case 1				
Hospitals	*600*	*197*	*10*	*280*
Schools	*2,737*	*857*	*90*	*1,241*
EOCs	*1*	*0*	*0*	*1*
Police Stations	*62*	*21*	*0*	*23*
Fire Stations	*10*	*4*	*0*	*5*
Dhaka : Case 2				
Hospitals	*600*	*22*	*1*	*431*
Schools	*2,737*	*97*	*2*	*2,029*
EOCs	*1*	*0*	*0*	*1*
Police Stations	*62*	*1*	*0*	*46*
Fire Stations	*10*	*0*	*0*	*7*
Dhaka : Case 3				
Hospitals	*600*	*178*	*0*	*301*
Schools	*2,737*	*791*	*0*	*1,294*
EOCs	*1*	*0*	*0*	*1*
Police Stations	*62*	*17*	*0*	*25*
Fire Stations	*10*	*4*	*0*	*5*

An earthquake at 8.0 Mw from plate boundary Fault-2 will moderately damage 22 hospitals and one totally damage. However 431 hospital or clinics will be fully functional on the first day. During this situation 97 schools will be moderately damaged and fire service & police station will remain normal. During an earthquake originated from under the city at 6.0 Mw, about 178 hospital or clinics will be moderately damaged. About 791 schools, 17 police station and 4 fire service station will be also moderately damage at the same time.

2.7. UTILITY DAMAGE IN DHAKA CITY CORPORATION AREA

An earthquake at 7.5 Mw originated from Madhupur fault will be responsible for moderate damage to potable water at 153 points, waste waster at 2, natural gas at 2 points, electrical power at 15,200 and communications at 5 places. During this period there will be 79 leaks and 272 breaks in water supply system, 107 leaks & 360 breaks in waste water system and 56 leaks & 191 breaks in gas supply network.

Table : Expected Utility System Facility Damage in Dhaka City Corporation Area

System	Scenario 1 Number of Locations					Scenario 2 Number of Locations					Scenario 3 Number of Locations				
	Total Number	With at Least Moderate Damage	With Complete Damage	With Functionality >50%		Total Number	With at Least Moderate Damage	With Complete Damage	With Functionality >50%		Total Number	With at Least Moderate Damage	With Complete Damage	With Functionality >50%	
				After Day 1	After Day 7				After Day 1	After Day 7				After Day 1	After Day 7
Potable Water	748	153	0	548	748	748	0	0	747	748	748	4	0	676	748
Waste Water	14	2	0	0	14	14	0	0	14	14	14	0	0	0	14
Natural Gas	7	2	0	2	7	7	0	0	7	7	7	7	7	6	7
Electrical Power	54,815	15,200	0	0	0	54,815	0	0	5,497	0	54,815	405	0	0	0
Communication	30	5	0	0	29	30	0	0	0	29	30	1	0	0	29

Table : Expected Utility System Pipeline Damage in Dhaka City Corporation Area

System	Scenario 1			Scenario 2			Scenario 3		
	Total Pipelines Length (km)	Number of Leaks	Number of Breaks	Total Pipelines Length (km)	Number of Leaks	Number of Breaks	Total Pipelines Length (km)	Number of Leaks	Number of Breaks
Potable Water	1,118	79	272	1,118	39	132	1,118	39	139
Waste Water	630	107	360	630	62	202	630	58	202
Natural Gas	834	56	191	834	26	86	834	26	94

An earthquake at 8.0 Mw from plate boundary Fault-2 all facilities will remain under operations from the first day of earthquake. During an earthquake originated from under the city at 6.0 Mw, all 7 points of natural gas system will be completely damaged. During this period there will be moderate dame to electrical power at 405 places. Waster water operation will remain under operation after seven day in all 14 points and potable water will be functional after 7 days in all places. During this period there will be 39 leaks and 139 breaks in water supply system, 58 leaks & 202 breaks in waste water system and 26 leaks & 94 breaks in gas supply network.

CHAPTER 3: CONCEPT OF OPERATIONS

3.1. GENERAL OPERATIONS

Much has been written in regards to Bangladesh's vulnerability to a number of natural and man made disasters. While cyclones and floods may pose the greatest risk to Bangladesh at a national level, it has been identified that the North Eastern and South Eastern regions of Bangladesh are vulnerable to earthquake (Bangladesh Disaster Risk Management Profile 2006). As per the seismic macro-zonation studies, urban areas such as Chittagong, Sylhet, Dhaka, Rangpur, Bogra, Mymensingh, Comilla, Rajshahi are located within possible seismic active zone. Although some level of awareness is raised among population by various institutions the country is far behind the minimum preparedness level to face such a disaster occurrence in any of such urban areas. This chapter provides a more detailed indication of the current situation with regards to potential earthquake emergencies under which this plan operates and the principles of operation that are utilised within Bangladesh.

Management Principles

In the draft National Policy for DM, the highest priority during and after a disaster has been accorded to response, relief and immediate recovery of essential services, and to medium and longer term reconstruction and rehabilitation to a higher standard than before the occurrence of the disaster.

In the emergency phase, main focus of the agencies involved in first responder functions and managing the earthquake emergency situation will be to:

- Save lives
- Provide humanitarian assistance to victims
- Restoration of life line facilities to reduce or minimize the hardships

Operations Principles

In the pre-disaster phase the DMB will play a lead role in coordinating and ensuring preparedness of first responder organizations for effective management of response activities in partnership with other stakeholder agencies. During disasters the Armed Force Division will take the lead role in responding to the emergency situation. The main function of Search and Rescue of victims will be handled by AFD with support from FSCD. Para-

military forces, Police and community first responders will assist the professional S&R personnel employed by FSCD and AFD.

The Relief and welfare of victims during disasters will be handled by the DRR. In relief and temporary shelter management, strict adherence will be ensured to social justice, equitable distribution of relief, neutrality and impartiality in the provision of assistance and respect for the dignity, values and culture of affected persons. Due consideration will be given to activities with respect to Internally Displaced Persons (IDPs) as a result of earthquakes and collateral hazards associated with primary and secondary events. DMB and DRR will coordinate with Ministry of Food & Disaster Management as required.

Currently, there are several ministries and agencies handling different functions related to post disaster recovery, rehabilitation and reconstruction. During the post disaster period DMB will coordinate on behalf of the MoFDM with all these ministries and agencies as relevant, in planning the long term recovery and to review the success of plan operations for necessary mortifications.

Capacity Assessment

The shortfalls in existing capacities for responding to the needs during the disaster situation will be tied to a scenario based assessment and can be analysed only after **production of hazard, vulnerability maps and loss estimation using HAZUS**. The capacity of respective first responder organizations needed to respond to such scenarios will be determined against the potential earthquake events (of magnitude "xyz") that impact the cities of Dhaka, Chittagong, and Sylhet. The devastating effects, severity of impacts will be compared against the ability of first responder organizations in terms of their manpower, equipment, material, location of institutions and proximity to the potential zones of high impact, health care needs for mass casualty treatment, and all other needs to respond to earthquake emergencies.

3.2. STANDARD OPERATING PROCEDURES (SOP)

National Earthquake Contingency Plan is a plan for management of earthquake emergencies of any magnitude which describes the management arrangements; relationships; strategies and mechanisms for ensuring effective response to the earthquake emergency situations if and when they occur, in different scenarios. The SOPs are needed to:

- Execute the command control structure for plan implementation and highlight the operating procedures of the plan in relation to respective first responder organisations
- Develop a reporting structure between the National Emergency Operations Center and first responder organisations
- Guide the individuals within the first responder organizations who are members of the overall response structure to discharge the assigned roles of the institution effectively

Standing Operating Procedures (SOP's) should guide the respective first responder organization to effectively discharge the assigned responsibility of each organisation or agency that has a role to play within this National Earthquake Contingency Plan. The SOPs for each responder organization have been developed and provided in the Agency level Contingency Plans.

The individual agencies are supposed to further expand the SOPs to reflect the vertical level functional responsibilities and horizontal level coordination, control & command structure within the organization.

Through the SOPs, the first responder organizations under the National Earthquake Contingency Plan should develop a reporting structure to report to the National Emergency Operations Center.

The National Emergency Operations Center, which is being established separately, will deal with in detail the tasks of Emergency Operations, including all activities ranging from early warning through immediate recovery of essential services and public utilities, covering in detail the emergency response and operations procedure for multi-stakeholder response in disaster or emergency situations in different scenarios. In case of earthquakes, since there is no time for early warning the response functions will start soon after the occurrence of earthquake but contingency plan has to be activated through an announcement by the Hon. Prime Minister on the advise on the Secretary, Ministry of Food and Disaster management and the Director General of Disaster Management Bureau(DMB).

3.3. STAKEHOLDERS

There are a number of institutions (ministries, departments, line agencies etc.) who have crucial roles to play during the disaster situation. Such institutions are the key stakeholders of this contingency plan and they must be involved in every step of the plan development process. Each stakeholder has different types and levels of functional responsibility associated with the comprehensive earthquake contingency plan. Table 3.1 shows a range

of different stakeholders and the functions they are supposed to carry out during the disaster events as well as in the plan development and implementation process.

Table 3.1: Stakeholders of National Earthquake Contingency Management

AGENCY	BROAD AGENCY LEVEL FUNCTIONS
Ministry of Food and Disaster Management (MoFDM)	• Plan administration • M&E
Disaster Management Bureau (DMB)	• Plan development, review and revisions • Coordination among stakeholders and facilitate development of Agency level plans • organize training and public awareness activities related to plan implementation • operate an emergency operation center • facilitate preparation of Union, Thana and District level DM plans
Directorate of Relief and Rehabilitation (DRR)	• Relief Operations and welfare of victims after disaster events • Maintenance of Camps for displaced • Execution of Rehabilitation schemes • Assistance for Contingency Plan Development • Assistance for DM plan preparation of Union, Thana and District levels
Armed Forces Division (AFD)	• Ensure Safety and security of Victims during disaster events • Search and Rescue(S&R) operations • Response actions such as distribution of food, water, medicines and first aid assistance, • Support the actions by Govt. agencies to ensure the welfare of victims • Security for critical facilities • Post disaster immediate Recovery actions • Assistance for Rehabilitation of most essential Infrastructure
Fire Services and Civil Defence Directorate (FSCD)	• Fire fighting • Search and Rescue • Logistics assistance • Support the activities undertaken by Govt. agencies and AFD
Bangladesh Police (BP)	• Maintenance of law & order

	• Safety of Victims • Traffic control during emergencies
City Corporations/ Office of the Commissioners	• Assistance to Govt. agencies and AFD for ensuring the safety and welfare of victims during disaster events • Assist in cleaning and disposal of debris during disaster events • Undertake City development projects to ensure safety of city dwellers • Undertake measures to ensure Conservancy, sanitation within the city • Maintenance of open areas, green areas, parks, recreation etc of city dwellers
Directorate General of Health services (DGHS)	• Health and hygiene • Medical care of victims • Triage • Recovery program assistance • Psycho-social activities for victim families
Bangladesh Power Development Board (BPDB)	• Emergency power supply to critical facilities • Restoration of power supply
Water and Sewage Authority(WASA)	• Emergency water supply • Rehabilitation of Water supply lines, storage, pumping stations
City Development Authorities	• Approval of building permits • Mitigation and preparedness measures through physical planning • Land use control • Recovery program assistance
Gas Supply Agencies	• Restoration of facilities • Rehabilitation and reconstruction
Bangladesh Telecommunication Regulatory Commission (BTRC)	• Emergency tele-communication • Restoration of destroyed facilities • Emergency telephone facilities for Emergency Response personnel
Roads and Highways Agencies	• Restoration of damaged roads, bridges • Rehabilitation and reconstruction operations • Emergency arrangements for Road sector (temporary bridges, repairs etc.)
Professional bodies(Bangladesh Institute of Planners, Bangladesh Institute of Architects, Bangladesh Institute of Engineers, Real Estate & Housing Association of Bangladesh (REHAB), other Professional Bodies, individual Consultants	• Recovery program design assistance • Rehabilitation and reconstruction assistance • Research, • Planning, Implementation support • Technology transfer • Knowledge management

Academia	• Research on Vulnerability & Risk assessment • Capacity building • Technology transfer • Assistance in Recovery program design
Bangladesh Red Crescent Society (BDRCS), International Federation of Red Cross and Red Crescent Society (IFRC), NGOs, International NGOs, Non-Profit Organization, Religious Groups	• Assistance for Contingency Plan implementation • Welfare of victims (camp maintenance, health and sanitation etc.) • Relief distribution • Community health and sanitation • Community first aid and Physio social support for victim families • Awareness creation and social marketing • Community and household level preparedness
Community Based Organizations (CBOs)	• Community level relief and response activities • Awareness creation and social marketing • Community and household level preparedness
Media	• Public awareness • Information dissemination • Situation reports and early warning dissemination
Private Sector	• Resources • Training & Education • Plan implementation support
Donor agencies	• Provision of Resources
UN agencies	• Technical assistance for response and early recovery • Guidance on International conventions • Resources for early recovery

Several formal and informal meetings, consultations were conducted to identify key stakeholders and their mandates and possible roles during disaster events as part of this contingency plan development process. Many agencies participated in the process with clear mandates and roles for disaster response. However, some of them participated in the process with or without clear agency mandates; because of organization missions; concern for safety; community responsibilities. When final considerations are made on institutional mandates, consideration must be given to those who do not have mandates, in order to create appropriate mandates. When such mandates are created, initiative should be made to integrate the same in to the process effectively.

3.4. MANAGEMENT

Successful preparation and implementation of the Plan requires a well-designed management framework, including the four phases of good management: leadership, planning, organizing, and monitoring and review. The Earthquake Contingency

management plan has paid special attention to create a comprehensive and effective management structure.

Leadership for plan management

The Government of Bangladesh has made a strong commitment to the protection of life and property of the people and the environment of Bangladesh from the consequences of disasters. The Ministry of Food & Disaster Management on behalf of the Government of Bangladesh shall take the lead role in disaster risk management activities as shown in the box 8.

The MoFDM has been set up to:

- facilitate implementation of DM projects and programs;
- design and implement programs;
- coordinate Monitoring and Evaluation of DRM programs; and,
- Provide technical assistance and administrative support. **Box 8**

The Ministry of Food & Disaster Management shall undertake the leadership responsibility for implementation of the *National Earthquake Contingency Plan* endorsed by the National Council for Disaster Management (NCDM) and the Disaster Management Bureau (DMB) will coordinate the process of contingency plan development with the support of all other stakeholders facilitating all efforts.

Planning process

The tasks shown on the *National Earthquake Contingency Plan* demand careful planning to accomplish the results expected. In compliance with the current mandatory provisions, a number of Cluster s/committees have been established to facilitate plan implementation. The reporting mechanism for reporting the readiness of first responder agencies has been established. The reports should reach the Secretary, Ministry of Food & Disaster Management for onward reporting to National Council for Disaster Management (NCDM) for further advice and guidance. The Disaster Management Bureau (DMB) will be the operational arm of Ministry of Food & Disaster Management in coordinating operations for achieving programme goals and objectives necessary to accomplish the tasks included in the *National Earthquake Contingency Plan*. With the guidance and approval of the Ministry of Food & Disaster Management and National Council for Disaster Management (NCDM), the DMB will undertake various interventions to mainstream *National Earthquake Contingency Plan* tasks as a component of development planning.

A Working Group has been appointed as a follow up to the Round Table Meeting of various key stakeholders which was participated also by the Secretary, Ministry of Food and

Disaster Management. The Round Table Meeting was participated by Heads of the institutions which have key roles in earthquake disaster risk management. Members for the Working Group are being nominated by these institutions for continuous update and planning to the contingency plan, and regular monitoring of its implementation. The members of the working Group include specialists, technical experts and members representing different stakeholder agencies handling different aspects of earthquake risk management. This Working Group also provides advice in specific contingency plan activities and functions at the respective levels.

3.5. MONITORING AND EVALUATION

The plan has identified specific elements and tasks to operationalize the plan and develop a work plan for the future. The Monitoring and Evaluation Plan (M&E) should be part of the overall work plan for implementation of the *National Earthquake Contingency Plan*. Monitoring and evaluation of each step identified in the work plan is necessary to ensure that the Contingency Plan goals and objectives are being met. A benchmark study prior to project initiation and review of standards and guidelines applicable to respective project provides evaluation criteria against which project milestones can be measured. Monitoring against the established evaluation criteria may be carried out in a number of ways: reporting requirements; field visits; progress reports for each activity in the work plan; and development of a reporting system for reporting the readiness of First Responder Organizations. The regular reports submitted to DMB by First Responder Organizations will help in comparison of status against initial evaluation criteria.

Regular monitoring and evaluation enables changes in direction, refinement of approaches and elimination of unproductive activities. It also will help to improve the resource base in terms of man-power, equipment etc. The capacity building programs should address the manpower needs of the First Responder Organizations. Monitoring and evaluation should be done on a regular basis (may be bi-annually) and or following major disaster events. The Plan tasks have to be reviewed against the expected outcome and modifications should be executed in areas where improvements are needed.

3.6. FUNCTIONAL RESPONSE CONCEPT

After the occurrence of a damaging earthquake and its impact on a community, there will be a huge task of different emergency response activities starting from damage assessment and need analysis (DANA), control of fires, rescue of trapped persons, treatment of injured to providing shelters and relief supplies to the displaced people. The following is the list of key response activities after any earthquake disaster.

- General Search and Rescue
- Specialist Search and Rescue
- Health and Medical Service
- Request for external assistance for search and rescue
- Law Enforcement & Security
- Emergency Shelter & Mass Care
- Fire-fighting/Rescue
- Communications
- Damage Assessment
- Identification, Care & Disposal of Dead (Coroner)
- Hazardous Material Response
- Relief Coordination
- Relief distribution
- Health & Welfare of Visitors
- Building inspection & demolition
- Inspection of Bridges overpasses, debris, etc
- Inspection of Silos, smoke stacks petroleum tank Farms etc
- Inspection of dams, reservoirs etc
- Public Information announcements &warnings
- Transportation
- Finance and Claims
- Restoration
- Utilities
- Pollution of Waterways & Marine Environments
- Impact Assessment

These emergency tasks can be grouped into a number of functional groups as a planning vehicle through which responsibilities can be assigned to a group of relevant organizations for lead and support functions. When clustering them into functional groups attempts will have to be made to identify institutions responsible for each activity. Assigning functional responsibilities to clusters and identifying lead and support institutions needed for easiness of operations, maintain the command, control structure and undertake training and capacity building operations by fixing the accountability to lead agencies in each cluster.

3.7. FUNCTIONAL GROUPS/ CLUSTERS

Usually many agencies are involved in accomplishing the above mentioned response activities immediately after occurrence of earthquake. However, experiences have shown that these response activities are extremely complicated and no single agency alone can perform any of the response activities fully; all related organizations have to work together in a coordinated manner for optimum and efficient response. All agencies need to work

together in a systematic manner so that their capacities and resources are best utilized to fulfil the need complimenting and supplementing other agencies. Realizing the need of coordinated and comprehensive emergency response, United Nations has been promoting its humanitarian response activities in a cluster approach. This approach is proved to be effective and efficient in responding to recent disasters for example the response during Oct. 8, 2005 earthquake in Pakistan. Hence, it has been decided that this concept of response operations in functional clusters be applied in Bangladesh also in case of possible earthquake disaster.

In this approach, all response activities are grouped into relevant functional clusters based on the similarity of works, normal time and disaster time mandates of different relevant organizations and possible complimentarity in the resources and capacities.

With the inputs from several formal and informal consultative meetings with key stakeholders, Round Table and Working Group Meetings, and also from the guidance of Technical Advisory Group of this Contingency Plan development process, the different functional response groups (clusters) decided to be applied in Bangladesh are included in Box 9.

Operational Functional Groups

- Emergency Operations Cluster 1– Overall Command and Coordination
- Emergency Operations Cluster 2 – Search, Rescue and Evacuation
- Health Cluster
- Relief Services (Food, Nutrition and other Relief) Cluster
- Shelter (Including Camp Management) Cluster
- Water Supply, Sanitation and Hygiene Cluster
- Restoration of Urban Services Cluster
- Transport (Road, Rail, Air, Sea) Cluster
- Security and Welfare Cluster

Box 9

Main response activities to be performed and identified lead agency for each of the functional response groups are listed in the following Table:

Table 3.2 Functional Response Groups (Clusters), Major Activities and Identified Lead Agencies

Functional Clusters	Activities to be performed	Lead agency	Global Cluster Partners (proposed)
Emergency Operations Cluster 1 – Overall Command and Coordination	• Notification of earthquake occurrence to/from concerned authorities • Conduct rapid Damage and Needs Assessment, compile emergency response needs and coordinate for appeals • Operationalization of agency, city etc. level Emergency Operations Centers (EOCs) • Facilitation and coordination for response operations o Command, control, Coordination among response institutions o Maintain proper chain of command o Facilitation for logistics and relief transport o Lead and operational zing the Incident Command System (ICS) o Compile reports regarding response operations • Information dissemination (media) and communication	MoFDM (National EOC)	UNOCHA, UNRC
Emergency Operations Cluster 2 – Search, Rescue and Evacuation	• Light Search and Rescue at the neighbourhood level • Specialized search and rescue • Rubble removal • First Aid & First Medical Response to provide emergency medical treatment • Field level victim triaging • Victim Transportation • Medical care of victims and injured people • Evacuation from hazardous areas • Fire safety & rescue	FSCD	IFRC
Restoration of Urban Services Cluster	• Quick restoration of critical services (electricity, communication, transportation and other critical services) • Detail damage assessment of buildings, infrastructures and other facilities • Restoration and rehabilitation of utilities and services	City Corporations	UNDP

Functional Clusters	Activities to be performed	Lead agency	Global Cluster Partners (proposed)
Health Cluster	• Preparedness planning for Hospitals • Arrangements for Medicare for injured • Child care and reproductive health • Medicare for sick people • Counseling and Psycho-social trauma support • Mortuary services • Epidemic control • Immunization	DG-Health services	WHO
Relief Services (Food, Nutrition and other Relief) Cluster	• Needs analysis survey (to identify needs for victims) • Supply and distribution of food items • Supply and distribution of non-food and other relief items	DRR	UNICEF, IFRC, WFP
Security and Welfare Cluster	• Management of dead & Missing • Security arrangements, Maintenance of law and order • Security (security of people and properties) • Traffic control • Maintenance of Information on dead and missing • Identification and reunification of displaced people	BP	UNHCR/OHCHR/UNICEF
Shelter (Including Camp Management) Cluster	• Establishment of temporary shelters • Collection and distribution of emergency shelter items eg. tents, tarpaulins etc. and assistance to people for erecting such emergency shelters • Identification of people those needing shelters in camps • Identification of Camps for displaced • Shelter management • Maintenance of information related to IDPs	AFD	IFRC UNHCR IOM
Water Supply, Sanitation and Hygiene Cluster	• Rapid Damage assessment • Restoration of Water supply & drainage • Sanitation • Waste disposal	City Corporations	UNICEF
	• Vulnerability assessment • Damage assessment and planning for restoration of transportation facilities		

Functional Clusters	Activities to be performed	Lead agency	Global Cluster Partners (proposed)
Transport (Road, Rail, Air, Sea) Cluster	connected with o Road transportation o Rail transportation o Air transportation o Sea transportation • Arrangements for quick restoration of transportation facilities	BRTA, CAAB, BR, CPA	UNDP, WFP

3.8. PLAN CONTRIBUTORS

Current public and private sector institutions, which are actively involved in earthquake risk management activities, are (but not limited to):

- Armed Forces Division (AFD)
- Bangladesh Fire Service & Civil Defense (FSCD)
- Bangladesh Police (BP)
- Bangladesh Ansar & VDP
- City Corporations and Authorities
- Department of Relief and Rehabilitation (DRR)
- Disaster Management Bureau (DMB)
- Directorate General of Health Services (DGHS)
- Dhaka Power Distribution Company (DPDC)
- Water Supply and Sewerage Authority (WASA)
- Titas Gas Transmission and Distribution Co. Ltd.
- Bangladesh Power Development Board (BPDB)
- Office of Commissioners in the Dhaka, Chittagong, Sylhet city corporation
- Anjumane Mofidul Islam, Bangladesh (AMI)
- Bangladesh Road and Transport Authority (BRTA)
- Geological Survey of Bangladesh (GSB)
- Institute of Architects Bangladesh (IAB)
- Institution of Engineers Bangladesh (IEB)
- Bangladesh Institute of Planners (BIP)
- Bangladesh Garment Manufacturers and Exporters Association (BGMEA)

- Real Estate & Housing Association of Bangladesh (REHAB)
- Federation of Bangladesh Chambers of Commerce (FBCCI)
- Bangladesh Telecommunications Company Limited (BTCL)
- Electronic and Print Media
- Various Mobile Companies: Grameen Phone, AKTEL, Banglalink, CityCell, TeleTalk)
- NGOs: International Federation of Red Cross and Red Crescent (IFRC), Oxfam GB Bangladesh Program, CARE Bangladesh, Islamic Relief Worldwide (IR), Action Aid Bangladesh (AAB), Bangladesh Disaster Preparedness Centre (BDPC), Bangladesh Red Crescent Society (BDRCS), etc.

CHAPTER 4: FUNCTIONAL RESPONSE GROUPS AND THEIR ROLES AND RESPONSIBILITIES

4.1. CLUSTER 1- EMERGENCY OPERATIONS- OVERALL COMMAND AND COORDINATION CLUSTER

Objective: To prepare a framework for integrated response efforts by formulating a well coordinated system for reduction of impacts of potential earthquake events			
Cluster Lead: Dhaka City Corporation			
Responsible Ministry: Ministry of Local Government and Rural Development			
Main Tasks assigned to lead and support agencies: 1) Network with National Emergency Operations Centre (NEOC), contributions to NEOC functions and periodic reporting on readiness 2) Contributions to disaster event response reporting system Institutional 3) ICS development at various levels 4) Participate in the Command, Control, Coordination Structure 5) Network with other agencies for information dissemination			
	Activities	**Lead Agency**	**Support Agencies/ Institutions**
Pre-disaster Phase	Development of Standard Operation Procedure (SOP)	DCC	AFD, FSCD, Ansar & VDP, RAB, BDR
	Establish National level 24/7 National Emergency Operation Centre (National EOC) and participate in EOC operations and reporting of readiness	DCC	FSCD, AFD
	Setting up earthquake Incident Command Systems (ICS) in place(establishment, training and capacity building) where appropriate	DCC	FSCD, Ansar & VDP, RAB, BDR
	Organize ICS training and nominate representatives to participate in ICS established at various levels	DCC	FSCD, Ansar & VDP, BDR
	Develop a disaster event response reporting system by stakeholder agencies (impacts, resource needs, actions by them for reducing the impact, difficulties, opportunities etc) during earthquake/any other disaster event	DCC	Ansar & VDP, RAB, DC Office, BDR
	Promotion of informal education on earthquake Contingency Plan operations at all levels and conduct simulations	DCC	NGO's
	Develop guidelines for media agencies on reporting disaster events procedures for public information dissemination related to emergency declaration, announcements & warnings on after-shocks and disseminate public awareness & advocacy material to support contingency planning and implementation	DCC	Office of Deputy Commissioner, Bangladesh Television, Bangladesh Betar, Private TV channels, Radio channels, News papers

Emergency Response Phase	Facilitate mobilization of earthquake incident command system where necessary under the command of AFD and Networking with organizations under ICS	DCC	FSCD, AFD, DRR, DMP, BR, BPDB, DWASA, TGTDCL, Office of Divisional Commissioner, Office of Civil Surgeon
	Execute operation surveillance continuously covering all the earthquake affected areas	DCC	FSCD, AFD, DRR, DMP, BR, BPDB, DWASA, TGTDCL, Office of Divisional Commissioner, Office of Civil Surgeon
	Expansion of National EOC to address the needs after earthquake disaster event and facilitate EOC operations, Daily or periodic reporting by stakeholders	DCC	FSCD, AFD, DRR, DMP, BR, BPDB, DWASA, TGTDCL, Office of Divisional Commissioner, Office of Civil Surgeon
	Mobilize ICS teams at lower level command structure	DCC	FSCD, AFD, DRR, DMP, BR, BPDB, DWASA, TGTDCL, Office of Divisional Commissioner, Office of Civil Surgeon and Newspapers
	Facilitate coordination of logistic supply management	DCC	FSCD, AFD, DRR, DMP, BR, DWASA, TGTDCL, Office of Divisional Commissioner
	Assist authorities for communications with media in relation to information dissemination on welfare of victims, Missing and found, Results on Damage assessment surveys, Results on need assessment surveys and facilitate media coverage by media agencies on reporting earthquake disaster event	DCC	DRR, Office of Deputy Commissioner, Bangladesh Television, Bangladesh Betar and Newspapers
	Facilitate public information dissemination related to emergency declaration, announcements & warnings on after shocks and repeat of occurrences of other collateral hazards due to aftershocks	DCC	DRR, Office of Deputy Commissioner, Bangladesh Television, Bangladesh Betar
Early Recovery Phase	Coordinate Operation Surveillance to reduce impacts due to aftershocks	DCC	AFD, FSCD, DRR, Office of Civil Surgeon, DWASA, BPDB, Office of Deputy Commissioner
	Facilitate coordination of logistic supply management and deployment of resources to affected areas, IDP camps etc	DCC	AFD, FSCD, DRR, Office of Civil Surgeon, DWASA, TGTDCL, BPDB, Office of Deputy Commissioner
	Conduct Post disaster Evaluation of performance of • earthquake incident command system and recommend improvements • performance of National EOC and improvement where necessary	DCC	AFD, FSCD, DRR, Office of Civil Surgeon, DWASA, TGTDCL, BPDB, Office of Deputy Commissioner

	Facilitate continuation of EOC operations and periodic reporting during early recovery period to EOC on involvement of all first responder organizations in earthquake event management and for necessary assistance	DCC	AFD, FSCD, DRR, Office of Civil Surgeon, DWASA, TGTDCL, BPDB, Office of Deputy Commissioner
	Facilitate media coverage by media agencies on reporting of post-earthquake disaster event situation analysis and facilitate public information dissemination related to emergency declaration, Announcements & warnings on after shocks and possible impacts due to collateral hazards	DCC	Electronic and Print media
	Assist authorities for communications with media in relation to information dissemination on welfare of victims, Missing and found, Results on damage assessment surveys, Results on need assessment surveys	DCC	DRR, Local Electronic and Print media
	Review the Contingency Plans under the Cluster - Emergency Operations- Overall Command and Coordination and revise the same to include suitable modifications to improve the performance	DCC	AFD, FSCD, DRR, Office of Civil Surgeon, DWASA, TGTDCL, BPDB, Office of Deputy Commissioner

4.2. EMERGENCY OPERATIONS- SEARCH, RESCUE & EVACUATION CLUSTER

Objectives:
- Preparation of effective plan for emergency services (Search ,Rescue & Evacuation, First Aid, Fire Safety etc.) by ensuring inter-agency coordination at national level
- Building the Capacity of concerned agencies and developing national guidelines in the light of international practice

Cluster Lead: Dhaka City Corporation

Responsible Ministry: Ministry of Local Government and Rural Development

Main Tasks assigned to lead and Support Agencies:
1) Search & Rescue 2) Fist aid & First Medical Response to provide emergency medical treatment 3) Triage, stabilization of victims before treatment 4) Fire safety & rescue

	Activities	Lead Agency	Support Agencies/Institutions
Pre-disaster Phase	Develop guidelines for meeting of INSARAG following International USAR Guideline	DCC	AFD, BP, Office of Deputy Commissioner
	Cataloguing/procurement of equipment for special search & rescue & develop procedure for ensuring access	DCC	FSCD, AFD, Office of Civil Surgeon, BDRCS
	Capacity building for creating special units for urban search and rescue from collapsed buildings, infrastructure, Medical First Response	DCC	FSCD, AFD, Office of Civil Surgeon, BDRCS
	Capacity building of community first responder groups in search and rescue operations, medical first response	DCC	FSCD, AFD, Office of Civil Surgeon, BDRCS
	Develop medico-legal procedure for identification and tagging of dead bodies with health group	DCC	FSCD, AFD, Office of Civil Surgeon, BDRCS, NGOs

	Ensure fire safety preparations (through pre-positioning of fire hydrants, fire stations, land use planning, developing data base of sources of water, storage of material etc.)	DCC	FSCD, Office of Deputy Commissioner, RAJUK DWASA, BPDB, TGTDCL
	Pre-positioning of tools , equipment and accessories get the civil authorities to develop inventories of such equipment available for use during earthquakes	DCC	AFD, FSCD, Office of Deputy Commissioner, LGED, RAJUK, DWASA, BPDB, TGTDCL
	Prepare resource inventory (equipment, tools, accessories and manpower etc.) and Procurement of necessary tools and equipment for urban S&R operations to fill the agency level gaps	DCC	FSCD, AFD, Office of Civil Surgeon, DRR, DMP, Bangladesh Ansar & VDP, BR, RAJUK, DWASA, TGTDCL
	Prepare guidelines for logistic supply management and deployment of resources	DCC	FSCD, AFD, Office of Civil Surgeon, DRR, DMP, Bangladesh Ansar & VDP, BR, RAJUK, DWASA, TGTDCL
	Capability assessment of agencies who could be involved in search & rescue operations	DCC	AFD, FSCD, Office of Civil Surgeon, BDRCS, DMP
Emergency Response Phase	Carry out the inter-agency coordination to optimize the efforts of Search and Rescue teams by providing necessary guidance and inputs.	DCC	AFD, DMP, Bangladesh Ansar & VDP, BDRCS, FSCD
	Supervision of compliance to INSARAG and International USAR guidelines	DCC	FSCD, AFD, Office of Civil Surgeon, DRR, DMP, Bangladesh Ansar & VDP, BR, RAJUK, DWASA, TGTDCL
	Coordination with national & international teams engaged in USAR and coordination of information supply and feedback	DCC	AFD, FSCD, Office of Civil Surgeon, BDRCS, Office of Deputy Commissioner, RAJUK
	Mobilize special teams of US&R for search and rescue from collapsed buildings, infrastructure	DCC	AFD, FSCD, Office of Civil Surgeon, BDRCS, Office of Deputy Commissioner
	Mobilizing necessary additional manpower, tools and equipment for urban S&R operation from other stations located outside the affected area	DCC	AFD, FSCD, Office of Civil Surgeon, BDRCS, DWASA, DMP
	Mobilize community based social volunteer networks and trained first responders from areas unaffected to support the S&R parties	DCC	FSCD, Bangladesh Ansar & VDP
	INSARAG marking should be done by CSSR team	DCC	FSCD, AFD
	Make arrangements to obtain resource inventory and data base for S&R operations and provide data based on the spatial data on rapid loss estimation	DCC	FSCD, AFD, Office of Civil Surgeon, RAJUK, DMP, DRR

Early Recovery Phase	Networking with organizations and mobilize support for search & rescue operations in areas which are difficult to reach.	DCC	FSCD, AFD, Office of Civil Surgeon, RAJUK, DMP, DRR, NGOs
	Mobilize community based social volunteer networks and trained community first responder groups to assist special units mobilized for search and rescue from collapsed buildings, infrastructure	DCC	FCSD, DMP, BDRCS, Bangladesh Ansar & VDP, Office of Civil Surgeon
	Make arrangements to Access Resource inventory items for S&R operations and mobilize support of external groups for search and rescue operations	DCC	AFD, DRR, NGOs, Office of Civil Surgeon
	• M&E and post disaster performance evaluation of special units mobilized for search and rescue from collapsed buildings, infrastructure • inter-agency coordination functions • All relevant emergency services in operation in earthquake affected areas aiming at reducing the human casualties	DCC	AFD, FSCD, Office of Civil Surgeon, DRR, DMP, Bangladesh Ansar & VDP
	Review the Contingency Plans under the Cluster - Emergency Operations- Search Rescue and Evacuation and revise the same to include suitable modifications to improve the performance	DCC	AFD, FSCD, Office of Civil Surgeon, DRR, DMP, Bangladesh Ansar & VDP

4.3. HEALTH CLUSTER

Objectives:

- To minimize human casualties by establishing an efficient medical first response system in areas with high seismic hazard
- To enhance the hospital emergency medical care through development of Hospital Preparedness plans
- Capacity building for setting up a well-organized mass casualty treatment system.
- Develop epidemic surveillance system to prevent outbreak of epidemics during post earthquake period

Cluster Lead: Office of the Civil Surgeon

Responsible Ministry: Ministry of Health & Family Welfare

Main Tasks assigned to lead and support agencies:
1) Arrangements for Medicare for injured 2) Preparedness planning for Hospitals 3) Handling dead & Missing 4) Medicare for sick & injured people 5) Counseling and Physio-social support

	Activities	Lead Agency	Support Agencies/Institutions
Pre-disaster Phase	Hospital Preparedness planning and training on Hospital Preparedness for Emergency operations	Office of the Civil Surgeon	DCC, BDRCS, NGOs
	Methodology development for handling of dead and missing during earthquakes and emergencies	Office of the Civil Surgeon	AFD, BDRCS, DCC
	Develop networks with private & government hospitals within the area and in the neighborhood for support during emergencies like earthquakes	Office of the Civil Surgeon	AFD, DCC, Private Clinics & Hospitals
	Develop alert system for hospital staff including doctors to report for work during emergencies such as earthquakes	Office of the Civil Surgeon	AFD, DCC, Private Clinics & Hospitals
	Setting up of 24/7 State of the art ambulance services	Office of the Civil Surgeon	AFD, FSCD, DCC, Private Clinics & Hospitals
	Identify needs for pre-positioning of medicine, temporary hospitals etc and obtain the necessary resources	Office of the Civil Surgeon	AFD, FSCD, DCC, NGOs
	Methodology development for epidemic surveillance and control Conduct operation surveillance training for all First Responder Organization for quick mobilization in earthquake events	Office of the Civil Surgeon	AFD, FSCD, BDRCS
	Train community medical first responders within the city and develop a database	Office of the Civil Surgeon	AFD, FSCD, BDRCS
	Methodology development for estimation of casualty and human injury	Office of the Civil Surgeon	AFD, FSCD, DCC
	Methodology development for estimation of livestock casualty	Office of the Civil Surgeon	AFD, FSCD, DCC
Emergency Response Phase	Mobilize health teams for providing emergency medical care to displaced persons.	Office of the Civil Surgeon	AFD, FSCD, DRR, NGOs
	Activate the alert system for hospital staff and voluntary groups to report to hospitals and medical centers as planned	Office of the Civil Surgeon	Hospital and Clinic authorities, Medical Colleges
	Mobilize health teams to provide first aid to displaced and injured when and where necessary	Office of the Civil Surgeon	FSCD, NGOs, BDRCS
	Mobilize health teams for setting up of temporary	Office of the	AFD, DCC

	hospitals in suitable locations, when and where necessary to treat injured and sick after the earthquake	Civil Surgeon	
	Mobilize pre-positioned medical facilities , Mobile Hospitals etc to treat injured and sick	Office of the Civil Surgeon	AFD, FSCD, DCC
	Mobilize support from other hospitals (Private hospitals**,** hospitals located elsewhere etc) when and as needed and coordinate with private and International Medical Teams to optimize their contributions to national efforts in saving lives and treatment of critically injured.	Office of the Civil Surgeon	Hospital and Clinic authorities, FSCD, NGOs
	Mobilize medical first responders within the city to assist field medical teams, Hospitals and Medical Clinic authorities	Office of the Civil Surgeon	Hospital and Clinic authorities, AFD, FSCD, DCC
	Mobilize trained Triage teams to affected city wards and control points, transportation of injured to hospitals	Office of the Civil Surgeon	Hospital and Clinic Authorities, DCC
	Mobilize ambulance services to transport sick and injured	Office of the Civil Surgeon	Hospital and Clinic authorities, AFD, FSCD, DCC
	Mobilize health teams for tagging of dead bodies and locating missing during the earthquake	Office of the Civil Surgeon	AFD, DMP, FSCD
	Get assistance from qualified professionals to conduct rapid damage assessment of all health infrastructure within the city and identify suitability for usage for treatment of injured and sick	Office of the Civil Surgeon	AFD, FSCD, DCC
	Establishing counseling centers	Office of the Civil Surgeon	DCC, NGOs
Early Recovery Phase	Continue in providing emergency medical care to displaced persons	Office of the Civil Surgeon	AFD, DRR, DCC
	Conduct the M&E and performance evaluation of Health cluster activities and introduce necessary modifications to improve the performance	Office of the Civil Surgeon	AFD, FSCD, DRR, BDRCS, NGO
	Conduct evaluation of performance of medical first responder groups and improve the methodology for training and simulations	Office of the Civil Surgeon	NGOs, Medias
	Conduct the evaluation of ambulance services to transport sick and injured during emergencies and introduce modifications to improve the services	Office of the Civil Surgeon	NGOs, Hospital and clinic authorities
	Continue Assistance to authorities in mortuary services(such as identifying dead & missing, issue of death certificates for disposed and inventorying and maintenance of records etc)	Office of the Civil Surgeon	AFD, FSCD, DRR, NGOs, BDRCS,

	Follow medico-legal procedure for identification and tagging of bodies, disposal of dead bodies	Office of the Civil Surgeon	DMP, AFD, FSCD, DCC
	Conduct Evaluations of the level of preparedness & performance during emergency by all Hospital and Medical institutions	Office of the Civil Surgeon	AFD, Medias, Civil Society
	Conduct review of the Contingency Plan for the Health Cluster agencies and revise to integrate the improvements	Office of the Civil Surgeon	AFD, FSCD, DRR, DCC

4.4. RELIEF SERVICES (FOOD, NUTRITION AND OTHER RELIEF) CLUSTER

Objectives:

- Damage Analysis and Need Assessment surveys to identify external needs,
- Ensure provision of necessary essential facilities for displaced after emergencies
- Provision of food and nutrition ,logistic supply to displaced based on need assessment
- Efficient coordination with UN Agencies, international and local NGOs, Donor agencies to supplement the government welfare assistance to IDPs
- Intersection/ Coordination

Cluster Lead: Dhaka City Corporation

Responsible Ministry: Ministry Local Government and Rural Development

Main Tasks assigned to lead and support agencies:
1) Damage Analysis and Need Assessment survey, 2 Arrangements for Food & nutrition and non-food supplies for displaced
3) Maintenance of Camps for IDPs after emergencies, 4) Prevention of outbreak of epidemics within the camps set up for IDPs

	Activities	Lead Agency	Support Agencies/ Institutions
Pre-disaster Phase	Networking with various stakeholders and development of system for reporting the stocks of supplies and resources (funding agencies, NGOs & INGOs for identification of resources, improved coordination relief material distribution) and maintain a database	DCC	DoF, BDRCS
	Develop guidelines, data formats and carry out capacity building for Damage analysis and Need Assessment	DCC	DC, AFD
	Develop guidelines and disseminate information on • Logistic supply management and deployment of resources, • Maintaining of temporary of permanent earthquake shelters, • Distribution of welfare items and food, • Quality assurance for food and nutrition, • Setting up welfare camps by all agencies	DCC	AFD, BDRCS
	Develop Guidelines for community mobilization to increase the community participation in evacuation and camp management	DCC	DRR, FSCD, AFD, BDRCS, Ansar & VDP

	Establish regional warehouses for store of government supplies of welfare items food and supplementary items	DCC	DC, AFD, DRR
	Ensure government resources for buying additional welfare items food and supplementary items	DCC	DRR, DC
	Developing guidelines for rehabilitation of physically handicapped disabled & vulnerable groups	DCC	DRR
	Develop inventory of agencies within the city who posses stocks of welfare items, food and nutrition , temporary shelter and camps, water purification plants, Generators, Cooking facilities etc to be used in case of emergencies	DCC	DC, DRR, AFD, BDRCS
Emergency Response Phase	Preparation of necessary documentation for preparation of Flash appeals in collaboration with UN agencies	DCC	AFD, DRR, BDRCS
	Conduct of Damage Analysis and Need Assessment survey in affected areas and preparation of estimates of items and other urgent needs for obtaining donor support for external contributions. Networking with various stakeholders (funding agencies, NGOs & INGOs for mobilization of contributions, improved coordination of relief material distribution)	DCC	DC, DRR, NGOs, AFD, FSCD
	Set up temporary camps to house IDPs and provide other essential items (such as Food, Nutrition and other Relief), Mobilize support from NGOs, INGOs for providing assistance to IDPs	DCC	DRR, DC, NGO, BDRCS, AFD
	Mobilization of community social volunteer groups through Local Governments, CBOs and NGOs to assist setting up of camps for IDPs ,maintenance of camps etc	DCC	AFD, DRR, Bangladesh Ansar & VDP, BDRCS
	Network with ministries, departments, district authorities, UN agencies, NGOs & INGOs for mobilization of support for supply & distribution of relief material & welfare items. Supply of food and supplementary items through DCs, government departments, other district authorities for distribution to victims, Conduct surveys for quality assurance for food and distribution	DCC	DC, AFD, DRR, Bangladesh Ansar & VDP, BDR
	Identification of physically handicapped disabled for special treatment	DCC	DRR, Private Hospitals, BDRCS, Social Welfare
	Liaise with relevant govt. Agencies, line departments, district authorities, civil society agencies to ensure welfare of other victims(those who are living in their own, those who are with friends and relatives etc) and food supply	DCC	DC, AFD, Bangladesh Ansar & VDP
	Assist other stakeholder agencies such as NGOs and INGOs for supply of food and supplementary items to displaced when and where necessary thro' assistance in national level procurement, import of items, custom clarence, transportation to affected areas etc	DCC	AFD, DC

Early Recovery Phase	Evaluation of overall performance of Cluster on Relief Services (Food, Nutrition and other Relief)	DCC	DMP, DRR, AFD
	Network with ministries, departments, district authorities, UN agencies ,NGOs & INGOs and assistance for efficient coordination for distribution of relief material welfare items	DCC	DRRO, DC
	Conducting routine surveys for quality assurance for food and nutrition distributions carried out by government and non-government agencies	DCC	AFD
	Periodic Stock taking of central Godawns to carry out qualitative and quantitative assessment of food items and facilitate efficient distribution	DCC	NGOs, DC, INGOs, NGOs, DRR, District Food Office
	Periodic visits to welfare camps and M&E of compliance of guidelines for maintenance of welfare camps by all agencies	DCC	DRR, DC, AFD
	Provide necessary Assistance in documentation, tax payment if applicable and custom clarence etc to other stakeholder agencies such as NGOs and INGOs for continues Supply of food and supplementary items to displaced located in camps for IDPs	DCC	DRR, DC, AFD
	Assist all agencies providing welfare , food and nutrition support for transportation and distribution of supplies to victims when and where necessary	DCC	DRR, INGOs, AFD
	Review the Contingency Plan for the Cluster on Relief Services (Food, Nutrition and other Relief) and revise if necessary to introduce measures to improve performance	DCC	DRR, NGOs, INGO, BDRCS, AFD

4.5. SHELTER (INCLUDING SETTING UP TEMPORARY SHELTER) CLUSTER

Objectives:

- To ensure efficient restoration of utilities and services after earthquakes such as supply of telecommunication facilities, power, gas and, waste disposal etc
- To ensure temporary shelter for displaced after disaster events such as Earthquakes and provision of basic facilities to the same
- To prevent outbreak of fire due to malfunctioning of utilities such as gas, electricity supply etc
- To ensure prevention of environmental disorder due to release of hazardous waste and material

Cluster Lead: Dhaka City Corporation

Responsible Ministry: Ministry of Local Government and Rural Development

Main Tasks assigned to lead and support agencies:
1) Vulnerability assessment of Utilities 2) Rapid Damage assessment 3) Restoration of utilities
4) Rehabilitation and recovery planning for utilities 5) Provision of temporary Shelter and basic essential facilities for displaced
6)Actions to control fire outbreaks, environmental hazards etc

	Activities	Lead Agency	Support Agencies/Institutions
Pre-disaster Phase	Conduct meetings with Utilities sub-committee for enhanced preparedness measures to be undertaken by Utility agencies to minimize impacts and to prevent malfunctioning of services during emergencies	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
	Maintenance of stocks of most essential spare parts and service personal for attending to large scale emergencies such as earthquakes	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
	Develop guidelines for vulnerability assessment of utilities and conduct training for Utility sector staff for undertaking vulnerability assessments	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
	Capacity building of utility sector for contingency planning and planning for restoration of facilities and Implement Response Capacity Assessment programs for reduction of impacts for Utility sector and develop efficient response capacity	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
	Design and implement projects for pre-positioning of emergency power supply services for critical areas	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
	Develop procedure for post earthquake damage assessment of all essential utilities within the city by utility managers	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
	Identification of all buildings(such as schools) which can be used as Temporary shelter and conduct capacity assessment survey for identification of needs	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
	Provision of utility services for buildings identified as temporary Shelters, and maintain stocks of standby emergency shelter items/equipment for quick mobilization during establishment of temporary shelter(stand-by generators, Temporary camps etc)	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
	Identification of all possible sources of Hazardous waste/hazardous material release during emergencies and conduct awareness programs to prevent	DCC	Relevant Industries, Business enterprises

	environmental and societal impacts due to release of hazardous substance during emergencies such as earthquakes		
Emergency Response Phase Role	Immediately activate the Plan for shut off of all supplies of Gas, electricity, Waste disposal etc at all shut off points.	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
	Utility agencies undertake restoration work and actions to rehabilitate supply of power, gas, etc to critical agencies(hospitals, AFD, Police, evacuation camps so on)	DCC	AFD, FSCD, School, College, Universities, DMB, DRR
	Conduct rapid damage assessment survey of power supply systems(generation, distribution, supply) and restoration of supply to critical facilities(such as hospitals, police, AFD, Fire Service etc) Organize project teams to conduct Rapid damage assessment of all essential utilities within the city by utility managers	DCC	AFD, FSCD, Universities
	Mobilize pre-positioned emergency power supply services for critical areas	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO, AFD, FSCD, Universities, NGOs
	Obtain periodic situation reports and review the progress on activation of Contingency Plans and restoration of services by utility agencies	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
Early Recovery Phase	Conduct survey of Temporary shelter set up for IDPs for qualitative improvement of shelter for IDPs	DCC	DRR, AFD
	Develop early recovery Plans for setting up new Settlement programs and rehabilitation of partially damage settlement and housing for supply of permanent shelter for affected.	DCC	AFD, FSCD, DRR
	Conducting damage assessment survey of all utilities and prepare Plans for restore and rehabilitate supply of power, water, gas, to affected areas and in waste disposal	DCC	AFD, TGTDCL, DWASA, BPDB, DESA, DESCO, BPDB
	Conduct damage assessment survey of power supply systems(generation, distribution, supply) and prepare estimates for restoration of supply to other areas , Preparation of Plans for rehabilitation	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO, BPDB, Universities,
	Integrate mitigation and preparedness programs in Recovery Planning by utilities for reduction of future earthquake impacts during restoration of facilities	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO
	Assist in restoration of all essential utilities and services within the city by utility managers	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO, BPDB, Universities
	Provide periodic situation reports on the status of restoration of services and review the progress	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO, BPDB, Universities
	Review the Performance of Cluster 5 - Shelter (Including setting up temporary Camps) and Utility Planning Cluster and introduce modifications to the Contingency Plan for better performance in future.	DCC	TGTDCL, DWASA, BPDB, DESA, DESCO, BPDB

4.6. WATER SUPPLY, SANITATION AND HYGIENE CLUSTER

Objectives: Quick restoration of water supply for provision of safe drinking water and sanitation management during earthquake disaster.			
Cluster Lead: Dhaka City Corporation			
Responsible Ministry: Ministry of Local Government and Rural Development			
Main Tasks assigned to lead and support agencies: 1) Damage assessment of Water supply & drainage, waste management systems 2) Restoration of Water supply & drainage 3)Observe Sanitation norms during emergencies 4) Restoration of Waste disposal 5) Epidemic control and Immunization			
	Activities	**Lead Agency**	**Support Agencies/Institutions**
Pre-disaster Phase	Develop procedure for vulnerability assessment of water supply system, infrastructure facilities & buildings, sewerage & drainage systems by respective managers	DCC	DWASA, DPHE
	Develop Contingency Plans for water and sanitation sector, waste management systems at all levels covering earthquake prone local government agencies by respective managers	DCC	DWASA, DPHE
	Pre-positioning of water supply deep wells to be used during emergencies	DWASA	DCC, DPHE
	Develop minimum standards for drinking water supply and issue guidelines to public, NGOs, INGOs and other civil society agencies	DCC	DWASA, DPHE
	Develop guidelines for close surveillance in epidemic outbreak and conduct of preparedness measures such as Immunization programs , awareness programs to prevent epidemic outbreaks	DCC	Office of Civil Surgeon, AFD
	Develop guidelines with water and sanitation group for minimum sanitation levels to be maintained in temporary shelter set up for IDPs	DCC	DWASA, DPHE
	Facilitate alternate systems for emergency water supplies such as transportation by container trucks, bowsers etc.	DCC	DWASA, DPHE, FSCD
	Promote household level long term water conservation methods such as rain water harvesting, water softening & SODIS techniques for water purification	DCC	DWASA, DPHE
Emergency Response Phase	Activate the Contingency Plans for water and sanitation sector at all levels covering earthquake affected areas	DCC	DWASA, AFD, DPHE
	Observe the emergency water supply needs and communicate to relevant stakeholders	DCC	DWASA, AFD, DPHE
	Close surveillance in epidemic outbreak in affected areas due to problems connected with water and sanitation and make remedial actions	Office of Civil Surgeon	AFD, DRR
	Rapid damage assessment of water supply, sewerage & drainage system and initiate actions for restoration Assist authorities to maintain water supply & sanitation	DCC	AFD, DWASA, DPHE, DRR

	facilities within welfare camps set up for victims		
	Implement temporary shelter sanitation management system in the temporary shelter for the benefit of victims in affected areas	DCC	AFD, DRR, DPHE
	Arrangements for quality check of water sources, bottled water and disposable water containers	DCC	AFD, DPHE
Early Recovery Phase	Carry out performance evaluation of response actions under cluster Water Supply, Sanitation and Hygiene and introduce suitable modifications to Contingency Plan to improve the performance	DCC	Office of Civil Surgeon, DRR, DPHE, DWASA
	Observe and facilitate the emergency water supply needs and communicate to relevant stakeholders	DCC	DWASA, DPHE, District Administrations
	Close surveillance in epidemic outbreak in affected areas due to problems connected with water and sanitation and make remedial actions	DCC	Office of Civil Surgeon, DWASA, DPHE
	Conduct Damage Assessment survey for Water supply facilities and develop Plans to restore and rehabilitate water and sanitation sector facilities at all levels covering earthquake affected areas	DCC	DWASA, DPHE
	Conduct periodic quality check of water sources, portable water containers and disposal of waste	DCC	DWASA, DPHE

4.7. RESTORATION OF URBAN SERVICES CLUSTER

Objectives:

- Identification of critical public facilities vulnerable to Earthquakes and strengthening the same to a higher safety level
- Spatial Planning & land use control for earthquake vulnerability reduction
- Building control & ensure compliance to Building Code practices

Cluster Lead: Dhaka City Corporation

Responsible Ministry: Ministry of Local Government and Rural Development

Main Tasks assigned to lead and support agencies:
1) Vulnerability assessment of building & facilities and ensure higher standards of building safety in earthquake prone areas, 2) Spatial Planning & land use control (for emergency evacuation and provision of temporary shelters both in developed & undeveloped areas) 3. Regular reviewing and updating of building codes(BC) and compliance with BC 4) Certification of suitability for occupancy after occurrence of earthquakes

	Activities	Lead Agency	Support Agencies/Institutions
Pre-disaster Phase	Conduct scenario based need assessment survey for emergency services for earthquake prone urban areas and report to authorities	DCC	DWASA, TGTDCL, FSCD, DRR, Office of Civil Surgeon
	Develop methodology for vulnerability assessment of buildings & infrastructures and loss estimation to identify high risk areas	DCC	RAJUK
	Develop procedure for restricting or preventing entry in to damaged buildings	RAJUK	FSCD, Bangladesh Ansar & VDP, AFD, DCC
	Conduct Vulnerability assessment of important government buildings , critical facilities, infrastructures (Govt. Hospitals, school buildings, theatres, & other important govt buildings, bridges)	RAJUK	DCC, AFD
	Prepare location maps and collect other information related to pre-positioned essential facilities (bore holes, tools , equipments , fire hydrants , temporary hospitals etc) to be used during earthquakes	DCC	RAJUK, FSCD, DRR, DWASA, TGTDCL
	Develop guidelines for spatial planning & land use control (for emergency evacuation and provision of temporary shelters both in developed & undeveloped areas) and revise land use Plans to create/preserve open areas within urban areas, create more parks, recreational areas , green areas suitable for emergency evacuations, create essential facilities such as water , electricity	RAJUK	DCC, DWASA, TGTDCL
	Develop guidelines for Recovery Planning at various levels based on sector needs and special vulnerable groups (gender, elder persons, children etc) through integration of earthquake risk management principles to ensure higher seismic safety.	DCC	RAJUK, FSCD, AFD, DRR, DMP, DWASA, TGTDCL, NGOs

	Regular reviewing and updating of building codes to integrate earthquake vulnerability reduction needs in buildings and methods and Efficient implementation of building codes to integrate earthquake vulnerability reduction within the city	RAJUK	DCC, FSCD
	Identification of evacuation routes in high risk areas and take actions to improve access to inaccessible areas for S&R actions	DCC	RAJUK, FSCD, AFD, DMP,
	Discuss with Private institutions(Business sector, Garment factories, Industries etc) to create awareness on contingency planning to reduce losses and casualties in work places and provide necessary technical assistance and conducting mock drill etc. for contingency planning	DCC	Private institutions(Business sector, Garment factories, Industries etc), RAJUK
Emergency Response Phase	Emergency Shut down of control switches & values of electrical substation, gas control centers etc.	DCC	TGTDCL
	Mobilize Pre positioned/stand by essential emergency support units and facilities(boreholes for emergency water supply, Search and Rescue stores at community level, Stand-by generators, mobile kitchens, water supply and purification units , mobile hospitals etc)	DCC	Office of Civil Surgeon, Bangladesh Ansar & VDP, AFD, DMP
	Facilitate safe evacuation of victims and the process of setting up evacuation centers in pre-identified areas for evacuation	AFD	DMP, Bangladesh Ansar & VDP, DCC
	Carry out rapid damage assessment of critical facilities (school buildings, theatres, etc) & city buildings and suitability check for using as Temporary offices, IDP occupation etc	RAJUK	AFD, DCC
	Facilitate provision of basic facilities to temporary camps set up for IDPs,	AFD	FSCD, DMP, Bangladesh Ansar & VDP
	Mobilize teams for rapid damage assessment of housing units and dwellings and issue certificate for occupation after earthquake event	RAJUK	AFD, DWASA, TGTDCL
	Assistance for Rapid damage assessment of buildings belong to First Responder agencies such as Armed Forces Division, Fire service, Hospitals , Critical Government Buildings, for prevention of occupation of unsafe buildings and further damage after shocks	RAJUK	DCC, AFD
	Liaise with private institutions(Business sector, Garment factories, Industries etc) for activating the Contingency Plans to conduct rapid damage assessments to work places and provide necessary technical assistance	DCC	Private institutions(Business sector, Garment factories, Industries etc), RAJUK
	Making suitable arrangements and provide assistance to buildings allocated for VIPs, and Important Ministries, departments for conducting rapid damage assessment survey and issue of	DCC	AFD, FSCD, Office of Civil Surgeon

	certificates for ensuring suitability for occupation after the earthquake		
Early Recovery Phase	Carry out rescue operation for livelihood recovery in earthquake prone areas	DCC	FSCD, AFD
	Phase by phase restoration of disrupted power, gas and water supply through assessment of degree of damage	DCC	DMP, Ansar & VDP, DWASA, TGTDCL, AFD, FSCD
	Provide assistance to AFD, Fire Service, Police, Ministries, departments for conducting rapid damage assistance and developing estimates for rehabilitation of services	DCC	AFD, DMP, Para-military, RAJUK, DWASA
	Rapid damage assessment survey and issue of certificates to house owners and owners of other buildings (business enterprises, shops, commercial centers, inductees, garment factories, hotels etc)for ensuring suitability for occupation after the earthquake	RAJUK	DCC
	Carry out Planning operations for systematic cleaning of debris , removal, transportation of debris, identify dump sites	RAJUK	DCC
	Carry out city Planning operations for rehabilitation and reconstruction of earthquake affected areas through integration of earthquake risk management principles	RAJUK	DRR, DWASA, TGDCL, AFD
	Carry out sector based early recovery Planning at various levels through integration of earthquake risk management principles to ensure higher seismic safety.	DCC	RAJUK, AFD, FSCD
	Conduct a review of performance of the Cluster - Restoration of Urban Service and revise the Contingency Plan accordingly	DCC	RAJUK, Universities

4.8. TRANSPORTATION (ROAD, RAIL, AIR, WATER WAY, SEA) CLUSTER

Objectives:

- Identification of vulnerabilities of transportation infrastructures to earthquakes and strengthening the same to a higher safety level
- To restore the transport system after earthquake events for mobilization of resources to the affected areas

Cluster Lead: Dhaka City Corporation

Responsible Ministry: Ministry of Local Government and Rural Development

Main Tasks assigned to lead and support agencies:
1) Vulnerability assessment of transportation infrastructures, 2) Planning for quick restoration of transportation facilities (Road transportation, Rail transportation, Air transportation, Sea transportation), 3.) Arrangements for quick restoration of transportation facilities

	Activities	Lead Agency	Support Agencies/ Institutions
Pre-disaster Phase	Develop guidelines for vulnerability assessment of transport systems (road, railway, air, water ways) and Conduct vulnerability assessment and strengthen the buildings and transport infrastructure	DCC	RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR
	Develop Emergency teams for restoration of facilities	DCC	RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR
	Study alternate transport arrangements in case of earthquakes and develop route map	DCC	RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR
	Develop coordination arrangements between different transport authorities(road, air, sea) to function during emergencies	DCC	RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR
	Develop Contingency plans for city level transportation systems to avoid high risk areas	DCC	RAJUK, DMP, LGED, RHD
	Make arrangements for storage of essential spare parts	DCC	RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR
	Make arrangements to fabricate temporary bridges,	DCC	AFD, RHD, LGED
Emergency Response Phase	Action by transport authorities to restore the transportation systems to reach critical areas for S&R teams and supply of relief	DCC	AFD, RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR, DRR, FSCD, DMP, Office of Civil Surgeon
	Conduct rapid damage assessment survey and reporting by transport authorities for obtaining cooperation of other agencies for restoration of transportation systems.	DCC	RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR
	Mobilization of resources for activation of alternate transport arrangements	DCC	AFD, RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR
	Notification of accessible routes after the earthquake event based on the rapid assessment	DCC	DMP, AFD, RAJUK, Zia International Airport, BRTC,

	and issue of updates regularly after restoration of additional routes		BIWTC, BIWTA, RHD, LGED, BCAA, BR
Early Recovery Phase	Conduct damage assessment survey of transport systems due to impact of occurrence of Earthquake and collateral hazards and develop Plans for restoration of transport systems to higher seismic safety.	DCC	AFD, RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR
	Assist actions by transport authorities to identify alternate routes for transportation of essential relief supplies, food stocks, welfare items etc	DCC	AFD, RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR
	Commence rehabilitation of damaged transport infrastructure and facilities, rail roads, main roads, ports, airports etc	DCC	AFD, RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR
	Review the performance of Cluster 8 - Transportation (Road, rail, air, sea) during the emergency response period and revise the contingency Plan to improve the performance	DCC	AFD, RAJUK, Zia International Airport, BRTC, BIWTC, BIWTA, RHD, LGED, BCAA, BR

4.9. SECURITY, AND WELFARE CLUSTER

Objectives: To maintain the law and order situation during emergencies such as earthquakes

Cluster Lead: Dhaka Metropolitan Police (DMP)

Responsible Ministry: Ministry of Home Affairs

Main Tasks:
1) Security arrangements during emergencies to ensure safety of citizens and protection of government & private property
2)Restrict entry into affected areas by unauthorized persons 3)Traffic control during emergencies

	Activities	Lead Agency	Support Agencies/ Institutions
Pre-disaster Phase	Develop a Comprehensive Plan for security arrangements for Citizens and protection of government & private property, business and industries as well as for maintenance of law and order to be adopted during emergencies such as earthquakes	DMP	AFD, BDR, Bangladesh Ansar & VDP, RAB
	Develop a comprehensive plan for traffic control during emergencies	DMP	AFD, BDR, Bangladesh Ansar & VDP, RAB
	Develop guidelines for control of entrance in to damaged buildings, and restrict access to affected areas by unauthorized persons	DMP	AFD, BDR, Bangladesh Ansar & VDP, RAB, FSCD
	Develop guidelines for evaluation of Security Planning and operations for maintenance of law and order during emergencies	DMP	FSCD, BDR, Bangladesh Ansar & VDP, RAB, FSCD, AFD, Office of Deputy Commissioners,
	Assist development of procedures for handling of destitute and orphans	DCC	DMP, NGOs
	Assist in promotion of social security systems (insurance schemes, micro credit, etc.)	DCC	Life Insurance companies
	Develop guidelines for integrating fire hazard management as a component of Earthquake response	FSCD	DCC, AFD, DRR, INGOs, NGOs

	and early recovery actions especially concerning temporary shelter, government buildings, private buildings, business enterprises, utilities & Services		
	Develop procedures for management and maintenance of information on dead and missing	DMP	AFD, DCC, FSCD, Office of Civil Surgeon
	Develop procedures for burial of dead, funeral rights, mortuary services etc	DMP	AFD, BDR, Bangladesh Ansar & VDP, FSCD
Emergency Response Phase	Activate the Security Plan for citizens and protection of government & private property, business and industries as well as for maintenance of law and order	DMP	AFD, BDR, Bangladesh Ansar & VDP, RAB
	Activate the Plan for traffic control during emergencies	DMP	AFD, BDR, Bangladesh Ansar & VDP, RAB
	Exercise control of entrance in to damaged buildings, and restrict access to affected areas by unauthorized persons	DMP	AFD, BDR, Bangladesh Ansar & VDP, RAB, FSCD
	Conduct periodic M&E of security operations for maintenance of law and order during emergencies	DMP	FSCD, BDR, Bangladesh Ansar & VDP, RAB, FSCD, AFD, Office of Deputy Commissioner
	Activate the Plan for handling of destitute and orphans	DCC	NGOs, DMP
	Assist in documentation and fulfillment of other needs to benefit the beneficiaries of social security systems such as insurance Schemes, micro credit, etc.	DCC	Life Insurance companies
	Carry out the Plans for prevention and control of fire hazard due to main shock and aftershocks in temporary shelter, government buildings, private buildings, business enterprises,, utilities & Services	FSCD	AFD, DRR, DCC, INGOs, NGOs
	Carry out the Plan for management and maintenance of information on dead and missing	DMP	AFD, DCC, FSCD, Office of Civil Surgeon
	Carry out the procedures for burial of dead, funeral rights, mortuary services etc	DMP	AFD, BDR, Bangladesh Ansar & VDP
Early Recovery Phase	Review the performance of implementation of Security Plan and arrangements during earthquake emergency for safety of Citizens and protection of Government & Private Property, Business and Industries as well as for Maintenance of law and order to be adopted during emergencies such as earthquakes	DMP	AFD, BDR, Bangladesh Ansar & VDP, RAB
	Review the performance of implementation of Plan for traffic control during emergencies	DMP	FSCD, BDR, Bangladesh Ansar & VDP, RAB, AFD, Office of Deputy Commissioners
	Exercise control of entrance in to damaged buildings, and restrict access to affected areas by unauthorized persons	DMP	AFD, BDR, Bangladesh Ansar & VDP, RAB, FSCD
	Carry out evaluation of Security Planning and operations for maintenance of law and order during Earthquake emergency	DMP	FSCD, BDR, Bangladesh Ansar & VDP, RAB, AFD, Office of Deputy Commissioner
	Conduct review of the Contingency Plan under Cluster 9 – Security and Welfare and introduce suitable modifications in revising the Plan to improve the performance	DMP	FSCD, BDR, Bangladesh Ansar & VDP, RAB, AFD, Office of Deputy Commissioner

CHAPTER 5: SPATIAL ANALYSIS AND CONTINGENCY PLAN FOR KEY ELEMENTS

Spatial analysis and plan associated with different clusters are as in the following sections:

5.1. CLUSTER 1: OVERALL COMMAND AND COORDINATION

Earthquake threat to key emergency response agencies

Continued functionality of key emergency response agencies is a crucial element in achieving proper command, coordination and ultimately effective emergency response. Therefore, potential earthquake risks to the key agencies have been analyzed to evaluate whether such agencies will be seriously affected. Potential earthquake hazards (ground shaking, liquefaction, land subsidence etc.) during a scenario earthquake (Scenario 1 Earthquake), the result from Hazard, Vulnerability and Risk Assessment Component of the project, have been used for the evaluation of such effects. Map 1 included in Annex 2 shows the location of different key agencies in different hazard areas. A summary of evaluation of risks to these facilities is given in Table 5.1 in Annex 1.

The evaluations of probable damages to these facilities have been done based on the general structural information that was extracted from the GIS database and observation from the satellite images. No detail structural vulnerability assessment surveys to these structures have been made. Hence, the damage evaluations mentioned in the table are very preliminary ones. For having damage evaluations at higher confidence levels, detail vulnerability assessments of these structures are recommended.

5.2. CLUSTER 2: EVACUATION, SEARCH AND RESCUE

Trapped, dead and self evacuated population

Following basis has been taken for calculating number of people trapped needing search and rescue; and those self evacuated who further need evacuation to nearest safe places:

- Around 60% of the people (from RADIUS tool) in collapsed structures will be trapped inside out of which around 10% (from HAZUS) will die immediately. Hence, around 50% of the people are expected to be alive. But, all 60% will require search and rescue.
- Around 40% people from the collapsed structures can come out of the buildings themselves and need evacuation immediately to the nearest safe evacuation area.
- Population from all other buildings (damaged or undamaged) requires immediate evacuation to the nearest safe place.

Based on above assumptions, calculations have been made to know the approximate evacuation and search and rescue needs. These calculations are made for the scenario earthquake if occurred in night time (maximum possible figures of death and injury).

From the calculations included in Table 2 in Annex 1, the total population those needed to be evacuated immediately to the nearest evacuation site is approximately 1,741,636 out of which around 50% i.e. 870,818 (around 181,420 families) require temporary shelters provided by governments of other agencies.

Likewise, the total population which gets trapped inside damaged buildings is approximately 100,469 (Table 2 of Annex 1) out of which some will come out themselves, some will be assisted by community volunteers and some may require medium to highly specialized search and rescue as shown in Figure 1. Following the same proportion suggested in INSARAG Guidelines, approximately 50,000 victims (50%) can be rescued by community themselves or with the light search and rescue teams, whereas another approximately 50,000 (50%) requires medium to heavy search and rescue teams to take them out.

Available evacuation spaces and their capacity

The open areas available within Dhaka City Corporation area have been identified from the GIS map and their approximate areas have been calculated. The data on existing open spaces has also been collected from Dhaka City Development Authority (RAJUK) and verified with those from GIS. However, no field verification was done. Such open spaces include smaller spaces ranging in hundreds of square meters to the bigger spaces ranging in several thousands of square meters in area. The smaller areas are appropriate only for immediate evacuation (assembly immediately after earthquake) whereas only bigger ones approximately larger than 25,000 square meters (which can accommodate approximately 500 families) are taken as appropriate for temporary shelter purpose. Hence, areas larger than 25,000 square meters are considered for temporary shelters.

Open spaces in different locations of the city and their approximate areas are shown in Tables 4, 5 and Maps 2, 3 in Annexes. The population holding capacity of each space is also shown. The spaces smaller than 25,000 square meters are proposed to be used as immediate evacuation centers and the capacity of such space is calculated based on 1 square meter area per person for immediate evacuation.

Open spaces available within the restricted areas, universities, colleges, institutional areas are not included in the list.

Evacuation routes

Evacuation routes for immediate evacuation of the population from different clusters/areas have been proposed in Map 4 in Annex 2. Only the roads with their width more than 6m are shown in the routes. Other smaller roads inside the cities will have

higher possibilities of blockage due to road damage itself or due to falling debris from the damaged houses. The detail calculation for such blockage is extremely complex in the data limited environment; therefore, such calculation has not been done. However, it is recommended that such analysis be done at the ward or cluster levels.

Search and Rescue (SAR) needs

The total population that can be potentially trapped inside the damaged buildings is approximately 100,000 as discussed above and presented in Table 2 of Annex 1 and Map 5 of Annex 2. Out of which, approximately 50,000 people are required to be searched and rescued by medium to heavy SAR teams.

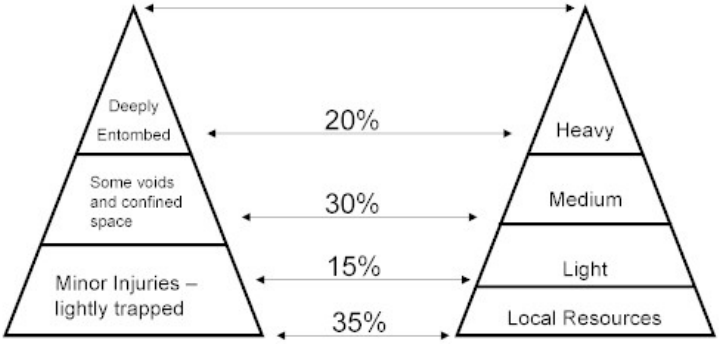


Figure 1: Proportion of different levels of trapped victims
(Source: INSARAG Guidelines)

Currently, the specialized SAR capacity exists only with the Armed Forces Division (AFD) and Fire Services and Civil Defense (FSCD). These institutions have few trained teams on specialized search and rescue courses such as Collapsed Structure Search and Rescue (CSSR) course, Medical First Response (MFR) course. However, due to the lack of a comprehensive database on availability of different emergency response capacities among different institutions, the actual capacity is not known and the calculation of deficit for planning purpose could not be made. Therefore, it is recommended that such a capacity assessment needs to be carried out; and a simple checklists for such assessment is included as Tables 8 in Annex 1.

Based on the general understanding and experiences from other countries, it can generally be said that the national and local capacities for search and rescue will be overwhelmed during a large earthquake disaster situation. And assistance from international search and rescue teams becomes obvious. Such assistance should arrive within a shortest possible time so that maximum victims can be rescued. Required standing orders, protocols or any other memoranda for the immediate request and mobilization for the international assistance need to be established with institutions like INSARAG before the disaster occurs. Hence, it is recommended such protocols be established as quickly as possible.

Once the international search and rescue teams arrive, they need to be supported and facilitated by the countries in their effective and timely operationalization. They need to be provided with an area for managing their field operations usually called Base of Operations. The available space within stadiums, or open spaces in restricted areas, or spaces in institutional, educational areas can be utilized for this purpose.

The locations of institutions with SAR capacities i.e. the locations of AFD and FSCD along with potential locations for Base of Operations are shown in Map 6. These areas are shown together with volume of trapped victims in different locations.

Fuel refilling stations, timber log godowns, lifting tools and equipment (cranes) etc. are also some other key resources which play crucial role during the SAR operations. Hence, the existing availability and their locations are shown in Map 7.

Fire control

HAZUS analysis shows that in Scenario 1 earthquake, there will be 920 places of fire ignitions at different locations.

There are total 16 fire stations scattered in different locations, the capacities of which are shown in Table 6. Based on the information provided from relevant institutions and extracted from the past experiences and practices, the average time required to suppress an urban fire case is from hours to days for a team fire fighters. Using the average time required, it can be calculated the total number of team of trained fire fighters are required to control all the fire cases within 24 hours or the required hours to control the fires with the existing capacities.

The locations of existing fire fighting stations and their potential catchment areas are shown in Map 8.

Evacuation and SAR requirements in educational facilities

In case the scenario earthquake occurs during daytime (school hours)

- Location and population in major educational facilities
- Evacuation and SAR needs

5.3. CLUSTER 3: HEALTH

Possible damage to health facilities and their functionality

All government hospitals and major private hospitals within Dhaka city have been identified in GIS database and verified during the field survey under the Hazard, Vulnerability and Risk Assessment Project. Existing capacities of major hospitals have been

assessed from the inventory surveys, meetings and discussions with the concerned authorities. Locations and capacities of all major hospitals are shown in Table 7 in Annex.

Potential damages to these hospitals and the probability of their functionality are directly calculated by HAZUS tool based on the information provided. The probabilities of functionality of the hospitals in scenario earthquake are shown in the Map 9 and 10.

Need vs. capacity

Following factors need to be considered when analyzing the need vs capacity for immediate emergency response:

Immediate care of traumatic injuries (48 hours)

Secondary care of traumatic injuries and routine emergencies (3-15 days)

Temporary facility to substitute for local damaged hospitals (several years)

Primary health care

Clinical services

Required staffing levels

Community levels

1 community health worker per 500 – 1000 population

1 skilled/traditional birth attendant per 2,000 population

1 supervisor per 10 home visitors

1 senior supervisor

Peripheral health facility (for approx. 10,000 population) – 2-5 staff: 1 qualified health worker (for maximum 50 consultations per day)

Central health facility (for approx. 50,000 population) –

min. 5 qualified health workers

min. 1 doctor

1 qualified health worker max. 50 consultations per day

1 qualified health worker for 20-30 beds, 24 hours service (for in-patient)

1 non-qualified health worker for ORT (Oral-Rehydration Therapy)

1 non-qualified health worker for pharmacy

1-2 for dressings, injections, sterilization

1 technician

Non-qualified staff for registration, security, etc

Referral hospital:

At least 1 doctor with surgical skills

1 nurse for 20-30 beds per shift

Control of non-communicable diseases

Triage system

5.4. CLUSTER 4: RELIEF SERVICES (FOOD, NUTRITION AND OTHER RELIEF)

Food, water and other relief items should be calculated using Sphere standard for emergencies using the total population in immediate shelter.

The population evacuated in immediate shelter requires about 3800 cubic meters of emergency water with the rate of 15 liters per capita per day. Total Population needing evacuation shelter is about 870,000 so the immediate shelter needing population exceeded the open space capacity within Dhaka city corporation area is 616822 and need to be provided with immediate shelter in the shelter camps near to City Corporation. The population who are taken outside require about 9,250 cubic meters of water per day. So the total emergency water needed in the emergency shelters is about 13,000 cubic meters per day.

Pre-positioning of this amount of the water at the planned spaces is given in the **Map 11** in **Annex II**.

The other relief item can be calculated accordingly.

5.5. CLUSTER 5: SHELTER (INCLUDING CAMP MANAGEMENT)

Immediate shelter needs

Generally, the population from residential/mixed residential buildings with extensive to complete damage needs assistance for emergency shelter. However, all the population from such buildings may not require shelters to be provided by government and relief organizations. Part of them will take shelter at their relatives' and friends' houses, or may rent out spaces in remaining buildings (undamaged for partially damaged). Economic condition, ethnicity, ownership of land/building, age are some common factors which have greater influence on whether they require emergency shelter support by the relief agencies. HAZUS includes an elaborate methodology for evaluating the percentage and number of households those requiring shelter assistance. To perform similar calculations for Bangladesh following the same methodology, it will be rather difficult at this stage because of the lack of several data sets required. Hence, an approximate percentage of 50%

is reasonable for arriving at the number of households requiring shelter out of the total households those lost their houses.

Average household size of 4.8 has been used for Dhaka city (source: Statistical Pocket Book Bangladesh 2008 published by Bangladesh Bureau of Statistics).

Possible shelter needs for the population in different clusters in Dhaka city have been calculated based on the above methodology using GIS data and the summary of it is presented in Table 2 in Annex 1.

The open spaces: parks, playgrounds, recreational centers etc. are potential shelter areas for the homeless population which are shown in Map 3 in Annex 2. The open spaces within the Dhaka City Corporation are taken into consideration at this stage; however, spaces available outside the city corporation area can also be utilized during the actual situation. But identification and calculation of these areas have not been done within this task.

The SPHERE standard for shelter provision is 45 square meter of surface area per person. However, realizing the scarcity of open spaces appropriate to be used as temporary planned or self-settled shelter camps, 45 square meters per family is used as the required minimum standard. The number of people/family that each potential shelter site can accommodate has been calculated based this basis.

Temporary planned shelter camps

Temporary planned shelter camps are shown in **Map 4** in **Annex II**.

5.6. CLUSTER 6: WATER SUPPLY, SANITATION AND HYGIENE

Water Supply

- Average water use for drinking, cooking and personal hygiene in any household is at least 15 litres per person per day
- The maximum distance from any household to the nearest water point is 500 metres
- Queuing time at a water source is no more than 15 minutes
- It takes no more than three minutes to fill a 20-litre container

Excreta Disposal

A maximum of 20 people use each toilet

Vector Control

Solid Waste Management

Drainage

5.7. CLUSTER 7: RESTORATION OF URBAN SERVICES

Electricity

For early recovery, it requires more than 3000 skilled workers working to repair the direct damage to all the distribution lines completing in 7 days. There will be more damage due to damage of buildings and other infrastructures, which shows that the repair of distribution lines cannot be done in a short period of time.

For the repair cost, the repair cost for the distribution line is about 1.5 Million USD while as for repair of two sub stations cost about 20 Million USD. So, it will be hundreds times cheaper to implement seismic retrofitting of the sub stations. However, retrofitting of distribution lines is not feasible as the damage depends on the damage to buildings and other infrastructures as well.

GIS maps for the facilitation of immediate response and early recovery are prepared based on probable damage to the different components and included in this plan.

Priorities are set for early recovery and listed as:

Priority 1: Repair Substations for Small scale damage

Priority 2: Distribution lines towards the shelter centres

Priority 3: Distribution lines related to Industrial Activities

Priority 4: Repair other distribution lines

Priority 5: Major repair for substations

Water Supply

The total number of skilled/trained workers required for repairing the Potable water and Waste water system within Dhaka city corporation area after an earthquake is about 1800 people per day to repair the system within 7 days. If it is planned to repair in 14 days, it require about 900 skilled workers per day and require about 420 people working per day to repair the system in 30 days time.

Skilled workers required to repair overhead water tank and waste water treatment plant is not calculated here, as it require thousands of skilled workers if planned to repair within a month, which is practically not possible even if planned. It requires 3-6 months to repair the overhead tanks and treatment plant, even if the required manpower is available. The total estimated cost require for repairs is about 27 Million US Dollars. It is assumed that the repair cost for the waste water treatment plant, probability of which to be functional after the earthquake is 40-50% has been assumed that 25% of the replacement cost. Priorities for recovery of different components within the system are also made in this plan.

Gas

So the arrangement of cooking gas for about 200,000 families is the main challenge during immediate response. At the same time, almost all of the gas line will be out of order and there will be an enormous demand from the public for the GAS.

GIS map with the numbers of families in different evacuation shelter is prepared to facilitate the Pre-positioning of this amount of GAS before earthquake.

The total number of skilled/trained workers required for repairing the Gas pipeline is about 280 per day repair the system within 7 days. If it is planned to repair in 14 days, it require about 140 skilled workers per day. This calculation is based on the assumption mentioned above; it can be updated in the availability of detail information.

5.8. CLUSTER 8: TRANSPORT (ROAD, RAIL, AIR, SEA)

One of the immediate actions related to road transportation network, after an earthquake, is to open some key roads facilitating urban search and rescue. Search and rescue equipment need to transport to different locations for the effective rescue of the trapped people. The direct damage to the road network and the heavy damage the buildings indicate that all of the roads get either direct damage or get blocked due to debris.

The possibility of road blockage to the wider road is relatively less. For example, to get a 12 m road blocked completely, it needs at 6 stories buildings in both side of the road get collapsed. Maps are prepared for the possible functional roads after the earthquake for facilitation immediate search and rescue. Possible blockages of these major roads are also highlighted in the plan so that the emphasis can be made for opening those.

The number of trapped people in different areas of the city and the number of people trapped per square kilometres are analysed to prioritize the major roads to be opened first.

It requires about 1100 skilled workers (Mainly heavy equipment drivers) to open the roads within 7 days and 540 and about 250 to open the road in 14 days and 30 days respectively. Almost same number of heavy equipments is also needed to finish the job. Area wise priorities are also prepared in the plan so that the roads can be systematically opened considering the resources available.

The amount of cost required for the clearance and repair of the roads is taken as equal to the direct damage obtained from HAZUS. The repair cost for the road network has been estimated to about 50 Million US Dollar and for the Bridges it is about 1.5 Million US Dollar.

Map 12 in **Annex II** of this plan shows the direct damage to road transportation network. The road blockage due to debris is of major concern than the direct damage for the majority of the roads.

Map 13 in **Annex II** gives the major roads with more than 12m width with the buildings with 7 stories up in height showing the possible blockage.

5.9. CLUSTER 9: SECURITY AND WELFARE

Three main areas of the security and welfare are:

- General security
- Management of dead bodies
- Reunification of people

CHAPTER 6: ACTIONS TO SUPPORT PLAN IMPLEMENTATION

6.1. CAPACITY BUILDING

A comprehensive understanding of capacity building as defied by the United Nation's Agenda 21 states, "Specifically, capacity building encompasses the country's human, scientific, technological, organizational, institutional, and resource capabilities." (Chapter 37, UNCED, 1992).

This would mean assessing the needs in relation to current or existing capacities and enhancing it to a level, which can satisfy the needs. It is important that our understanding of capacity building emanates from the platform of human resource needs, which would need skills, (crafts, and labour), knowledge- (technical and indigenous) and character (attitudes and motivation). Following three important issues are needed to be addressed for national capacity building to face earthquake emergencies of the country.

1.2. CAPACITY BUILDING, AWARENESS CREATION AND ADVOCACY ACTIVITIES

- Training and Education
- Pre-Positioning of Emergency Facilities at important Urban Centers and critical locations
- Resource mobilization for addressing the gaps
- Community Level Awareness Programme
- Awareness campaigns for Different Government Officials at City level
- Creating awareness among Private sector institutions
- Public Awareness Campaigns
- School Awareness programmes
- Supportive Role of Media
- Advocacy Campaigns for mobilizing support of political leaders for Contingency Plan implementation

Box 10

6.2. TRAINING AND EDUCATION

Training and Education include trainings for different strata of administration and technical personnel, field officers, NGOs, business community, CBOs, selected community leaders and volunteers. In developing plans for Training and Education under Contingency Planning for Earthquakes need to consider appropriateness of such activities already being conducted by various agencies for different Target Groups. Based on the Training Needs Analysis conducted by the Contingency Planning Project Team, the categories of trainees and types of training to be conducted are listed in the following Table.

Type of training	Target group	Delivery method	By whom
Contingency Plan development	First Responder Agencies	Training Workshops.	DMB
	Utility services agencies and lifeline agencies	Training workshop/Guideline for contingency planning	DMB
	Other agencies	Issue Guideline for contingency planning	DMB
	Ward/Community level	Issue Guideline for contingency planning and training for NGOs to undertake planning at ward level	DMB
	Private sector institutions, banks, industries, factories	Issue Guideline for contingency planning	DMB
Training in EOC functions	DMB, Other government agencies	Issue SOPs	DMB
Training on Incident Command System (ICS)	AFD, Stakeholders within city corporations of Dhaka, Chittagong, Sylhet	City level Training workshops	DMB
Training on Damage assessment and need analysis(DANA)	DMB, DRR, other national level relevant stakeholders	National level Training workshops	DMB
Earthquake Response simulations/table top exercises	Health Service, FSCD, AFD, DMB, DRR, city corporations	City level Training workshops	DMB

Professional First responder courses(Collapse Building Search & Rescue, Medical First Responder training)	AFD, FSCD, Auxiliary forces,	PEER training delivery method	By Instructors trained by PEER training program as per government commitment
Hospital Preparedness for emergencies(HOPE)	Health services, National and city level hospitals	PEER training delivery method	By Instructors trained by PEER training program as per government commitment
Community level first responders	Community Volunteer groups in three cities	FSCD training course on community first responders	FSCD as per arrangement with CDMP
	Red Cross and Red Crescent volunteers	PEER community first responder training program	By Instructors trained by PEER training program and PEER training schedule
Restoration of Utility services	Field teams attached to utility agencies	Training programs designed by utility agencies	By utility agencies
Restoration of life line facilities	Field teams attached to lifeline agencies	Training Workshops.	By lifeline agencies

6.3. PRE-POSITIONING OF EMERGENCY FACILITIES AT IMPORTANT URBAN CENTERS AND CRITICAL LOCATIONS

An efficient emergency response system can be in place as planned in areas where damage is minimum but in areas where the damages are high due to occurrence of earthquake event there will be a high demand for search and rescue operations and other response actions but working in such areas will be extremely difficult due to non-functioning of most of the essential facilities. In areas where high risk is found and heavy losses are anticipated prior arrangements have to be made to replace potential non-functional facilities or enhance the existing capacity. In some cases the demand may be higher than what is available due to additional demand created by the event, in such areas the additional facilities will help to respond to increased demand. Also in some cases due to damages and destructions expected services can not be made available to certain other areas and First Responder Agencys may have difficulties to engage efficiently in their expected roles.

In order to ease the situation certain facilities or materials are suggested to be pre-positioned in such a way that such facilities can be utilized immediately after the disaster event as an alternative source.

Some of such suggested facilities are given below;

Table 6.2 Suggested facilities for pre-positioning of Emergency

Facility	Purpose	location	Number
Water supply wells(deep tube wells)	• Emergency water supply for drinking • Emergency water supply for fire fighting	Ref. maps of city level plan for each city	Ref relevant Tables
Temporary Hospitals	To provide emergency medical care during mass casualty situations		
Temporary shelter	• To be used as temporary shelter for displaced • To be used as temporary office facilities, warehouses, etc		
Emergency Rescue containers	Emergency rescue items, equipments to be used by community first responders		

Generators	Provide electricity for essential locations such as hospitals, medical storage, food storage etc		
Water purification plants, mobile kitchens, etc	To be used for evacuation camps for displaced		
Heavy equipments and tools	For Urban search and rescue		

6.4. RESOURCE MOBILIZATION

i) CDMP Phase II

Comprehensive Disaster Management Program (CDMP) of the Government of Bangladesh (GoB) currently being implemented by the Ministry of Food and Disaster Management (MoFDM) may get extended to its second phase after completion of Phase I in 2009 August. CDMP is currently funded by the United Nations Development Programme(UNDP), UK Department for International Development-Bangladesh (DFID-B) and the European Commission (EC) and such funding support will be extended to its second phase and if such resource needs can be identified under phase I such needs can be included in the Phase II as CDMP is designed to strengthen the Bangladesh Disaster Management system and more specifically to achieve the paradigm shift from reactive response to a proactive risk reduction culture.

ii) UN system support

The United Nations Disaster Management Team (UNDMT) is expected to exist in each disaster prone country and it can assist in capacity building of most essential areas of deficiency. The UNDMT comprising a core group represented by the country level representatives of FAO, UNDP, UNICEF, WFP, WHO and UNHCR when present in the country, is convened as necessary and chaired by the UN Resident Coordinator/ Humanitarian Coordinator (RC/HC), who is normally assisted by the mandated agencies.

The United Nations Disaster Assessment and Coordination (UNDAC) system is designed to assist the United Nation system in meeting international needs for early and accurate information supply during the initial phase of a sudden-onset of an emergency. It also helps in the coordination of incoming international relief at national level and/or at the

site of emergency. Other UN-Agencies such as UNOCHA, WFP, UN-BCPR, WHO provide different kind of assistance during disasters. Contingency Plan should have links to obtain such agency support and it is better if the assistance needed in implementation of Contingency Plan can be defined during capacity assessment.

iii) Support from INGOs, Donor community

The Red Cross system and International NGOs such as CARE, Oxfam, Islamic relief, ActionAid etc have their own assessments and Contingency Plans for assisting countries. DMB and DRR can have a coordination mechanism with all such INGOs and Donor agencies such as USAID, DEFID for assistance for emergency response. It is better some agreements can be worked out for not only for emergency response needs but also capacity building of community responder teams and other assistance such as material, equipment etc. Involvement of NGOs and INGOs in Earthquake Preparedness Planning in the respective geographical areas where they are active will be very effective. Such efforts by NGOs are underway in order to train First Responder teams in selected districts of Bangladesh. Discussions are on the way with other NGOs for similar initiatives such as developing disaster mitigation plans & preparedness plans at different levels; CBDM activities etc. The government will take steps to stipulate a policy framework within which NGOs and INGOs will be able to operate within Bangladesh and complement the actions taken by some of the government first responder agencys. Such activities may include:

- Response activities related to medical first response, counselling, psycho-social support etc.
- Community first response
- Preparedness planning at community and house hold level
- Awareness creation, advocacy and training

iv) Other Opportunities for Capacity building of Enhancement of Emergency Response

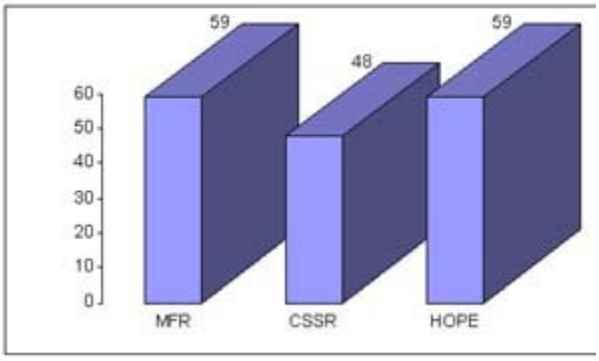
The Program for Enhancement of Emergency Response (PEER) is a regional training program initiated in 1998 by the U.S. Agency for International Development's, Office of U.S. Foreign Disaster Assistance (USAID/OFDA) to strengthen disaster response capacities in Asia.

In March 2003, Bangladesh was included as the fifth partner country in the Program for Enhancement of Emergency Response (PEER), joining India, Indonesia, Nepal and the Philippines – the four PEER countries in Phase I of the program (1998-2003). These countries were selected to participate in the program based on their high seismic vulnerability, their need to improve their disaster response capacity, and the interest on the part of their national governments to participate in the program. PEER countries

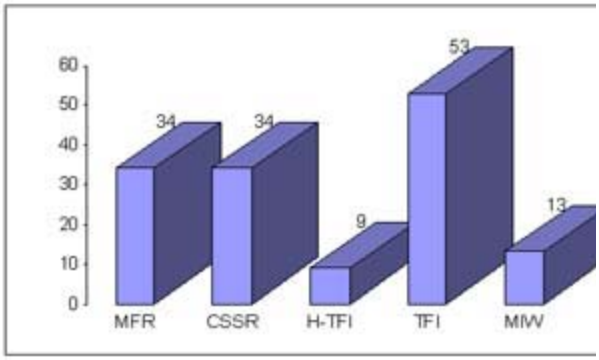
were selected based on seismic vulnerability and PEER is now in the fifth year of phase II (2003-2008).

PEER implements activities in Bangladesh under the coordinating authority of the Ministry of Food and Disaster Management (MoFDM), with which the program has a Memorandum of Understanding. The designated training institution for Medical First Responder (MFR) and Collapsed Structure Search and Rescue (CSSR) training is the Bangladesh Fire Service & Civil Defence (FSCD). The designated training institution for Hospital Preparedness for Emergencies (HOPE) is the National Institute for Preventive Medicine (NIPSOM), which falls under the authority of the Ministry of Health and Family Welfare.

The National Society for Earthquake Technology (NSET), Nepal, in collaboration with three U.S. partners, manages PEER, International Resources Group (IRG), Johns Hopkins University/Center for International Emergencies, Disasters and Refugee Studies (CIEDRS), and Safety Solutions, Inc.



PEER Graduates



PEER Instructor W/s Graduates

PEER conducted Seventeen different programs in Bangladesh from March 2003 – December 2007. PEER was able to produce 79 graduates and 34 IW graduates for MFR, 48 graduates and 34 IW graduates for CSSR, 73 TFI graduates, 79 graduates and 9 IW graduates for HOPE and 13 Master Instructors Workshop graduates. These IW graduates can be utilized as assistant instructors and instructors for the PEER courses. In the process of institutionalizing and nationalizing PEER courses in the country, NSET-PEER is assisting the Fire Service and Civil Defense (FSCD) and National Institute of Preventive and Social Medicine in developing their pool of instructors.

The PEER stage 3 will be started from 2009 and has three components included in its next phase;

- PEER training in order to increase the Instructors and master instructors for CSSR, HOPE, MFR etc.;
- Conduct of HOPE course and prepare Hospital emergency plans;
- Develop curriculum for community first responder training;

6.5. AWARENESS CREATION

Low understanding of risk can be the result of inadequate capacity of local-level community to understand the risk environment, inadequacy of knowledge on infrastructure, which can protect vulnerable communities, lack of knowledge or lack of confidence on early warning or other inadequacies for behavioral change for improvement of living conditions. Risk communication as an effective tool or measure for creating appropriate understanding on the unacceptability of prevailing conditions of risk can cross more boundaries (a skill once learned can be taught more easily than a safe building can be built). An informed public can take action before, during the following disaster onset to reduce the risk of injury and loss. An effective public awareness education campaign requires the coordinated efforts of all the stakeholders such as the government officials and community members, media, scientific and technical experts, business leaders and development workers, civil society groups etc.

6.5.1 Community Level Awareness Programme

Following aspects should be covered in awareness programmes

In a situation of an impending earthquake disaster,

- Encourage people to keep fuel in their cars as petrol pumps may be closed during emergencies.
- Ask people to keep gas supply line closed always after utilization
- Ask people to shut off the electricity main switches, gas and water valves, soon after the earthquake if they do not have a fixed automatic disconnecting mechanisms
- Close and lock doors and windows and secure their homes before leaving.
- Ask people to listen to a battery-powered radio and follow local instructions.
- If the danger is a chemical release, then people should be instructed to evacuate immediately.
- Leave early enough to avoid being trapped.
- Follow recommended evacuation routes.
- Not to move or drive into areas heavy destructions or areas with fire break out.
- Stay away from fallen power lines.

- Release pets and domestic animals
- Community should set the livestock free

Earthquake survival kit: The earthquakes normally generate a high number of displaced people and also many people will be trapped inside buildings. The immediate life support and survival will depend on how fast they can get external assistance. Until such time they need to survive through their own supplies and it is highly recommended that at community level they have prepared an Earthquake survival kit. Families should be encouraged to take along with them during earthquake emergencies adequate supplies such as shown in the box 11:

Such supplies should be collected and kept in a **Go-Bag** so that they will be able to evacuate quickly with such urgent supplies.

Earthquake Survival Kit

- Adequate supply of water in closed unbreakable containers
- Adequate supply of non-perishable packaged food and dry rations
- Medicine
- A change of clothing and rain gear
- Blankets and bed sheets, towels
- Buckets, plates, glasses, mugs made of plastic
- Soap, toothbrushes, toothpaste
- A battery-powered radio, torch, lantern, matches
- Cash and jewelry
- Personal medicines
- Important documents including passport, national identity card, bank passbook, address/telephone book (of relatives), certificates, driving license, property documents, insurance documents etc.
- Special items including food for infants, elderly or disabled family members.

6.5.2 Awareness campaigns for Government Officials

Awareness programmes related to following important issues need to be conducted in all cities (Dhaka, Chittagong, Sylhet etc) with high seismic risk:

- Awareness on seismic hazards and vulnerability to earthquakes
- Awareness about the functional response clusters and contingency planning functions
- Roles and responsibilities of agencies according to city level earthquake Contingency Plans
- SOPs and responsibilities assigned to various agencies/institutions

- EOC functions, and duties and responsibilities assigned to various agencies/ institutions
- Site Operation Centre (SOC) functions, and duties and responsibilities assigned to various personnel
- Validation of plans especially evacuation routes at community level with assistance from local governments (by ward commissioners/ward level DM committee) and NGOs, CBOs working in certain areas.

6.5.3 Creating awareness among Private sector

Private sector establishments can get affected by earthquakes depending on the vulnerability of buildings. This can bring very high economic losses as well as human and material losses. In most cases institutions such as Garment factories do have a large work force and vulnerable to building collapse in an event of an earthquake. The private sector should be encouraged for having their own Contingency Plans and also they should conduct periodic simulations to enhance the preparedness level. The fire safety is another important factor and they should be encouraged to equip with equipment and trained staff to handle cases of fire until the staff from FSCD take charge of such events. It is also better to encourage private sector security firms to have trained and skill medical first responders, search and rescue teams to help the professional first responder agencies.

6.5.4 Public Awareness Campaigns

Public awareness programmes on the City level Contingency Plans should be organized with the involvement of City Corporations, various Government Stakeholder Agencies, NGOs and Media. These can take the form of public awareness campaigns using both electronic and print media, posters, competitions, street dramas, workshops and others.

Public awareness campaigns generate community support for the implementation of Earthquake Contingency Plans at city level and encourage those engaged in response activities at community level and to mobilize community support. Informing the general population about the potential seismic hazard and risks increases public knowledge and understanding of the situation. Risk communication can encourage greater public participation in community/household/family level preparedness activities, enhancing the effectiveness of preparedness planning. Campaigns need to be targeted to specific audiences with directed messages.

Public Awareness programmes should be for the following target groups

- Community leaders and members including farmers, fishermen, traders, skilled workmen in building trades etc. and house wives
- School children
- Religious leaders
- Officials of various private sector agencies
- Professionals of different sectors
- Political heads of local Authorities, other selected members, office bearers
- Media personnel

A wide array of channels of communication is available for Public Awareness campaigns with different target groups:

- Face-to-face: meeting, seminar, workshop, conference, march, exhibition, demonstration, training, exchange visit, planning
- Mass media: television, melodramas, radio, newspaper, cinema
- Distributed print material: leaflet, pamphlet, brochure, booklet, guideline, case study, newsletter, journal, research paper, report
- Folk media: story, drama, dance, song, puppet, music, street entertainment
- Audio-visual: video, audio, multi-media, artwork, photograph, slide show, model, map
- Stand-alone print: billboard, poster, banner, warning sign, flood water level marker
- Postal: direct mailing
- People: community leader, volunteer, project worker, head of women's group
- Electronic media: website, e-mail, e-mail discussion lists, electronic conferencing, distance learning platform, SMS etc.
- Earthquake simulations

6.5.5 School Awareness programmes

i. Training for Scouts as First Responders

If the Earthquake response activities can be brought to the Scouts movement, they can be trained easily in

- Community First Responder activities to assist professional Search and Rescue teams
- First Aid and medical First Response activities.

It will be necessary for the Ministry of Food and Disaster management to have discussions with Ministry of Education and school authorities as well as with the Scout movement to impart training on above activities. Qualified trainers/Instructors from FSCD can provide ToT and train school teachers for providing necessary trainings to scouts and girl guides in selected schools.

ii. School awareness programmes

School awareness programmes should consist of the activities as shown in the Box 12:

School Awareness Programmes

- Seminars for school children, teachers and parents
- Distribution of specific awareness leaflets – Materials on Contingency Plans, evacuation areas , routs, should be developed by DMB
- Awareness on First Aid and medical first responder functions(for those involved in Scout movement)
- Awareness programs conducted through media (TV, Radio and Newspaper) targeting at school children, parents and teachers

Box 12

DMB will collaborate with Ministry of Education and school authorities' through CDMP in conducting school awareness programmes and in sharing awareness material (videos, printed material posters etc.) as well as in conducting joint simulation activities under some School Safety Projects.

Extra curricular activities like art/quiz competitions, school safety clubs, news letters etc will be promoted as a part of awareness campaign on contingency planning and earthquake preparedness. The extra curriculum activities comprised of establishing of School earthquake preparedness/safety clubs in the selected schools. Activities of such clubs will focus on the following:

- Identifying the earthquake vulnerability in the neighbourhood of the school
- Components of structural non-structural vulnerability of schools
- Earthquake Preparedness planning for class/school and evacuation simulations
- Lectures by guest lecturers and publication of wall paper
- Studying wind effects and measuring wind speeds
- Gathering and recording DM related data and information
- Disaster mitigation and environmental management related activities that can be done at school level

6.5.6 Role of Media

The Media act to provide the public with technical information about hazards, the risks posed by the hazards and steps people can take to protect themselves and their families from disaster. Media transmit vital information quickly and in language that the community can relate to, both in normal times and in emergency. Media Personnel are important allies for the government and technical experts in that they have access to telecommunications and information management systems that government may not have. Government should actively seek out media participation in disaster management activities before, during, and after disaster;.

- For providing information on earthquake disaster, what to do before, during and after an earthquakes
- For providing information on preparedness measures(keeping a Go-bag with essential supplies
- For building awareness to develop house-hold level preparedness plan by every household
- For creating awareness about and continuous persuasion to local government bodies for making Contingency Plans at local government level
- to aware citizens about evacuation places and evaquation routs in the communities/towns/ cities during any earthquake situation
- Dos and Don'ts during earthquakes

i. The Emergency Public Information Function

During the emergencies, provision should be made for frequent briefings with accurate and timely information to the media. It is advisable to provide as much information as possible from one location or source, i.e. The EOC where the information has been compiled and verified. Accurate, timely and useful information and instructions to the public are necessary throughout a disaster period. Information must be disseminated to the people at risk and also to the public at large, who may be indirectly affected by the disaster event, e.g. those with family or friends at risk, or persons who may want to assist in providing relief. Responsibility for emergency public information should be convened to the appropriate agency. Available means of dissemination should be surveyed and access to them ensured. In case of earthquake, normal lines of communication may be disrupted, and alternate means may need to identified and provided.

ii. Media Mobilization Guidelines

In any case of disaster event it is also necessary to mobilize the support of Media for information dissemination. Since this has to be done in a systematic manner it is advisable to provide guidelines for media so that they will be familiar with the Standard Operational Procedure during such emergencies.

The following media mobilization guidelines are suggested for covering Earthquake disaster event, immediate response, social mobilisation at national and local level etc.

Table 6.3 Media Mobilization Guidelines

Methods	Activity / Technique	Materials to be used
Establish Standard Operational Procedure for use	Media briefing formats: press conferences, warning bulletins for after shocks, disaster event bulletins (e.g., public safety etc.)	Disaster event bulletins, After shock warning bulletins public statements and standard data forms drafted for media / general release: casualties, public safety measures, evacuation instructions etc.
Information control: to prevent public confusion and ensure appropriate behaviour e.g., correct safety / prevention measures	Sequencing of information releases with content according to each stage of evolving situation; accurate targeting intended audience according to message	Data / announcements pre-drafted in readiness for each stage; content as relevant to each stage, accurately drafted for intended audience / purpose
Media education: informing media professionals of nature of possible / anticipated disasters, and contingencies arising thereof; ensuring selected media people (concerned reporters / video-	Specific disaster-related training and briefing of media people; provision of informational material on contingencies	Training materials, disaster news coverage guide manuals, instructional audio / video cassettes, photographic briefs, briefing dockets, posters

graphers, news decision makers – e.g., editors, news directors)		
Public awareness via media	Prior arrangements with media organisations for airtime slots, newspaper space for prepared material	Video warning / instruction messages, prepared print material for public instructions on disaster response measures

6.6. ESTABLISHMENT OF REPORTING SYSTEM FOR REPORTING THE READINESS OF DIFFERENT AGENCIES

6.6.1 Reporting on the readiness of First Responder Agencies

During the Plan development stage each and every first responder agency should agree to provide a bi-annual report to the National Earthquake Emergency Operation Centre (NEEOC) about the preparedness level. This format is annexed to Agency level Plan prepared by each First responder agency.

Each agency will minimum provides information on:

1. Whether the staff within the agency is familiar with of the Earthquake Contingency Plan of the Agency
2. Orientation and training for Earthquake Contingency Plan and procedures undertaken or not? 3. Understanding of each relevant officer about the earthquake disaster response procedures s/he has to follow during earthquake event?
4. Whether arrangements are in place to impart Special skills required during Earthquake emergency operations to the officials and the staff. As example; No of Master Instructors for CSSR No of master Instructors for MFR No of specially trained cadre of First Responders for CSSR and MFR

5. Whether following tasks have been Reviewed and updated: ▪ Earthquake Precautionary measures and procedures. ▪ The vulnerability assessment of buildings ▪ The precautions to be taken to protect equipments and material have been undertaken. ▪ Post earthquake disaster procedures to be followed. 6. No of Buildings which were strengthened to have high standard of safety
7. Name of the officer , who has been designated as Nodal Officer for Earthquake Disaster Response 8. Name, designation and contact details of the officer is as follows;
9. Details about the Additional Sources of supply of materials, manpower, equipment required/identified to support the Response capacity of the respective agency in Earthquake response operations.

The National Earthquake Emergency Operations centre will develop a report on the Readiness or Preparedness level of each agency to Respond to an earthquake disaster event and submit it through DMB to the Secretary MoFDM for onward transmission to the National Council.

Depending on the situation Secretary of MoFDM and DMB will be able to lobby for additional financial/man-power/material assistance to First Responder agencies to achieve the expected levels. They also can present such needs to Un-Agencies, International Donor agencies for possible assistance by them to First Responder Agencies.

6.6.2 Reporting during disasters

During earthquake emergencies AFD will take over the command in Responding to disaster event.. The reporting at each level will be done to each level Response commander. For example- on arriving at the scene of any rescue site, the Officer-in-Charge will immediately provide the following information to the Incident Commander:

- Location
- Type of structure
- Number of victims alive and trapped.
- Any dangers which might exist - live wires, gas, hazardous materials, etc.
- Assessment of resources needed to effect rescue

- Any medical assistance needed
- Any other relevant information

The Officer in Charge will commence rescue operations as necessary and will provide reports every three hours (3 hours), then every six hours (6 hours), then twelve hours (12 hours) at discretion of the Officer in charge at site to higher levels. Such operations will be cascaded up to high level command and the reports will flow to the National Earthquake Emergency Operations Centre.

Reports will be sent to the National Earthquake EOC from each Operational Head Quarters every 12 hours. The following information will be provided:

- Number dead
- Number injured
- Number of victims still trapped
- Number of persons reported missing
- Type of structures damaged
- Existing co-lateral hazards
- Availability of water
- Road conditions

In case or rescue operation, the reporting system would also cover and maintain the following priority list:

i. Hospitals and Emergency Services Facilities
ii. Schools, Educational and Residential Institutions
iii. High Population Areas
iv. Hotels/Government Buildings
v. Other Buildings(factories, commercial buildings etc)

6.6.3 Reporting after disasters

The reports will mainly deal with the Recovery aspects and improvements that are needed to increase the efficiency of Contingency Plans (Difficulties, Challenges faced, and opportunities, what went well, improvements suggested.

Those plans also should be submitted to NEEOC, DMB and to the Secretary, MoFDM.

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GLOSSORY OF TERMS

Building Codes Ordinances and regulations controlling the design, construction, materials, alteration and occupancy of any structure to insure human safety and welfare. Building codes include both technical and functional standards.

Capacity A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster.

Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Capacity may also be described as capability.

Capacity Building Efforts aimed to develop human skills or societal infrastructures within a community or organization needed to reduce the level of risk.

In extended understanding, capacity building also includes development of institutional, financial, political and other resources, such as technology at different levels and sectors of the society.

Cluster A "cluster" is essentially a "sectoral group" and there should be no differentiation between the two in terms of their objectives and activities; the aim of filling gaps and ensuring adequate preparedness and response should be the same. (IASC Guidance Note on Using the Cluster Approach Nov 2006)

Cluster Approach The Cluster Approach aims to strengthen humanitarian response capacity and effectiveness in five key ways: i) ensuring sufficient global capacity is built up and maintained in key gap sectors/areas of response; ii) identifying predictable leadership in the gap sectors/areas of response; iii) facilitating partnerships and improved inter-agency complementarity by maximizing resources; iv) strengthening accountability; and 5) improving strategic field-level coordination and prioritization in specific sectors/areas of response by placing responsibility for leadership and coordination of these issues with the competent operational agency. (IASC Guidance Note on Using the Cluster Approach Nov 2006)

Cluster Leads A "cluster lead" is an agency/organization that formally commits to take on a leadership role within the international humanitarian community in a particular sector/area of activity, to ensure adequate response and high standards of predictability, accountability &

partnership. (IASC Guidance Note on Using the Cluster Approach Nov 2006)

Disaster A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.

A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.

Disaster Risk Management The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.

Disaster Risk Reduction (disaster reduction) The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

The disaster risk reduction framework is composed of the following fields of action, as described in ISDR's publication 2002 "Living with Risk: a global review of disaster reduction initiatives", page 23:

- *Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis;*
- *Knowledge development including education, training, research and information;*
- *Public commitment and institutional frameworks, including organisational, policy, legislation and community action;*
- *Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments;*
- *Early warning systems including forecasting, dissemination of*

warnings, preparedness measures and reaction capacities.

Earthquake	An earthquake is a series of vibrations on the earth's surface caused by the generation of elastic (seismic) waves due to sudden rupture within the earth during release of accumulated strain energy.
Emergency Management	The organization and management of resources and responsibilities for dealing with all aspects of emergencies, in particularly preparedness, response and rehabilitation. *Emergency management involves plans, structures and arrangements established to engage the normal endeavours of government, voluntary and private agencies in a comprehensive and coordinated way to respond to the whole spectrum of emergency needs. This is also known as disaster management.*
Emergency Preparedness	Consists of all activities taken in anticipation of a crisis to expedite effective emergency response. This includes contingency planning, but is not limited to it: it also covers stockpiling, the creation and management of standby capacities and training staff and partners in emergency response. (Source: ODIHPN Contingency Planning Review Paper 2007)
First Responder	The term 'first responder' refers to those agencies/ individuals who in the early stages of an incident are responsible for the protection and preservation of life, property, evidence, and the environment, including emergency response providers as well as emergency management, public health, clinical care, public works, and other skilled support personnel (such as equipment operators) that provide immediate support services during prevention, response, and recovery operations. *Source: Homeland Security Act of 2002 (6 U.S.C. 101, Washington, U.S.A.)*
Geographic information systems (GIS)	Analysis that combine relational databases with spatial interpretation and outputs often in form of maps. A more elaborate definition is that of computer programmes for capturing, storing, checking, integrating, analysing and displaying data about the earth that is spatially referenced. *Geographical information systems are increasingly being utilised for hazard and vulnerability mapping and analysis, as well as for the application of disaster risk management measures.*
Hazard	A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and

	economic disruption or environmental degradation. *Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterised by its location, intensity, frequency and probability.*
Hazard Analysis	Identification, studies and monitoring of any hazard to determine its potential, origin, characteristics and behaviour.
Land-use Planning	Branch of physical and socio-economic planning that determines the means and assesses the values or limitations of various options in which land is to be utilized, with the corresponding effects on different segments of the population or interests of a community taken into account in resulting decisions. *Land-use planning involves studies and mapping, analysis of environmental and hazard data, formulation of alternative land-use decisions and design of a long-range plan for different geographical and administrative scales.* *Land-use planning can help to mitigate disasters and reduce risks by discouraging high-density settlements and construction of key installations in hazard-prone areas, control of population density and expansion, and in the siting of service routes for transport, power, water, sewage and other critical facilities.*
Mitigation	Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.
Natural Hazards	Natural processes or phenomena occurring in the biosphere that may constitute a damaging event. *Natural hazards can be classified by origin namely: geological, hydrometeorological or biological. Hazardous events can vary in magnitude or intensity, frequency, duration, area of extent, speed of onset, spatial dispersion and temporal spacing.*
Planning Assumptions	The key elements of a scenario that form the basis for developing a contingency plan (for example, projected caseloads) (Source: IASC Contingency Planning Guidelines 2001)

Preparedness	Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations.
Prevention	Activities to provide outright avoidance of the adverse impact of hazards and means to minimize related environmental, technological and biological disasters. *Depending on social and technical feasibility and cost/benefit considerations, investing in preventive measures is justified in areas frequently affected by disasters. In the context of public awareness and education, related to disaster risk reduction changing attitudes and behaviour contribute to promoting a "culture of prevention".*
Recovery	Decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk. *Recovery (rehabilitation and reconstruction) affords an opportunity to develop and apply disaster risk reduction measures.*
Relief / Response	The provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration.
Resilience / Resilient	The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures.
Retrofitting (or upgrading)	Reinforcement of structures to become more resistant and resilient to the forces of natural hazards. *Retrofitting involves consideration of changes in the mass, stiffness, damping, load path and ductility of materials, as well as radical changes such as the introduction of energy absorbing dampers and base isolation systems. Examples of retrofitting includes the consideration of wind loading to strengthen and minimize the wind force, or in earthquake prone areas, the strengthening of structures.*

Risk	The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions. *Conventionally risk is expressed by the notation Risk = Hazards x Vulnerability. Some disciplines also include the concept of exposure to refer particularly to the physical aspects of vulnerability.* *Beyond expressing a possibility of physical harm, it is crucial to recognize that risks are inherent or can be created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes. (Source: ISDR)*
Risk Assessment/Analysis	A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend. *The process of conducting a risk assessment is based on a review of both the technical features of hazards such as their location, intensity, frequency and probability; and also the analysis of the physical, social, economic and environmental dimensions of vulnerability and exposure, while taking particular account of the coping capabilities pertinent to the risk scenarios.*
Scenario	An account or synopsis of a possible course of events that could occur, which forms the basis for planning assumptions (for example, a river floods, covering a nearby town and wiping out the local population's crop) (Source: IASC Contingency Planning Guidelines 2001)
Scenario-building	The process of developing hypothetical scenarios in the context of a contingency planning exercise. (Source: IASC Contingency Planning Guidelines 2001)
Seismic Hazard	Seismic hazard in the context of engineering design is defined as the predicted level of ground acceleration which would be exceeded with 10% probability at the site under construction due to occurrence of earthquake anywhere in the region, in the next 50 years.
Sustainable development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations

imposed by the state of technology and social organization on the environment's ability to meet present and the future needs. (Brundtland Commission, 1987).

Sustainable development is based on socio-cultural development, political stability and decorum, economic growth and ecosystem protection, which all relate to disaster risk reduction.

Vulnerability

The conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.

For positive factors, which increase the ability of people to cope with hazards, see definition of capacity.

ANNEXES

ANNEX 1: CALCULATION TABLES

Table 1: Probability of Damage to Main Buildings of Different Emergency Response Agencies (Scenario Earthquake 1)

S. No.	Name of Emergency Response Agency	Structural Type of Building	Seismic Hazard Level (PGA or gal)	Damage Probabilities					Structural Damage
				None	Slight	Moderate	Extensive	Complete	
1	Armed Forces Division	C3M	0.281 – 0.300	0.715	0.029	0.004	0.002	0.250	None – Slight
2	Banga Bhaban	C3L	0.215 – 0.240	0.908	0.072	0.014	0.006	0.001	None – Slight
3	Bangladesh Meteorological Department	C3H	0.261 – 0.280	0.701	0.039	0.006	0.003	0.250	None – Slight
4	Bangladesh Police Headquarters	C3M	0.241 – 0.260	0.908	0.072	0.014	0.006	0.001	None – Slight
5	Bangladesh Secretariat	C3H	0.241 – 0.260	0.006	0.055	0.339	0.343	0.257	Mod. - Extensive
6	Bangladesh Telecommunications Company Ltd	C3M	0.241 – 0.260	0.005	0.046	0.321	0.348	0.280	Mod. - Extensive
7	Dhaka City Corporation	C2H	0.241 – 0.260	0.956	0.037	0.005	0.002	0.000	None – Slight
8	Dhaka Power Distribution Company	C3H	0.241 – 0.260	0.006	0.056	0.341	0.342	0.254	Mod. - Extensive
9	Dhaka WASA	C4H	0.241 – 0.260	0.004	0.041	0.309	0.351	0.295	Mod. - Extensive
10	Directorate General of Health Service	C3L	0.261 – 0.280	0.953	0.039	0.006	0.002	0.000	None – Slight
11	Disaster Management Bureau & DRR	C3M	0.261 – 0.280	0.941	0.048	0.008	0.003	0.000	None – Slight
12	DMP Headquarter	C3L	0.241 – 0.260	0.951	0.041	0.006	0.002	0.000	None – Slight
13	Fire Service Civil Defense	C3L	0.215 – 0.240	0.006	0.052	0.333	0.345	0.264	Mod. - Extensive
14	Jatiya Sangsad Bhaban	C2M	0.261 – 0.280	0.954	0.038	0.005	0.002	0.000	None – Slight
15	Prime Minister's Office	C3L	0.261 – 0.280	0.191	0.236	0.320	0.180	0.073	Slight - Moderate
16	Roads & Highways Department	C3L	0.241 – 0.260	0.953	0.039	0.006	0.002	0.000	None – Slight
17	Titas Gas	C3H	0.241 – 0.260	0.580	0.206	0.114	0.094	0.005	None – Slight

Table 2: Calculation of Immediate Evacuation and Temporary Shelter Needs

Ward	Total Building Count	Total Population Count	Total population from extensive and complete damage buildings (requiring immediate evacuation)	Total displaced population (50% from extensive and 100% from complete damage buildings)	Total population requiring temporary shelters in planned or self-settled camps (50% of total displaced)	Total families requiring shelter in camps (@4.8 as the household size)
1	8182	200493	68668	53673	26837	5591
2	6114	141689	48875	35393	17696	3687
3	4695	99937	34463	24999	12499	2604
4	2181	40188	13763	10771	5386	1122
5	5981	116727	40152	29961	14980	3121
6	10452	214232	73357	57418	28709	5981
7	2786	57912	19841	15505	7753	1615
8	6380	120128	41231	31550	15775	3286
9	3796	68276	23413	18044	9022	1880
10	5878	113631	39024	29717	14858	3095
11	3101	70375	24059	19162	9581	1996
12	3373	73626	25350	18784	9392	1957
13	12114	265720	90894	72122	36061	7513
14	5307	127492	43834	33001	16501	3438
15	13141	221732	76036	58593	29296	6103
16	7953	191497	65695	50569	25284	5268
17	12376	240838	82877	61943	30971	6452
18	3529	73683	25462	18110	9055	1886
19	7323	135957	46736	35230	17615	3670
20	4467	98212	33896	24388	12194	2540
21	6482	126889	43608	32886	16443	3426
22	6140	163834	56663	39971	19986	4164
23	2563	64160	22440	14050	7025	1464
24	2742	82395	29158	15420	7710	1606
25	4608	114062	39873	25126	12563	2617
26	5294	106204	36970	24190	12095	2520

27	3730	101996	35847	20785	10393	2165
28	3632	83174	28804	20099	10049	2094
29	3057	82376	28772	18043	9022	1880
30	2351	51761	17678	14261	7131	1486
31	1249	32952	11955	4018	2009	419
32	2176	47142	16446	10429	5214	1086
33	404	15819	5388	4347	2173	453
34	2889	75758	26164	18684	9342	1946
35	2097	68528	24032	14302	7151	1490
36	2014	60981	21170	14256	7128	1485
37	3103	68492	23797	15846	7923	1651
38	2583	37879	13072	9461	4731	986
39	2609	55566	19092	14433	7216	1503
40	3075	69946	23957	18682	9341	1946
41	1426	31071	10626	8397	4199	875
42	2621	64658	22379	15611	7806	1626
43	5263	122212	41959	31926	15963	3326
44	2163	65611	22782	15321	7660	1596
45	2360	56816	19577	14358	7179	1496
46	6794	146614	50446	37509	18754	3907
47	3910	83044	28574	21245	10623	2213
48	4981	109111	37494	28311	14155	2949
49	2729	60494	20755	15860	7930	1652
50	2778	62573	21391	17006	8503	1772
51	2281	52974	18146	14128	7064	1472
52	1632	35129	12086	8991	4495	937
53	1861	43984	15194	10867	5434	1132
54	3314	87552	30243	21669	10835	2257
55	3228	81710	28190	20381	10191	2123
56	1444	19212	6708	4170	2085	434
57	1353	23960	8214	6315	3157	658
58	4692	97617	33433	26087	13043	2717
59	2318	55236	19020	14021	7010	1461

60	3427	67681	23349	16879	8440	1758
61	1694	41008	14158	10151	5076	1057
62	1629	41068	14083	10827	5413	1128
63	1189	30250	10614	6315	3158	658
64	1266	38138	13745	5351	2675	557
65	3210	62891	22065	13087	6543	1363
66	1444	29245	10814	2154	1077	224
67	1339	34128	12309	4679	2340	487
68	1563	47058	17131	5344	2672	557
69	2864	73829	26253	12935	6468	1347
70	1659	47322	17248	5266	2633	549
71	1557	42365	15360	5255	2627	547
72	1062	30404	11051	3578	1789	373
73	839	15440	5700	1152	576	120
74	2334	54557	19270	10396	5198	1083
75	2071	48401	16667	12280	6140	1279
76	3083	68080	23714	15413	7707	1606
77	2360	58133	20088	14262	7131	1486
78	1588	40093	14027	8581	4291	894
79	2440	54945	19203	11956	5978	1245
80	1681	40496	14243	8185	4093	853
81	3300	72983	25404	16628	8314	1732
82	2572	52373	18177	12440	6220	1296
83	3088	61981	21382	15564	7782	1621
84	3785	78853	27426	18106	9053	1886
85	4412	84417	29076	21463	10731	2236
86	3658	84503	29667	17461	8730	1819
87	4530	85173	29529	20285	10142	2113
88	2855	53599	18555	12949	6474	1349
89	4386	84051	28955	21290	10645	2218
90	4865	81848	28161	21009	10505	2188
91	0	0	0	0	0	0
Grand Total	326825	7187150	2487154	1741636	870818	181420

Table 3: Calculation of Trapped Population

Ward	Total Building Count	Total Population Count	Count of complete damage buildings	Count of collapse buildings (10% of complete damage buildings)	Population in collapse buildings	Count of trapped population (60% of population in collapse buildings)
1	8182	200493	1902	190	4635	2781
2	6114	141689	1419	142	3294	1976
3	4695	99937	1090	109	2322	1393
4	2181	40188	501	50	929	557
5	5981	116727	1385	138	2708	1625
6	10452	214232	2418	242	4952	2971
7	2786	57912	621	62	1339	804
8	6380	120128	1461	146	2782	1669
9	3796	68276	878	88	1580	948
10	5878	113631	1359	136	2633	1580
11	3101	70375	710	71	1625	975
12	3373	73626	782	78	1709	1025
13	12114	265720	2761	276	6138	3683
14	5307	127492	1233	123	2956	1774
15	13141	221732	3047	305	5132	3079
16	7953	191497	1844	184	4433	2660
17	12376	240838	2873	287	5588	3353
18	3529	73683	805	81	1715	1029
19	7323	135957	1677	168	3152	1891
20	4467	98212	1040	104	2284	1370
21	6482	126889	1502	150	2941	1765
22	6140	163834	1453	145	3816	2289
23	2563	64160	642	64	1506	904
24	2742	82395	676	68	1952	1171
25	4608	114062	1138	114	2677	1606

26	5294	106204	1241	124	2485	1491
27	3730	101996	883	88	2404	1442
28	3632	83174	876	88	1939	1163
29	3057	82376	720	72	1933	1160
30	2351	51761	546	55	1194	717
31	1249	32952	301	30	795	477
32	2176	47142	513	51	1105	663
33	404	15819	119	12	364	218
34	2889	75758	673	67	1763	1058
35	2097	68528	503	50	1612	967
36	2014	60981	471	47	1424	855
37	3103	68492	727	73	1600	960
38	2583	37879	605	61	880	528
39	2609	55566	599	60	1288	773
40	3075	69946	691	69	1617	970
41	1426	31071	330	33	718	431
42	2621	64658	609	61	1507	904
43	5263	122212	1218	122	2831	1699
44	2163	65611	504	50	1533	920
45	2360	56816	539	54	1320	792
46	6794	146614	1574	157	3402	2041
47	3910	83044	907	91	1927	1156
48	4981	109111	1161	116	2529	1517
49	2729	60494	623	62	1400	840
50	2778	62573	645	65	1445	867
51	2281	52974	526	53	1225	735
52	1632	35129	381	38	815	489
53	1861	43984	435	44	1023	614
54	3314	87552	787	79	2037	1222
55	3228	81710	757	76	1900	1140
56	1444	19212	336	34	450	270
57	1353	23960	303	30	554	332
58	4692	97617	1085	109	2257	1354

59	2318	55236	539	54	1282	769
60	3427	67681	796	80	1574	944
61	1694	41008	393	39	954	572
62	1629	41068	374	37	950	570
63	1189	30250	284	28	712	427
64	1266	38138	303	30	916	550
65	3210	62891	750	75	1480	888
66	1444	29245	344	34	716	429
67	1339	34128	319	32	820	492
68	1563	47058	373	37	1139	683
69	2864	73829	689	69	1755	1053
70	1659	47322	400	40	1146	688
71	1557	42365	372	37	1022	613
72	1062	30404	253	25	735	441
73	839	15440	204	20	377	226
74	2334	54557	551	55	1291	774
75	2071	48401	481	48	1124	674
76	3083	68080	731	73	1594	956
77	2360	58133	552	55	1353	812
78	1588	40093	375	38	942	565
79	2440	54945	573	57	1289	774
80	1681	40496	397	40	955	573
81	3300	72983	773	77	1708	1025
82	2572	52373	621	62	1222	733
83	3088	61981	727	73	1440	864
84	3785	78853	887	89	1844	1106
85	4412	84417	1022	102	1960	1176
86	3658	84503	867	87	1990	1194
87	4530	85173	1063	106	1987	1192
88	2855	53599	667	67	1249	749
89	4386	84051	1020	102	1952	1171
90	4865	81848	1135	113	1899	1139
Grand Total	**326825**	**7187150**	**76239**	**7624**	**167448**	**100469**

Table 4: List of Available Open Spaces and their Capacities (Immediate Evacuation)

(Bigger than 100 square meter size)

Ward	Area of Open Spaces (square meters)	Population Holding Capacity (@1m² / person for immediate evacuation)	Total Population from Extensive and Complete Damage Buildings	Total Deficit (population requiring further space for immediate evacuation)
1	206726	206726	68668	0
2	25895	25895	48875	22981
3	1413	1413	34463	33050
4	127551	127551	13763	0
5	12604	12604	40152	27548
6	102837	102837	73357	0
7	48064	48064	19841	0
8	1244913	1244913	41231	0
9	16155	16155	23413	7258
10	10750	10750	39024	28274
11	2258	2258	24059	21801
12	1285	1285	25350	24065
13	1367	1367	90894	89527
14	850	850	43834	42984
15	7563	7563	76036	68473
16	18250	18250	65695	47445
17	16878	16878	82877	65999
18	11521	11521	25462	13941
19	126738	126738	46736	0
20	52001	52001	33896	0
21			43608	43608
22	276	276	56663	56387
23			22440	22440
24	15468	15468	29158	13690
25	580	580	39873	39292
26	1497	1497	36970	35474
27	8620	8620	35847	27226

28	623	623	28804	28181
29	8991	8991	28772	19781
30	6984	6984	17678	10694
31	1085	1085	11955	10870
32	7378	7378	16446	9068
33	19974	19974	5388	0
34	3018	3018	26164	23146
35			24032	24032
36	64271	64271	21170	0
37	2566	2566	23797	21231
38	1486	1486	13072	11587
39	2068	2068	19092	17025
40	831584	831584	23957	0
41	2738	2738	10626	7889
42	4729	4729	22379	17650
43	935	935	41959	41024
44	8154	8154	22782	14628
45	81741	81741	19577	0
46	12909	12909	50446	37537
47			28574	28574
48	6917	6917	37494	30577
49	133808	133808	20755	0
50	133	133	21391	21258
51	2158	2158	18146	15987
52	49681	49681	12086	0
53			15194	15194
54	885	885	30243	29358
55	2873	2873	28190	25317
56	540060	540060	6708	0
57	266853	266853	8214	0
58			33433	33433
59	112598	112598	19020	0
60	6381	6381	23349	16968

61	60910	60910	14158	0
62	27849	27849	14083	0
63	10107	10107	10614	507
64			13745	13745
65	14067	14067	22065	7998
66			10814	10814
67	1120	1120	12309	11189
68	2244	2244	17131	14887
69	1532	1532	26253	24722
70	91	91	17248	17158
71			15360	15360
72			11051	11051
73	4474	4474	5700	1226
74			19270	19270
75	7877	7877	16667	8790
76	53545	53545	23714	0
77	12284	12284	20088	7804
78	6363	6363	14027	7664
79	1184	1184	19203	18018
80			14243	14243
81	21732	21732	25404	3672
82	183	183	18177	17993
83	22969	22969	21382	0
84	3480	3480	27426	23946
85	17927	17927	29076	11149
86	5829	5829	29667	23838
87	4312	4312	29529	25216
88	1049	1049	18555	17506
89			28955	28955
90	42577	42577	28161	0
Total	**4569345**	**4569345**	**2487154**	**0**

Table 5: List of Available Big Open Spaces and their Capacities (Temporary Shelter) (Bigger than 25,000 square meters)

Open Space ID	Area of Open Space (square meters)	Population Holding Capacity (@45m² / family for immediate evacuation)	Total Deficit (families requiring further space for immediate evacuation)
1	64157	1485	Total Families needing Evacuation shelter are: 181,420 So the deficit is: **128,673** Families
2	59836	1385	
3	81509	1887	
4	677244	15677	
5	60265	1395	
6	128245	2969	
7	119715	2771	
8	809639	18742	
9	31132	721	
10	25125	582	
11	145079	3358	
12	32601	755	
13	44054	1020	
Total	**2278600**	**52747**	

Table 6: Locations and Capacities of Fire Stations in Dhaka

S. No.	Name of Fire Station	Fire Fighting Capacity		Other Remarks
		Total Number of Manpower	Total Number of Equipments	
1	Fire Service & Civil Diffence Station Notun Bazar	26	322	
2	Fire Service & Civil Diffence Station Polashi	29	324	
3	Fire Service & Civil Diffence Station Lalbagh	29	230	
4	Fire Service & Civil Diffence Station Postagola	26	263	
5	Fire Service & Civil Diffence Station Hajaribagh	22	248	
6	Fire Service & Civil Diffence Training Complex Mirpur	39	485	
7	Fire Service & Civil Diffence Station Khilgaon	36	265	
8	Fire Service & Civil Diffence Head Quater	266	626	
9	Fire Service & Civil Diffence Station Tejgaon	38	514	
10	Fire Service & Civil Diffence Station Mohammadpur	42	387	
11	Fire Service & Civil Diffence Station sadarghat	20	421	

Table 7: List of Major Hospitals and Their Capacities

Sl. No.	Name of Hospital	Location	Capacity						
			No. of Beds	Average Outpatient Cases per day	Doctors	Nurses	Paramedics Staff	Other Staff	Other Facilities Available (X-ray, MRI etc.)
1	Dhaka Medical College	Shahbag	1741		400	638	86	724	XRAY,CT Scan,Blood Bank
2	Salimullah Medical College & Hospital	Old Dhaka	600		350	320	18	338	XRAY,CT Scan,Blood Bank
3	Dhaka Sishu Hospital	Sher-e-Bangla Nagar	520		41	180	18	198	XRAY,Blood Bank
4	Z. H Sikder Women's Medical College & Hospital	Manika Estate, West Dhanmondi	500		134	65	0	65	XRAY,CT Scan,Blood Bank
5	Shahabuddin Medical College Hospital	Gulshan	500		160	80	15	95	XRAY,CT Scan,Blood Bank
6	B M S R I Medical College Hospital	Uttara	460		156	162	13	175	XRAY,CT Scan,Blood Bank
7	Bangladesh medical College Hospital	Dhanmondi	350		76	300	110	410	XRAY,Blood Bank
8	Salauddin Specialized Hospital	Tikatuli	300		68	80	12	92	XRAY,CT Scan

9	Gonoshastho Nagar Hospital	Dhanmondi	250		62	112	0	112	XRAY,CT Scan,Blood Bank
10	Dhaka Community Medical College & Hospital	Baro Maghbazar	250		17	47	250	297	XRAY
11	Appolo Hospital	Bashundhara	227		171	272	159	431	XRAY,CT Scan,Blood Bank
12	Samorita Hspital Ltd	Pantho Path	172		24	124	10	134	XRAY,CT Scan
13	Lab Aid Cardiac	Dhanmondi	153		30	2004	0	2004	XRAY,CT Scan,Blood Bank
14	IBN Sina Hospital	Dhanmondi	150		50	165	0	165	XRAY,CT Scan
15	National Institute of Mental Health	Sher-e-Bangla Nagar	150		32	37	6	43	XRAY,CT Scan
16	City Hospital Ltd	Lalmatia	150		23	60	15	75	XRAY,CT Scan,Blood Bank
17	Lab Aid specialized	Dhanmondi	130		23	207	5	212	XRAY,CT Scan,Blood Bank
18	National Institute of Kidney Diseases & Urology	Sher-e-Bangla Nagar	116		27	75	0	75	XRAY,Blood Bank
19	Northern International Medical College & Hospital	Dhanmondi	105		11	24	0	24	XRAY
20	Japan Bangladesh Friendship Hospital	Dhanmondi	85		24	80	10	90	XRAY

21	Z. H. Sikder Women's Medical College	Gulshan-2	82		12	30	7	37	XRAY,Blood Bank
22	Selina General Hospital and Diagonostic	Mirpur	72		28	32	0	32	XRAY,Blood Bank
23	Comfort Nursing Home Pvt. Ltd.	Green Road	63		14	44	0	44	XRAY,CT Scan
24	Bangladesh National Blind Association	Mirpur	60		7	6	7	13	XRAY
25	Peoples Hospital	Lalmatia	55		15	15	2	17	XRAY
26	BDM Hospital and Diagonostic Center	Mohammadpur	51		161	38	0	38	XRAY
27	Green Life	Green Road	50		23	51	0	51	XRAY
28	Panoroma	Dhanmondi	50		8	15	3	18	XRAY
29	Aichi Sishu Hospital	Uttara	50		29	65	0	65	XRAY
30	Medi Aid Hospital Ltd	Kalabagan	50		23	30	1	31	
31	Trauma Center & Ao Orthopedics	Shamoly	50		6	20	20	40	XRAY
32	Bangladesh Hospital Services Pvt Ltd	Dhanmondi	50		12	48	3	51	XRAY

Table 8: Summary of Institutional Capacities for Earthquake Disaster Response
(Summary of Table 9 completed by individual institutions)

S. No.	Description	Unit	Total Available Quantity in Dhaka
A	**Damage Assessment and Needs Analysis (DANA)**		
1	Trained Personnel on DANA	No.	
B	**Collapsed Structure Search and Rescue (CSSR)**		
1	Trained Personnel on Standard CSSR	Team	
2	Trained Personnel on Advanced SAR	Team	
3	Trained Personnel Light SAR	Team	
4	Standard CSSR Equipment Set	Set	
5	Light SAR Tools, Equipment	Set	
C	**Medical First Response (MFR)**		
1	Trained Personnel on MFR	Team	
2	First Aid Personnel	Team	
3	First Aid Certified Trainers	Team	
4	MFR Equipment Set	Set	
5	First Aid Kit	Set	
D	**Fire Fighting**		
1	Trained Fire Fighters	Team	
2	Fire Fighting Machines	Set	
E	**Information / Communication**		
1	Internet Connection – Broadband, VSAT, BGAN etc.	Type	
2	Satellite Phone	Set	
3	Radio communication	Set	
4	GIS Mapping Capacity Availability	Yes/No	
5	GIS/Remote Sensing Trained Personnel	No.	
F	**Relief Materials (Available for approx. no. of people or families)**		
1	Food Item	Families	
2	Non-Food Items	Families	

G	**Emergency Shelter Management**		
1	Tents, Tarpaulin	Families	
2	Plastic Sheets	Families	
3	Trained Personnel for Emergency Shelter Management	No.	
4	Expert/Personnel for Shelter Design	No.	
H	**Debris Removal**		
1	Normal Truck	No.	
2	Large Truck	No.	
3	Dumper	No.	
4	Excavator/Bull Dozer/Backhoe	No.	
5	Loader	No.	
6	Rollers	No.	
7	Cranes	No.	

Table 9: Checklist for Assessing Institutional Capacities for Earthquake Disaster Response

(To be filled separately by different relevant institutions)

Name of Institution:

S. No.	Description	Unit	Location-wise Quantities in Dhaka						Total Available Quantity
			Location	No./Qty	Location	No./Qty	Location	No./Qty	
A	**Post Disaster Damage Assessment and Needs Analysis (DANA)**								
1	Trained Personnel on DANA	No.							
B	**Collapsed Structure Search and Rescue (CSSR)**								
1	Trained Personnel on Standard CSSR								
2	Trained Personnel on Advanced SAR								
3	Trained Personnel Light SAR								
4	Standard CSSR Equipment Set	Set							
5	Light SAR Tools, Equipment	Set							
C	**Medical First Response (MFR)**								
1	Trained Personnel on MFR								
2	First Aid Personnel								
3	First Aid Certified Trainers								
4	MFR Equipment Set	Set							
5	First Aid Kit	Set							
D	**Fire Fighting**								
1	Trained Fire Fighters	Team							
2	Fire Fighting Machines	Set							
3									

E	**Information / Communication**								
1	Internet Connection – Broadband, VSAT, BGAN etc.	Type							
2	Satellite Phone	Set							
3	Radio communication	Set							
4	GIS Mapping Capacity Availability	Yes/No							
5	GIS/Remote Sensing Trained Personnel	No.							
F	**Relief Materials (Available for approx. no. of people or families)**								
1	Food Item	Families							
2	Non-Food Items	Families							
G	**Emergency Shelter Management**								
1	Tents, Tarpaulin	Families							
2	Plastic Sheets	Families							
3	Trained Personnel for Emergency Shelter Management	No.							
4	Expert/Personnel for Shelter Design	No.							
H	**Debris Removal**								
1	Normal Truck	No.							
2	Large Truck	No.							
3	Dumper	No.							
4	Excavator/Bull Dozer/Backhoe	No.							
5	Loader	No.							
6	Rollers	No.							
7	Cranes	No.							

ANNEX 2: MAPS

Map 1: Location of Key Emergency Response Agencies in Different Hazard Areas

Map 2: Open Spaces for Immediate Evacuation (Bigger than 100m^2 area)

Map 3: Proposed Locations for Temporary Shelter Camps (Bigger than 25,000 m^2 area)

Map 4: Possible Evacuation Routes for Immediate Evacuation to the Nearest Open Space (Roads width greater than 6m)

Map 5: Potential Trapped Population in Different Locations

Map 6: Locations of SAR Capacities

Map 7: Locations of Fuel Refilling Stations, Timber Godowns and Lifting Machines (Cranes)

Map 8: Locations of Fire Stations and their Potential Catchment Areas

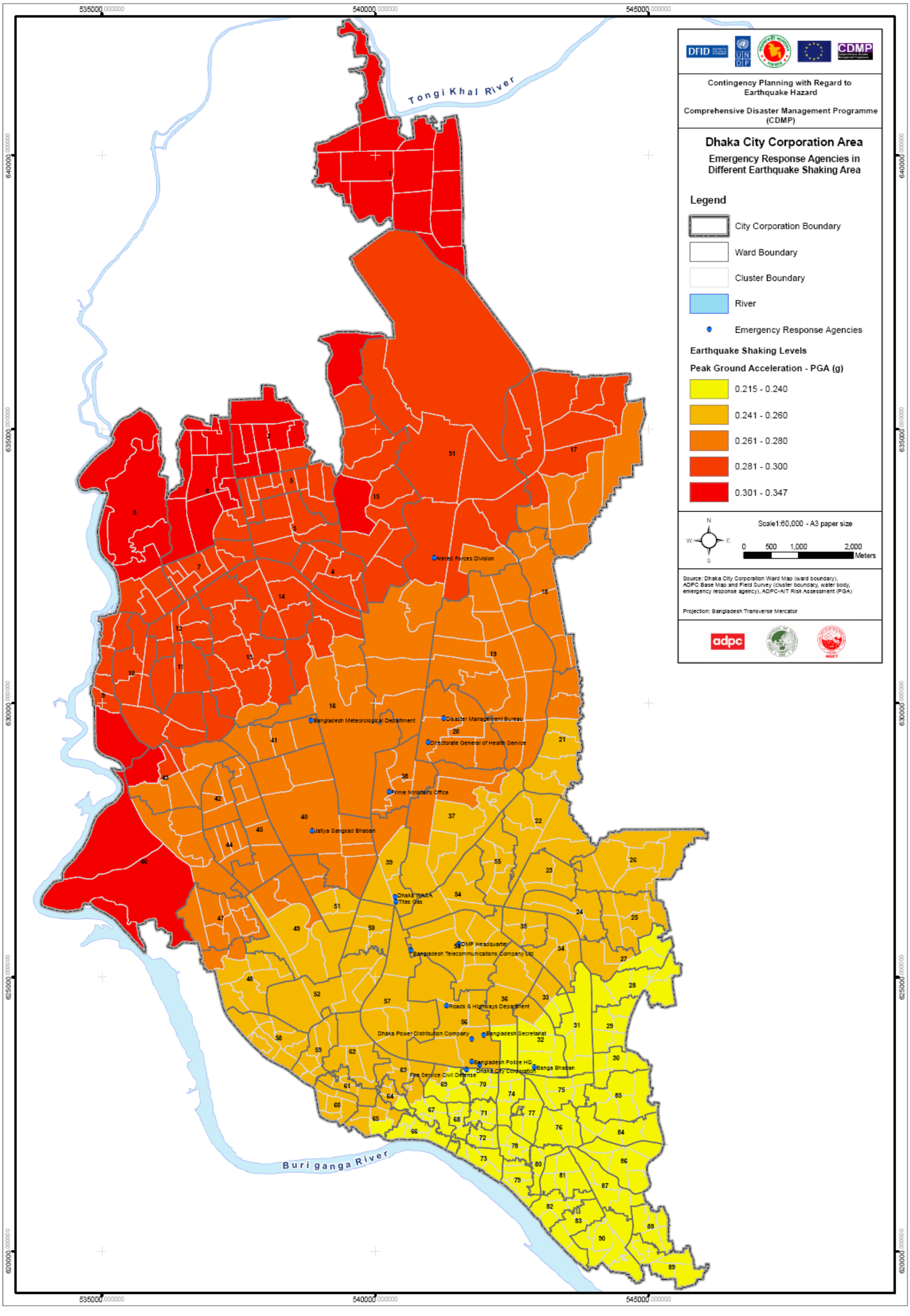
Map 9: Locations of Major Hospitals

Map 10: Probability of Functionality of Major Hospitals

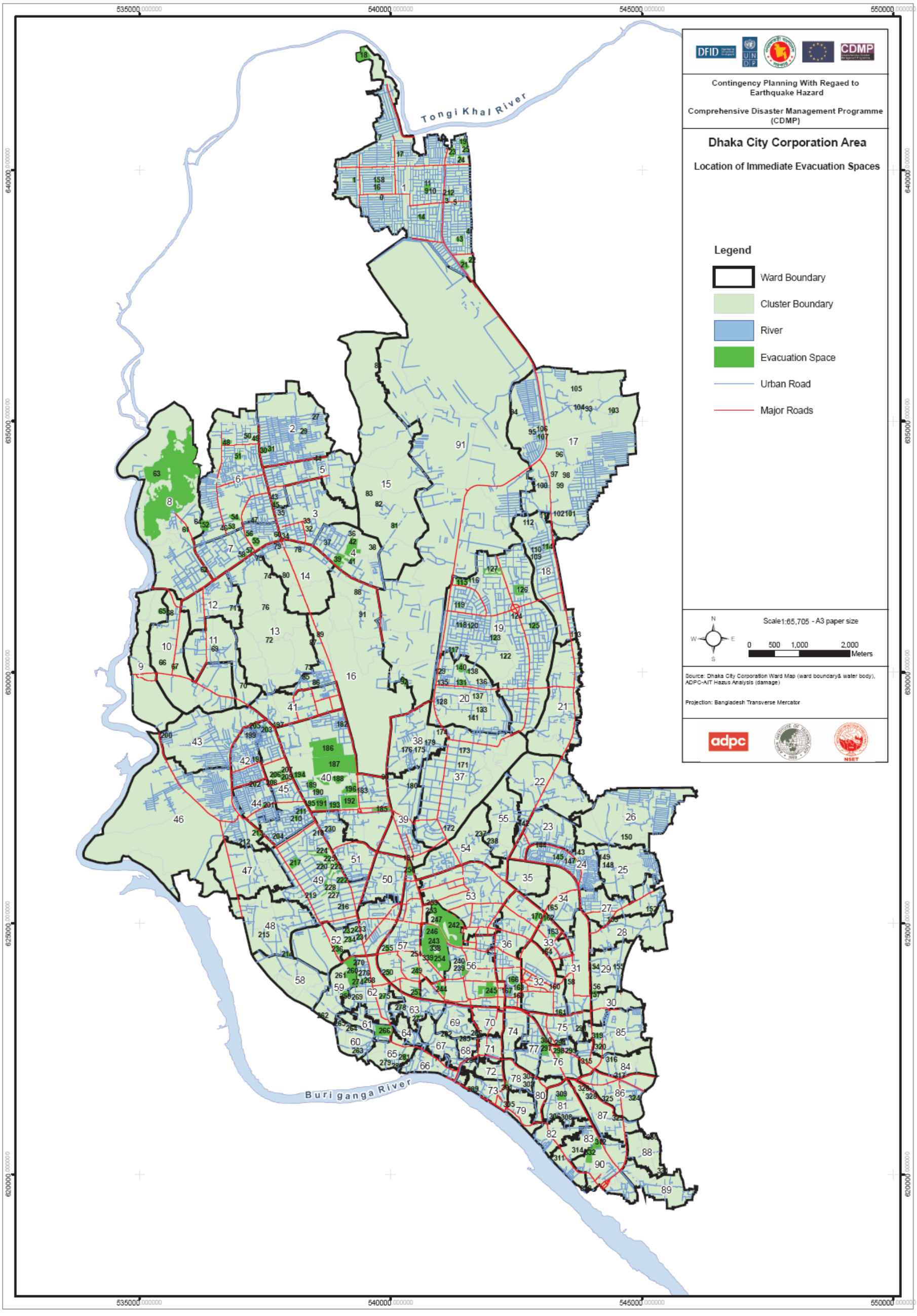
Map 11: Open Spaces for Immediate Shelter and Required Amount of Pre-Positioning Water for Three Days

Map 12: Direct Damage to Road Network in Dhaka City

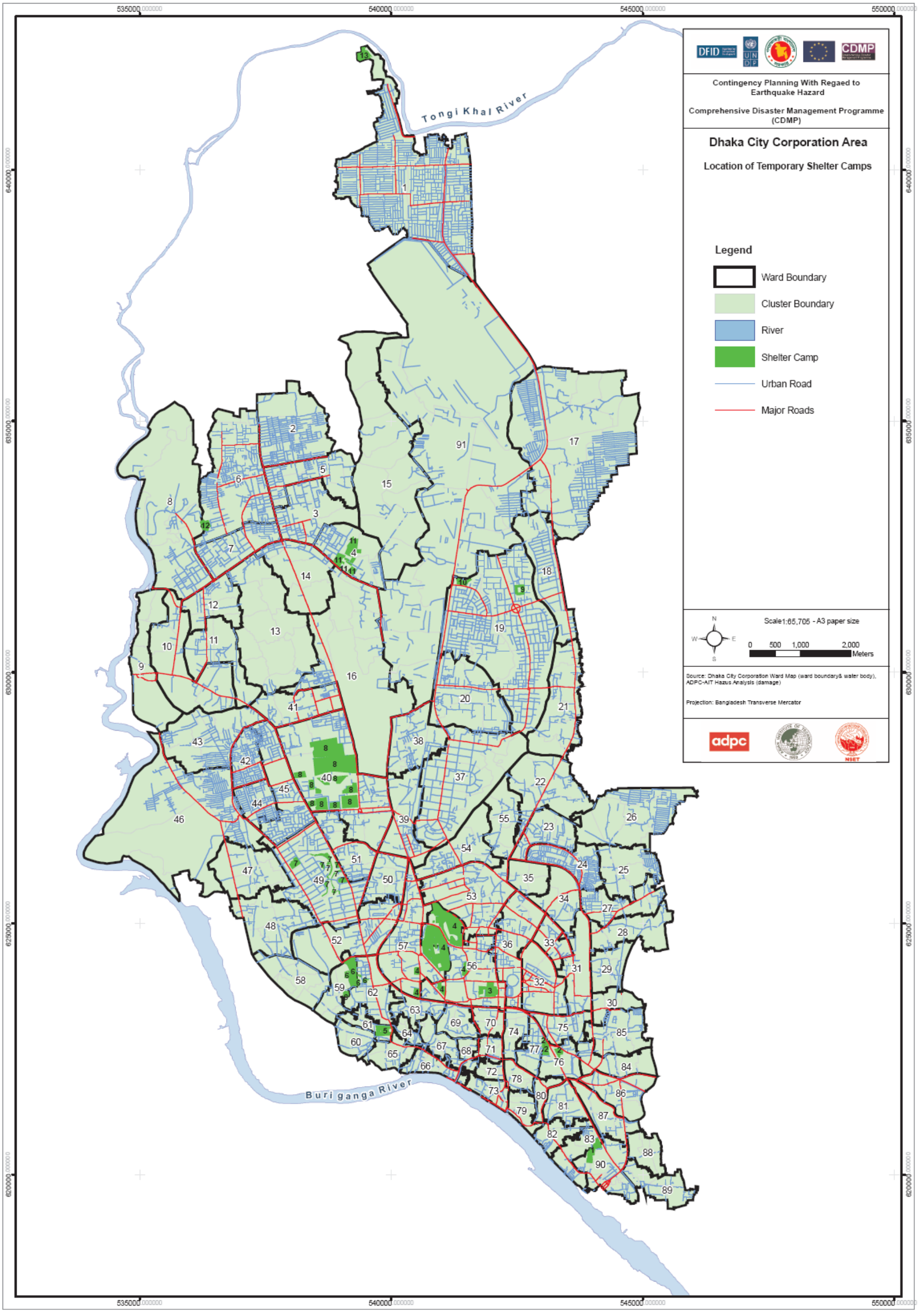
Map 13: Major Roads in Dhaka with high raised structures showing possible blockage



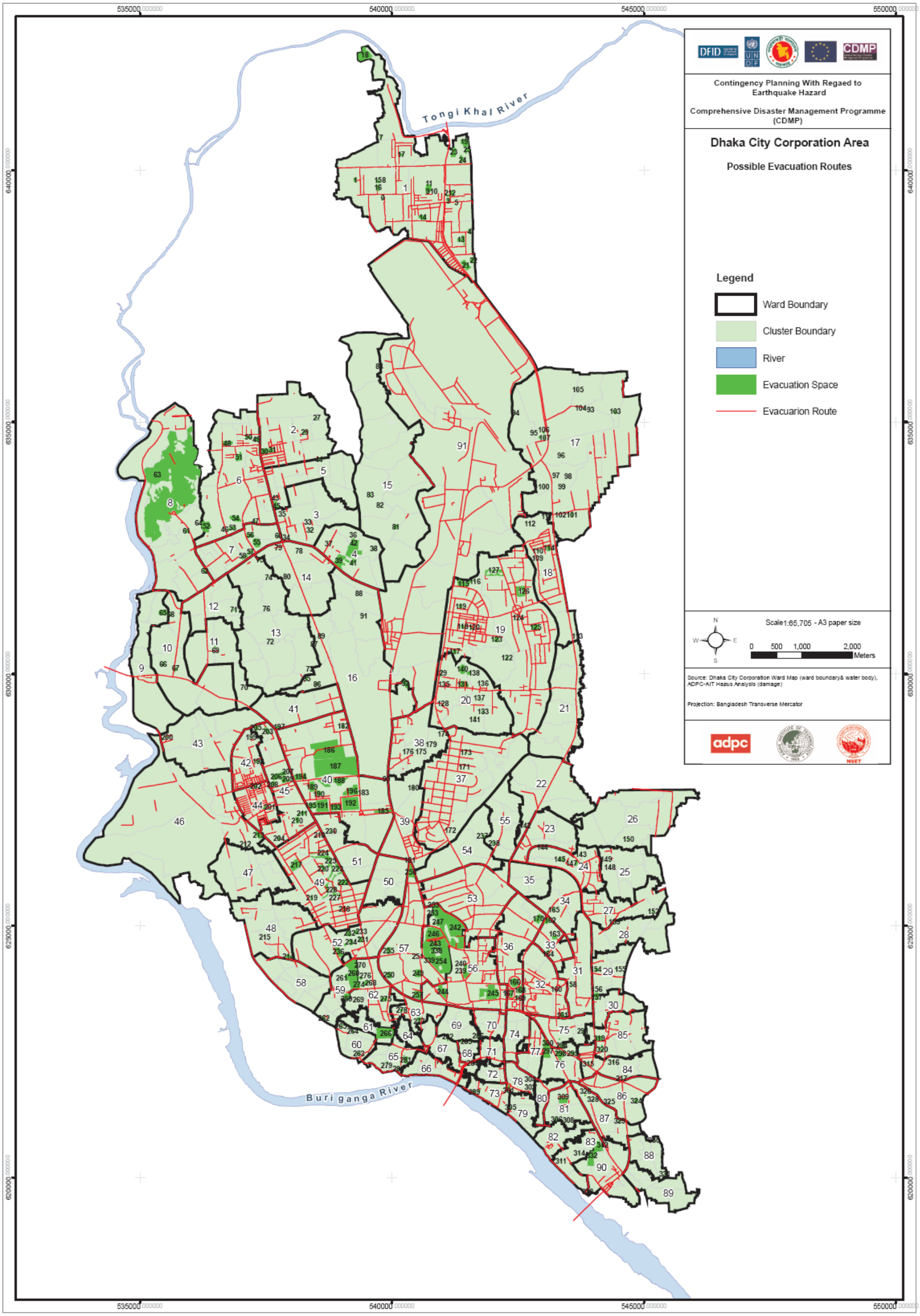
Map 1: Location of Key Emergency Response Agencies in Different Hazard Areas



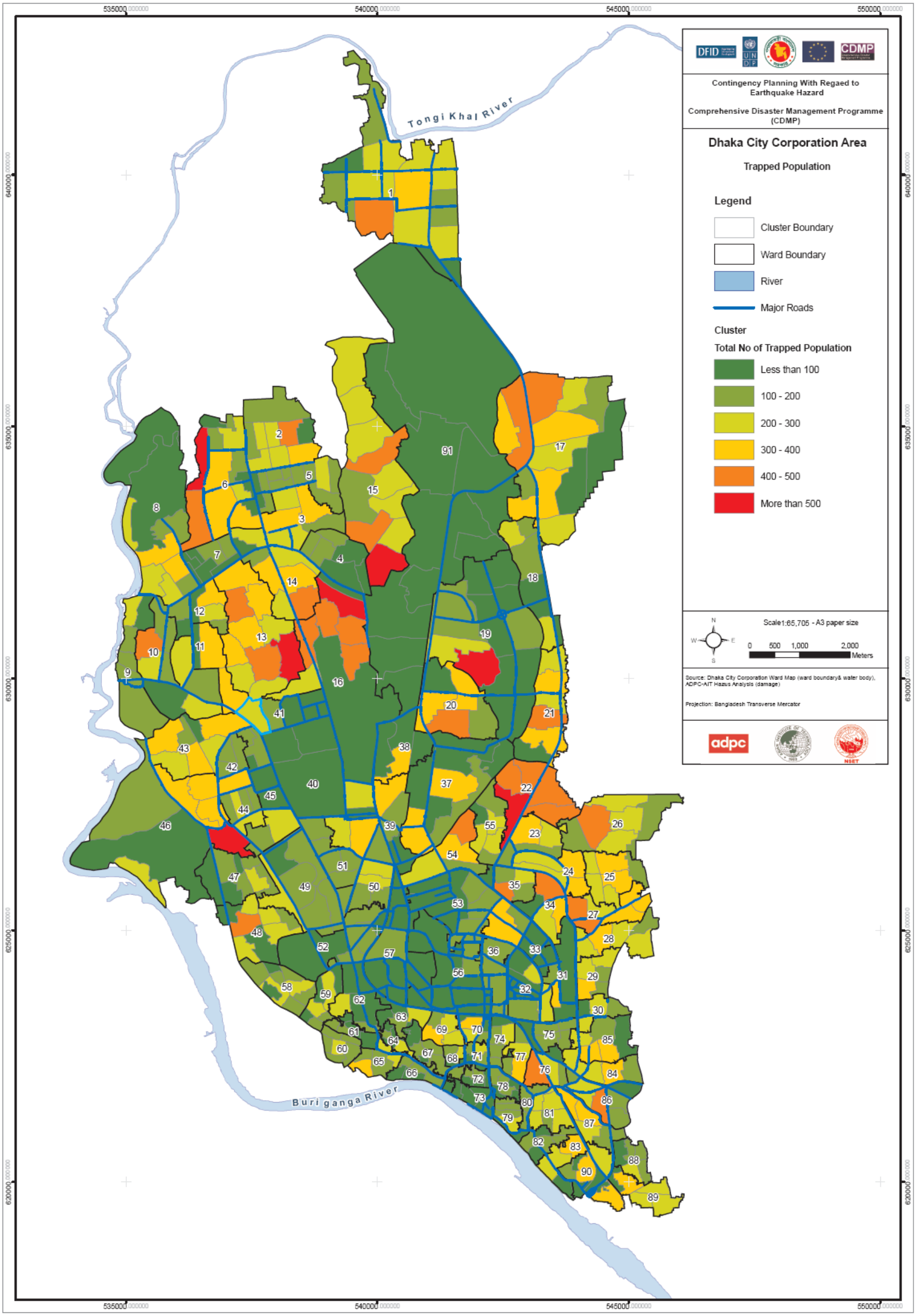
Map 2: Open Spaces for Immediate Evacuation (Bigger than 100m² area)



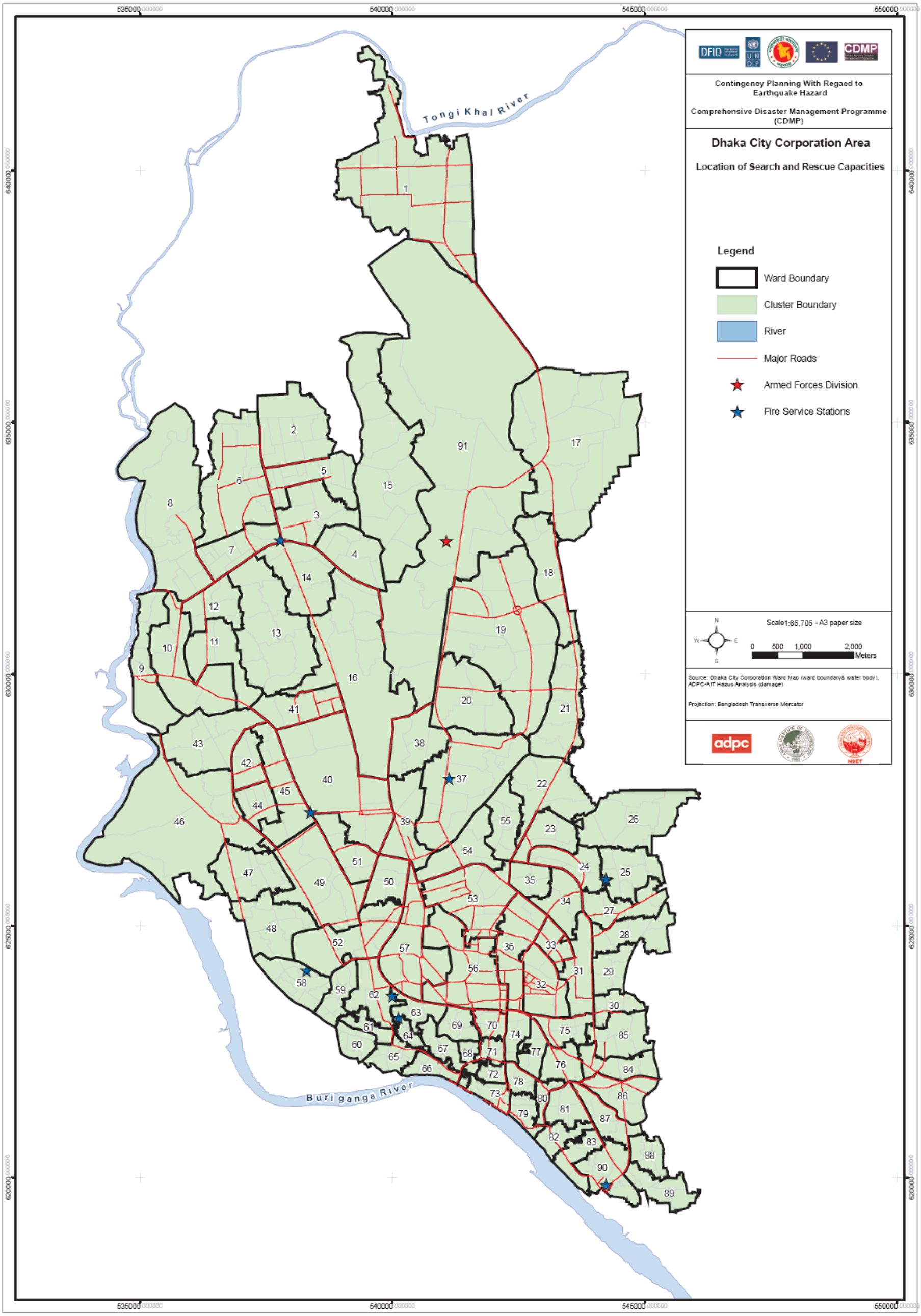
Map 3: Proposed Locations for Temporary Shelter Camps (Bigger than 25,000 m² area)



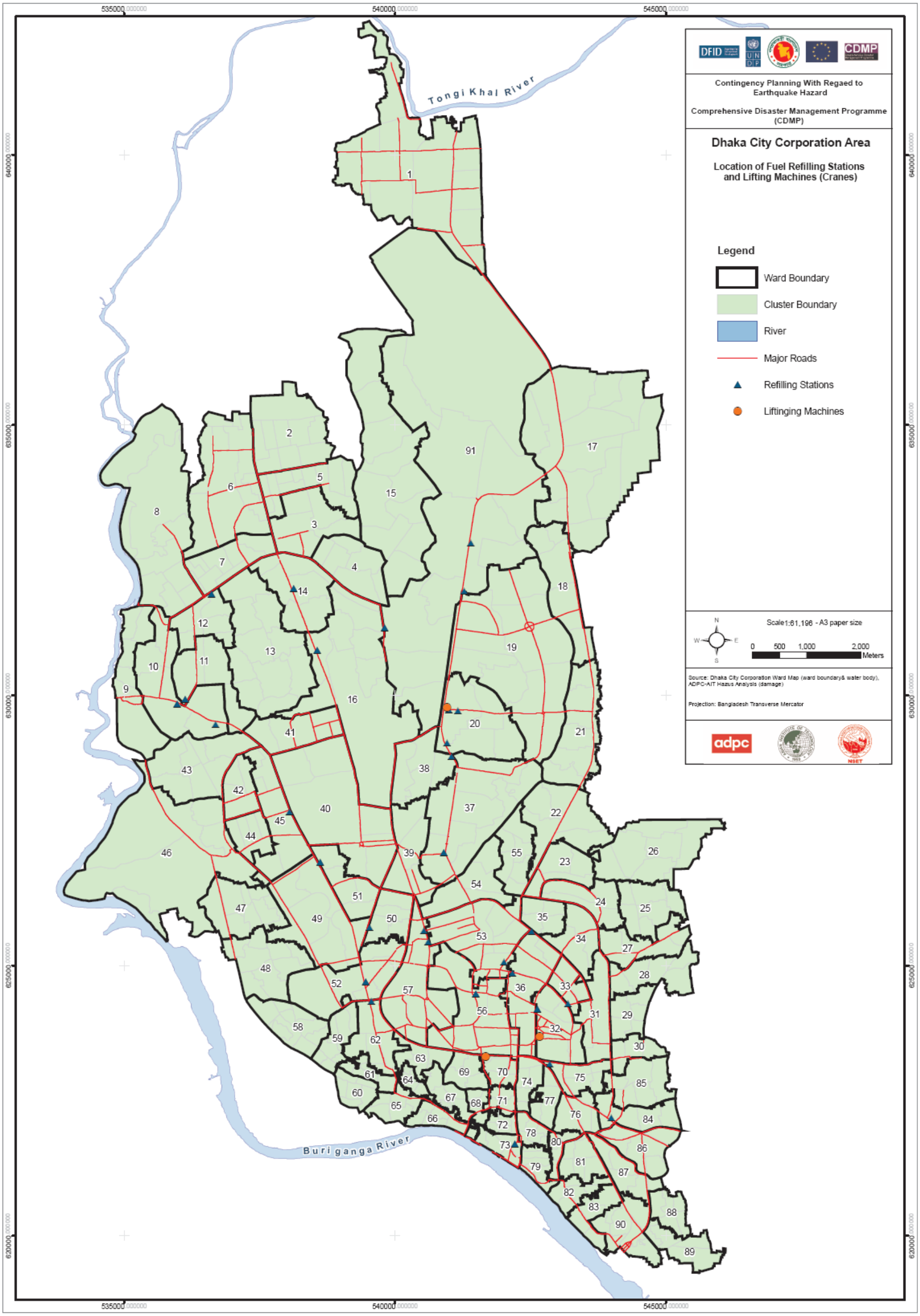
Map 4: Possible Evacuation Routes for Immediate Evacuation to the Nearest Open Space (Roads width greater than 6m)



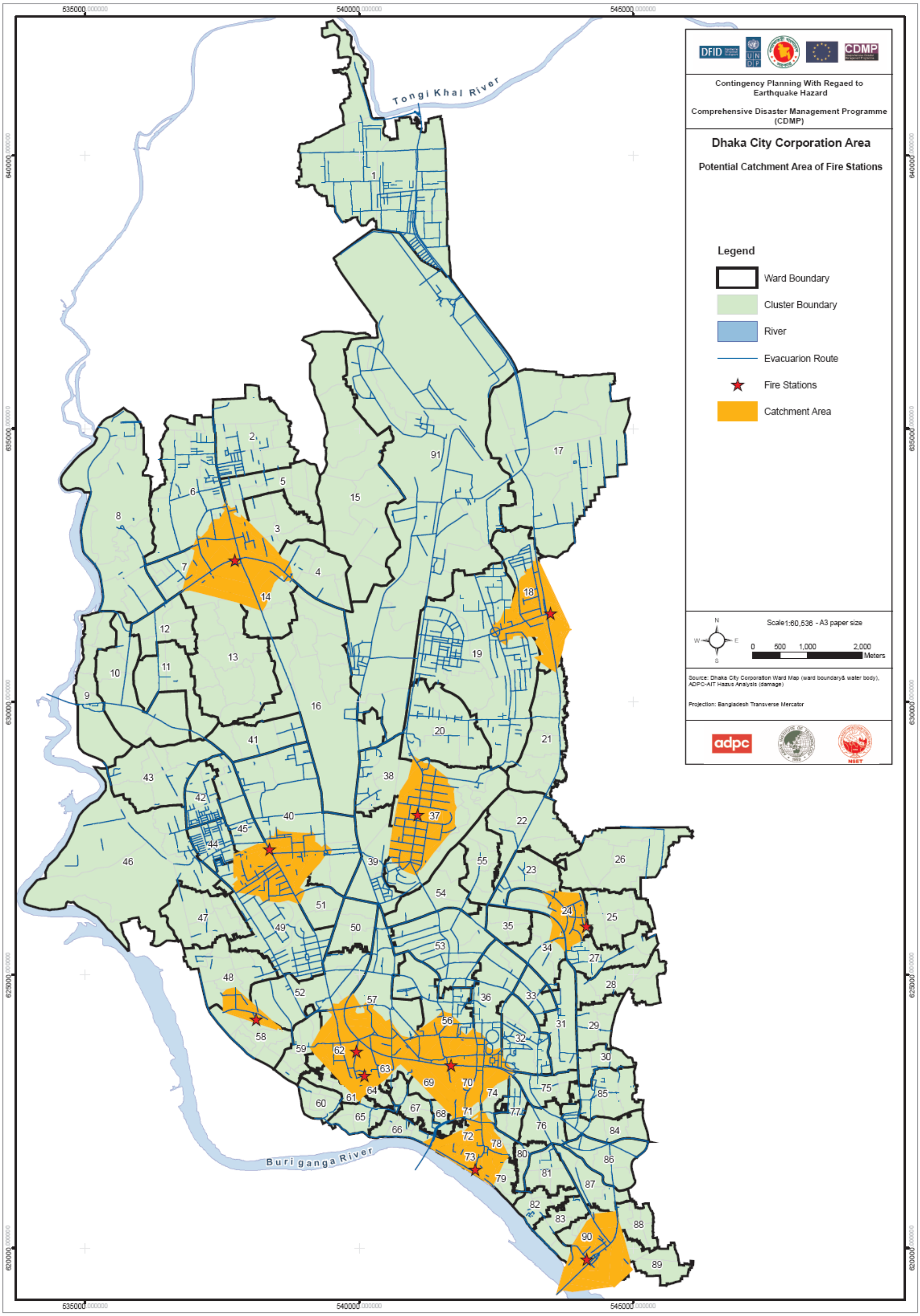
Map 5: Potential Trapped Population in Different Locations



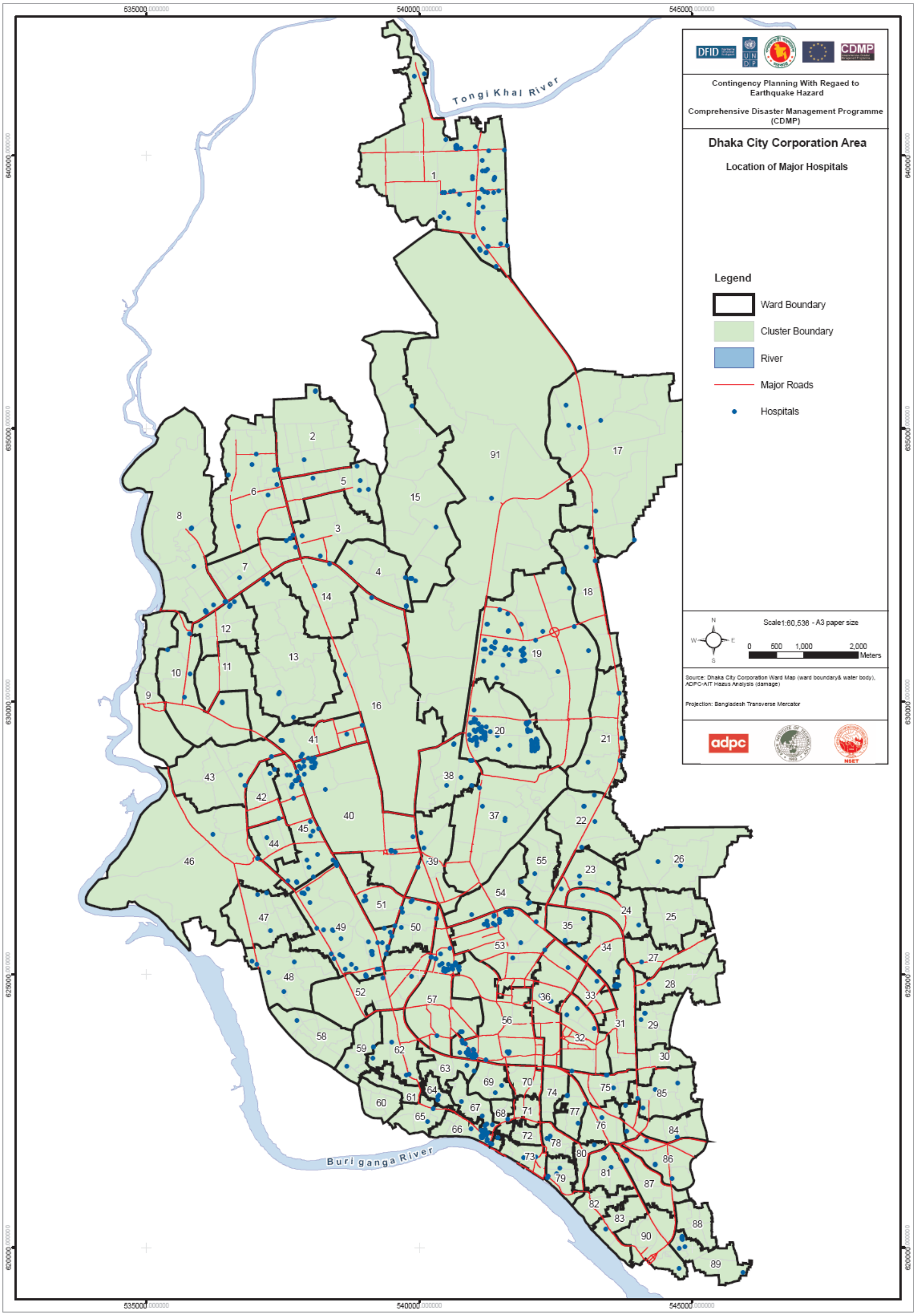
Map 6: Locations of SAR Capacities



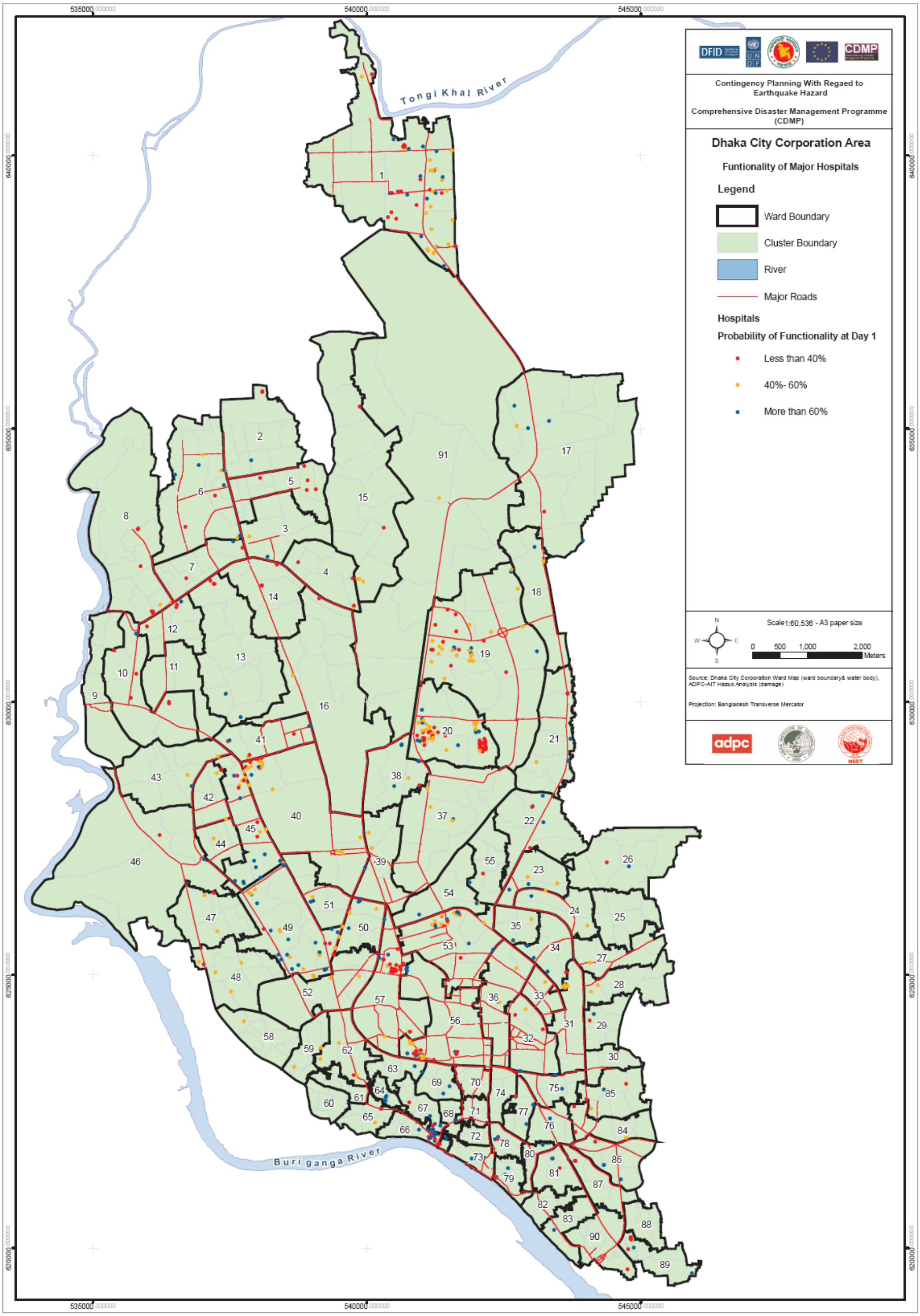
Map 7: Locations of Fuel Refilling Stations, Timber Godowns and Lifting Machines (Cranes)



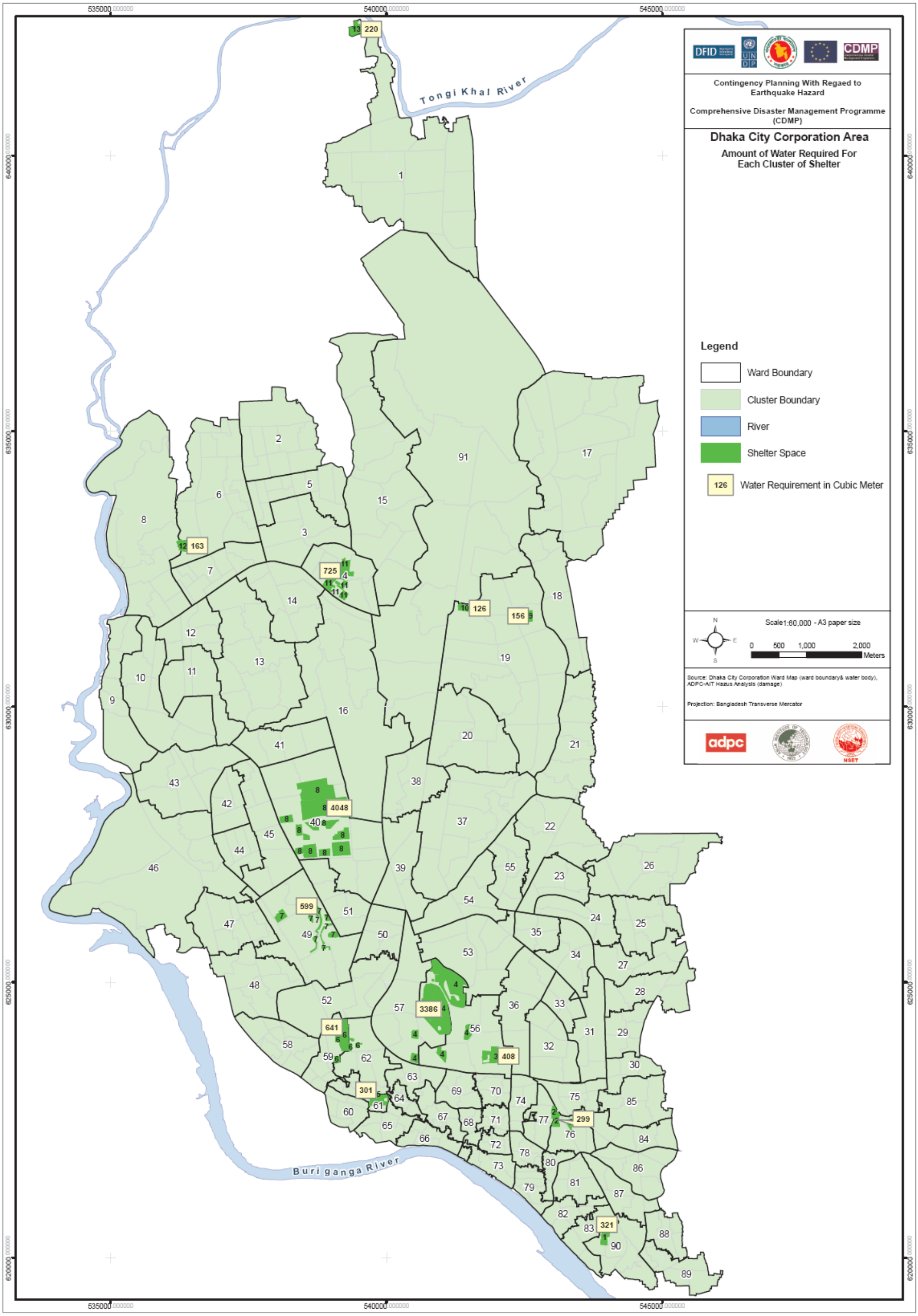
Map 8: Locations of Fire Stations and their Potential Catchment Areas



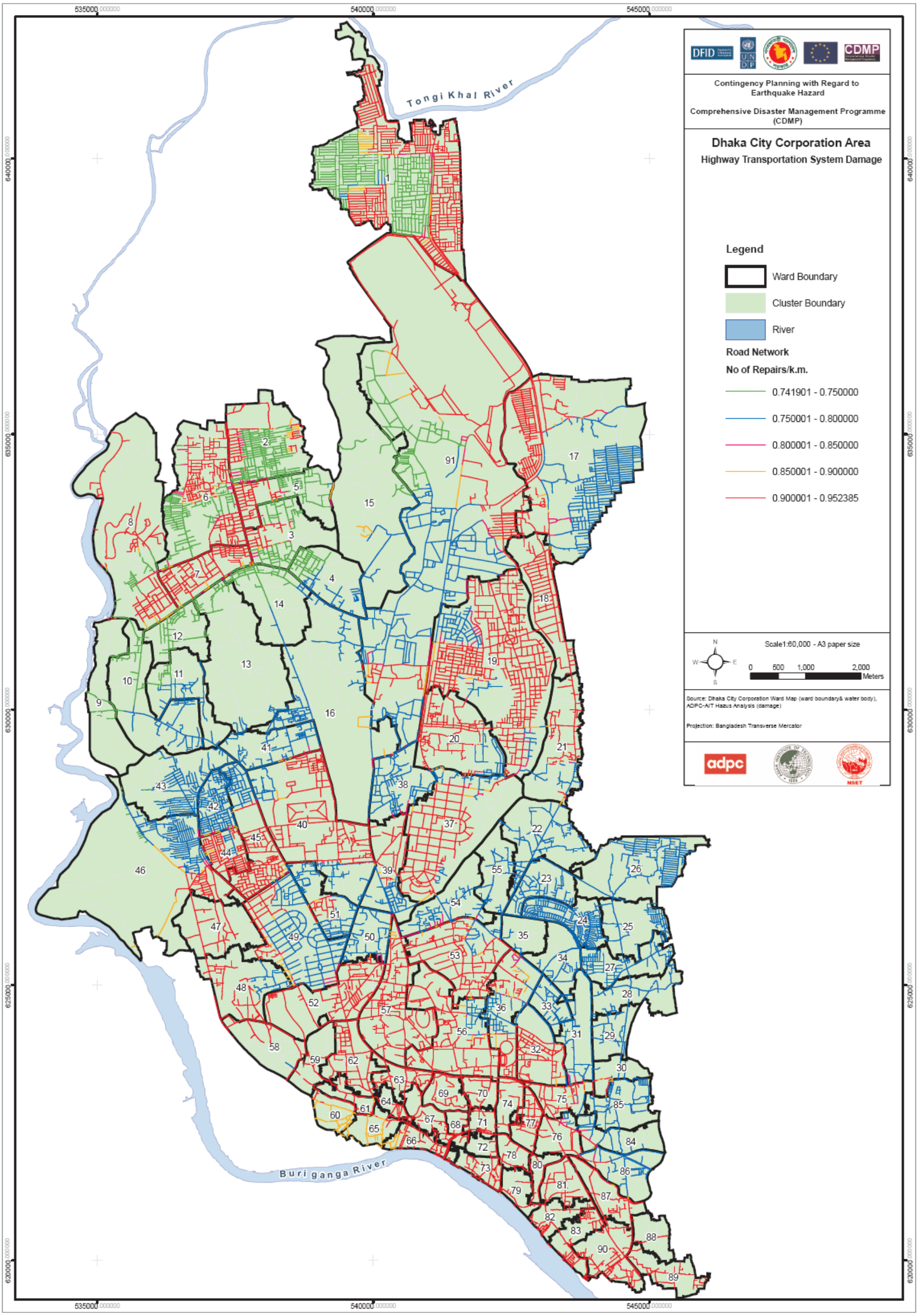
Map 9: Locations of Major Hospitals



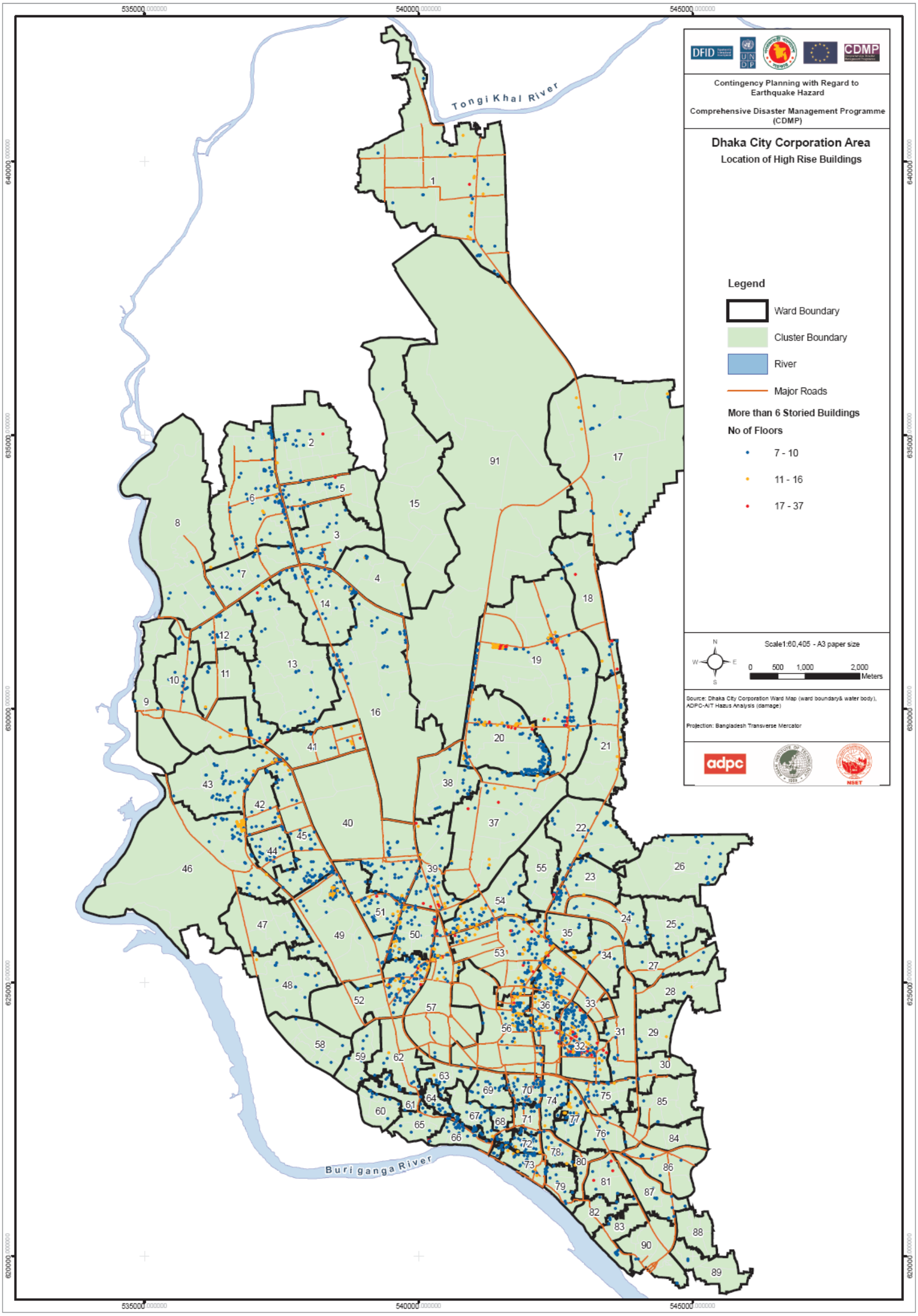
Map 10: Probability of Functionality of Major Hospitals



Map 11: Open Spaces for Immediate Shelter and Required Amount of Pre-Positioning Water for Three Days



Map 12: Direct Damage to Road Network in Dhaka City



Map 13: Major Roads in Dhaka with high raised structures showing possible blockage