Chapter 7. Additional Studies

7.1. Introduction

This chapter includes additional studies undertaken to check directly or indirectly affect of construction and operational activities. As per Standard Terms of Reference, only Disaster management plan will be required for Building Construction project. Thus, Disaster Management Plan will be developed to reduce the impact of disasters like earthquake, fire etc. and to encourage recovery. And Training will be given to staff & contractors about disaster management and handling.

Hazard Analysis involves identification and quantification of various hazards (unsafe conditions). On the other hand, risk analysis deals with identification and quantification of risks, the equipment and personnel are exposed to, due to accidents resulting from the hazard present in the project.

Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks, which the neighboring populations are exposed to as a result of hazards present. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of populations etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident studies.

7.2. Approach

Risk involves the occurrence or potential occurrence of some accident consisting of an event or sequence of events. The risk analysis assessment study covers the following:

- Identification of potential hazard areas
- Visualization of the resulting scenarios in terms of fire
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios
- Assess the overall suitability of the site from hazard minimization and disaster mitigation point of view
- Preparation of broad emergency management plan (DMP).

7.3. Hazard Identification

Identification of hazards at proposed ITSEZ is of primary significance in the analysis, quantification and cost effective control of unlikely events of accidents. A classic definition of hazard states that hazard is in fact the characteristics of system/process that presents potential for an accident. Hence, all the components of proposed project need to be thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident.

Several hazards may endanger the IT/ITSEZ complex, health and safety of workers and may cause danger to the surrounding environment. The following hazards are to be identified, assessed and suitable preventive/mitigating plans taken prior to rolling out project works initiation. Details of Hazards are given in **Table 7.1**

Table 7.1 : Details of Hazard

Type of Hazard	Hazard	Details	Likelihood (1-5)
Natural Hazard	Flood	The site is located near to the Yamuna River and Hindon River. Hence, chances of flood are high. This mainly can occur only during the excess rain.	3
	Earthquakes	The project site is located at Seismic Zone IV, thus area is at High risk.	2
	Lightening	Electrical energy from lightning will flow out in all directions of lowest electrical impedance to equalize the electrical potential.	2
Man Made	Fire & explosion	This can be occur due to the electric spark, leakage in fuelling area, fire in HSD area etc.	2
	Electricity	Fatalities can arise due to electric shocks, burns and when contacted with overhead or underground power cables.	2
	Mechanical	The Mechanical fault can cause the risk & hazard which include the elevator & DG sets.	2
	Chemical	Spillage of oil and other chemicals.	1

7.4. Preventions

As per Hazard identified, few measures will be adopted to reduce the risk at the first place. Details are given below

7.4.1. Flood

- Drainage & Sewerage System will be provided all over the project site
- Rainwater harvesting will be designed for peak rainfall
- Cleaning of Storm water line and rainwater harvesting will be done prior to the monsoon season
- Sewage line will be connected through outside sewerage system for disposal of excess sewage.

7.4.2. Earthquake

- Structure will be design as per NBC 2016.
- All norms for safety of structure will be followed
- Structural certificate has been taken from Jamia Millia Islamia Institute for safety of structure.
- All the raw material will be chosen as per standard norms laid by NBC 2016.

7.4.3. Lightning

- Ensure that the building is well grounded and every conductive path is bonded to the ground system.
- Lightning arrestor will be installed at every building.

7.4.4. Fire & Explosion

- Fire safety norms shall be followed as per NBC 2016
- Fire safety plan will be prepared and displayed at all floors of the building
- Fire exit gates will be provided
- Fire extinguishers will be installed at all places
- Way to assembly area will be displayed at all floors
- Underground water tank and over head water tanks will be provided
- Safety officers will be appointed
- Routine Drill will be done
- All fire safety equipments will be installed in the complex as per norms
    - Fire Hydrant
    - Fire Extinguishers
    - Sprinkler
    - Stand by pumps
    - Booster Pumps
    - Water Tanks
    - Fire Sensor
    - Alarm System

7.4.5. Electricity

- Safety norms as per Indian Electricity rules 1956 and ECBC shall be followed
- Earthling system will be provided
- All the wires will be selected as per norms
- Design shall be done as per all Indian Code
- Sand bags will be provided near to the electric control panel
- Precaution banners will be displayed wherever required
- Regular maintenance will be done to check any loop hole.
- Routine Drill will be done
- Sign of Danger at all hazard place will be displayed
- PPE will be provided to the workers

7.4.6. Mechanical

- All mechanical equipment will be services in routine
- Sign of Danger at all hazard place will be displayed
- All safeguards will be provided at appropriate places
- Periodic change of all damaged equipment will be done

- Log book will be prepared

7.4.7. Chemical

- Isolated place will be provided for stooge of chemical
- Full surveillance will be done on chemical storage area
- Fire system will be provided at chemical storage area
- MSDS will be displayed
- Separate storage of Fuel will be done.
- License will be taken from concern department, if applicable

7.5. Occupational Hazard Management Plan during Construction Period

Occupational hazard management plan are proposed to be undertaken for the project and are listed below

- Provision of PPE to the workers like helmets, safety jackets, masks, ear plugs, gum boots etc.
- Provision of neat and clean living space for construction labour
- Adequate illumination should be provided at site and in labour camps, if any
- Clean drinking water facility should be provided for construction labour
- Toilets and bathing facility should be provided at the site to prevent open defecation and unhygienic conditions at site
- Proper drainage and wastewater collection shall be provided at the site.
- Septic tanks and soak pits shall be provided at site for disposal of sewage generated from toilets and bathrooms
- Dustbins shall be provided at site for collection of waste and workers.
- Municipal waste shall be disposed off through local agency in the area on daily basis. Construction material shall also be disposed off regularly
- Water ponding shall be avoided at the site as it encourages breeding of mosquitoes
- LPG will be provided as fuel and no open burning of fuel shall be carried out at site
- Structure design of building shall be as per NBC, 2005. Good quality construction material will be used for construction to prevent any collapse of structure
- Quality supervisor shall be available at site to ensure the quality of raw material and the structures constructed
- EHS supervisor shall be deputed at site to ensure the healthy and safe environment at work place
- Workers will be given training at the site for safety for handling the construction material and equipment
- Fire-fighting facility shall be provided at the site and workers shall be trained to handle such emergency conditions
- Entry to the fuel storage area and electricity meter area shall be restricted
- Cautionary notice should be provided for safety and no entry in areas associated with the risks

7.6. Emergency Management Plan

Emergency Management Plan is necessarily a combination of various actions, which are to be taken in a very short time but in a pre-set sequence to deal effectively and efficiently with any disaster, emergency or accident with an aim to keep the loss to the minimum.

The project will have to have complete liaison and co-ordination with outside agencies to minimize the effect of such disaster/emergency. The major function of the plan is to formulate a procedure for:

- Controlling it with minimum damage to men, material and machine
- Rescuing victims and treat them suitably
- Safeguarding others (evacuating them to safe places)
- Identifying the person affected
- Information to relatives of the causalities
- Providing authoritative information to news media and others concerned
- Preserving relevant records needed as evidence in any subsequent enquiry

7.6.1. Scope

The aim of hazard control and disaster management is concerned with preventing accidents through good design, operation, maintenance and inspection, by which it is possible to reduce the risk of an accident, but it is not possible to eliminate it. Since, absolute safety is not achievable, an essential part of hazard control must include mitigating the effect of an accidents.

An important element of mitigating is emergency planning i.e. recognizing that accidents are possible, assessing the consequences of such accidents and deciding on the emergency procedures, both on site and off site, that would need to be implemented in the event of emergency.

Emergency planning is just one aspect of safety and cannot be considered in isolation. In particular, it is not a substitute for maintaining good standards within the project. Before starting to prepare the plan, project management will ensure that the necessary standards and safety precautions are administered.

Emergency plans are likely to be separate for on-site and off-site, but they must be consistent with each other, i.e. they must be related to the same assessed emergency conditions. The on-site plan is called Disaster Management Plan (DMP) and the off-site plan is called Emergency Preparedness Plan (EPP).

7.6.2. Objectives

The overall objectives of an emergency plan are:

- To localize the emergency and if possible, eliminate it; and
- To minimize the effects of the accident on people and property

Elimination of hazard will require prompt action by operators and emergency staff using, for example, fire-fighting equipment and water sprays. Minimizing the effect will include rescue, first aid, evacuation, rehabilitation and giving information promptly to people living nearby.

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7.6.3. Formulation of DMP

The assessment of the risk and hazards leads either to improvements being made to the project, in the form of additional safeguards or better procedures, or to the decision being taken that the risk is sufficiently small to be accepted.

The plan will be substantial document including following:

- Assessment of the size and nature of the events foreseen and probability of their occurrence;
- Formulation of the plan and liaison with outside authorities, including the emergency services;
- Procedure for- raising the alarm and communication both within and outside the works;
- Appointment of key personnel and their duties and responsibilities are:
    - work incident controller
    - works main controller
- Emergency control centre;

The project will set out the way in which designed people at the site for the incident can initiate supplementary action both insides or outside the works at an appropriate time. An essential element of the plan must be the provision for attempting to make safe the affected unit, for example by shutting it down. On a project site, the plan will contain the full sequence of key personnel to be called in from other sections or from off-site.

It is particularly important that the requirement of the plan for emergency resources, both personnel and equipment, are reasonable and can be quickly assembled in the event of an emergency. Management will consider whether sufficient resources exist at the site to carry out the plan for the various assessed incidents in conjunction with the emergency services, for example sufficient water for cooling and fire fighting. The time element is of great significance but is often overlooked.

7.6.4. Onsite Emergency Plan

Emergency is the one which may or may not cause material damage or injury but likely to have an impact on the project. Such an emergency may be controlled using resources and resources available in the surrounding establishments.

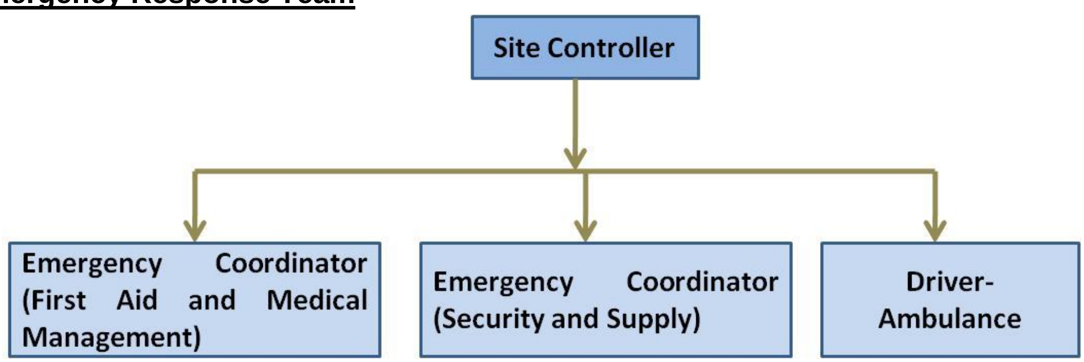
Scope of Onsite Emergency Plan

The scope of the plan is to ensure safety of life, protection of environment and protection of property. Although the emergency may be caused by different factors such as natural calamity, civil disturbance, sabotage, equipment failure, human error, it will normally manifest in the form of fire, etc.

Objective of Emergency Plan

- To localize the emergency and if possible eliminate
- To control and contain the incident as early as possible
- To safeguard other employees by evacuating them to safe assembly points
- To minimize the damage to the project;
- To rescue accident victims and organize medical treatments
- To re-establish normal conditions; and preserve relevant records and equipment for the subsequent enquiry into the cause and circumstances of the emergency.

Emergency Response Team



7.6.5. Roles and Responsibility

Site Controller

- Upon hearing announcement on P.A. system, he will proceed to emergency control centre.
- Establish contact with the Incident Controller through telephone
- Declare emergency in consultation with incident controller
- Review all possible action and assesses in consultation with incident controller and other personnel.
- Directs the evacuation of personnel.
- Arranges for additional help from pot side agencies if required.

- Exercises direct operational control over the works outside the affected area, with the help of emergency coordinator (service/communicator) and emergency coordinator (first aid and medical)
- Liaison with Government official, if required
- Once the situation is brought under control, calls off onsite emergency in consultation with incident controller.

Emergency Coordinator (First Aid and Medical Management)

- Arranges for first aid specific treatment with the advice of doctor
- Organizes to shift injured to nearby clinic& medical. Accompanies the victim if the case is critical based on doctor's advice
- In case of need arrange for shifting to other medical centres as the case may be, maintains contact with site controller from time to time

Emergency Coordinator (Security and Supply)

- Upon hearing the siren, all person will be sent out and closes the gate
- Restricts visitor entry inside the premises
- Directs the ambulance to the vicinity of site of incident
- Ensures all the security guards are reporting to main gate.
- He will rush to scene and reports to incident controller.
- Additional fire extinguisher, hoses, nozzles, located in various points will be drawn and arranged for fire fighting
- Organizes to open the main gate as soon as the ambulance reaches
- Co-ordinates with fire brigade group and help them

Driver-Ambulance

- Keeps Ambulance in running condition
- Keeps engine in running condition
- Opens the back door of the ambulance
- Goes back to seat
- Takes the injured to hospital, stops the vehicle and opens the back door.

7.6.6. Alarm and Communication Mechanism

Communication is crucial factor in handling an emergency. It is the practice that many persons can raise an emergency alarm, so allowing the earliest possible action to be taken to control the situation. There will be an adequate number of points from which the alarm can be raised either directly, by activating an audible warning, or indirectly, viz., a signal or message to a permanently manned location. The alarm will alert the incident controller who will assess the situation and implement appropriate emergency procedures. In areas where there is a high level of noise, it may be necessary to install more than one audible alarm transmitter or flashing lights. Automatic alarms may be appropriate on some site.

There will be a reliable system for informing the emergency services as soon as the alarm is raised on site. The details of the communication arrangements will be agreed locally; in some cases it may be advisable to have a direct line to the fire brigade. Pre determined code words to indicate the scale and type of the emergency may be valuable.

7.6.7. Fire Fighting Facilities

Adequate fire fighting facilities will be provided as per applicable rules in the various parts of the proposed project as per applicable regulations.

Fire fighting equipment will be provide at the site as per local Bye Laws, NBC, 2016 & requirement of Fire Department

All Building will be provided with fire protection arrangements such as hose reel, down comer in entire building, automatic fire detection system in entire buildings, central underground water storage tank, overhead water tank, fire pumps, potable fire extinguishers, exit signs, Yard Hydrants, Fireman's lift grounding switch, cautionary notices in lifts etc as applicable.