DISASTER MANGEMNET PLAN-
DSTRICT HOSPITAL KANNUR

1.0 Introduction

Disaster is a sudden, calamitous phenomenon that can cause damage to life and property and destroy the economic, social and cultural life of people. Though often caused by nature, disasters can have human origins. Disaster management is the discipline of dealing with and avoiding both natural and manmade disasters. It involves preparedness, response and recovery in order to lessen the impact of disasters. As the proposed facility is a hospital, a risk assessment for the operation stage and preparation of a disaster management plan is essential

The District Hospital at Kollam is one among the major healthcare providers in the District. It is located at hospital road, chinnakada and is just 5 Km from Kollam Town and 2 km from Kollam Railway station and therefore easily accessible by people. It is a boon to locals since it is run by the Government with the sole intention of providing good health care facilities to the common man at an affordable cost.

The hospital at present has a capacity of 559 beds with main specialties General Medicine, General Surgery, Ortho, Gynecology, ENT, Ophthalmology, Dermatology, Dental and Pediatrics and has about out patients of about 200-3000 per day. At present, there is a grave need for up gradation of existing facilities as the public is heavily dependent on this Hospital. Hence the DHK is proposed to expand to 1053 bed capacity.

The proposal for the expansion include demolition of obsolete structures and construction of new blocks at different corners of the available plot. Thus after the development the major components with in the master plan of the DHK is presented in **Table 01** below.

Table 01 Master Plan Components of DHK after development

Sl No.	Item	No of Floors	Total Area (Sqmt)
1	Daigonsitic Block	BF+ GF+7 + Terrace	5555
2	Ward Tower	BF+GF+12+Terrace+Machine Room + Helipad	24558
3	Utility Block	GF+3+Terrace	1627
4	OP & Dialysis Block	GF +1	1351.22
5	Main Block	GF +3	8800
6	Casualty	GF+2	3532.8
7	Rotary Pay ward	GF +1	624.18
8	MRI Block	GF+2	1211.79
9	Medical Annex	GF+2	789.15

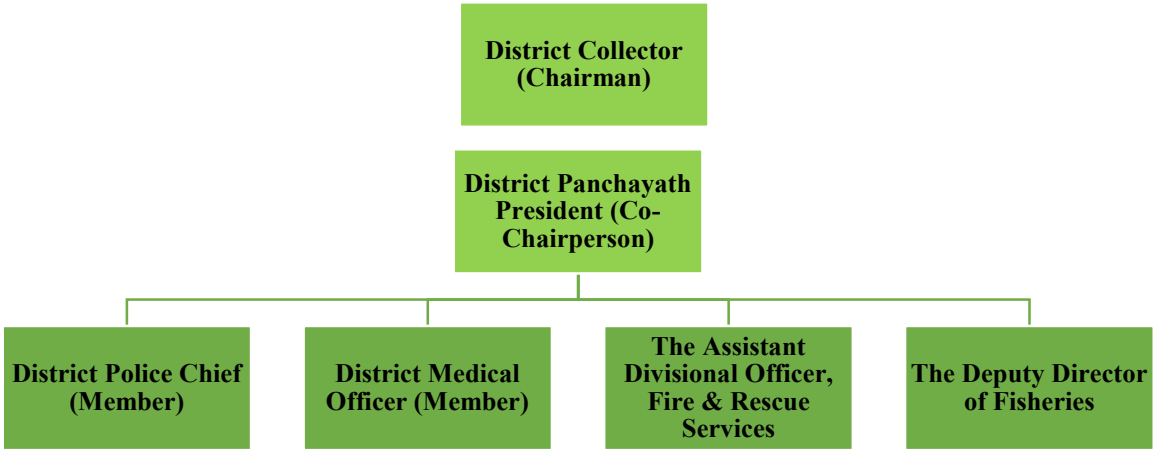
Detailed Disaster Management Plan (DMP) for DHK after the expansion is presented in following sections.

2.0 District Disaster Management Plan (DDMP) of Kollam

Kollam District have a detailed DDMP prepared in the year 2015, published under Section 30(2)(i) of the Disaster Management Act, 2005 (Central Act 53 of 2005). Vulnerable places in the district due to various natural hazards as per the DDMA are presented in following section

- Flood: All the coastal villages in the district are flood prone areas. High intensity of rainfall during the monsoons causes severe floods.
- Sea Erosion: The ancient harbor town of Kollam has 37 Kms. coast lines. Sea Erosion is a perpetual threat to many stretches of Kollam district. The erosion process is neither uniform nor induced by the same process at different locations. Coastal beds in Eravipuram, Mayyanadu, Neendakara, Sakthikulangara, Chavara and Alappadu villages in the district are vulnerable points. Heavy sea erosion occurring at Kakkathoppu coastal area in Eravipuram Village of Kollam Taluk from 04.05.13 onwards which is causing damage to beach, coastal road, and even the fishermen's houses.
- Drought: Due to the lack of Monsoon in the last year, district is severely affected by drought. Prime water sources like Sasthamcottah Lake and ThenmalaParappar Dam were dried in this drought.
- Thunder & Lightning: More lightning death cases in the district were reported from Kadakkal Village of Kottarakkara Taluk.
- Earthquake: Minor tremors reported recently in East kallada, West kallda, Sasthamcotta, Puthoor, Provazhy, Mulavana, Chadayamanagalam, Kadakkal Villages of Kollam District. This is caused minor damages to the residential buildings in the areas. But no casualties were reported due to these minor earthquakes.
- Land slide / Mud Flow/ Debris Flow: Pandavanpara at Ottakkal in Pathanapuram Taluk and some places of Kulathupuzha and Thenmala are prone to Land slide
- Cyclones: Cyclone is a tropical storm in which winds can reach speeds over 120 km / hour. No cases of heavier cyclones are reported in the district. But heavy storm occasionally occurs during the monsoon season along with heavy rain.

District Disaster Management Authority, (Kollam) is an institution constituted as per the National Disaster Management Act, 2005 at the District level to ensure effective management and response to any disaster. The DDMA (Kollam) has following structure;



Source: DDMP Kollam

Figure 01 DDMA of Kollam

Nodal departments for various hazards are;

- Revenue & Disaster Management: Hydro-meteorological & geological disasters
- Home: Road & rail accidents
- Health & Family Welfare: Chemical, biological, radiological & nuclear disasters
- Factories & Boilers Dept., Dept. of Industries and the industry: Industrial accidents
- Agriculture: Pest attacks
- Animal Husbandry: Cattle epidemics
- Water resources: Dam break
- Public Works: Building collapse
- Forests: Forest Fire
- Airport: Air accidents

3.0 Objective of Disaster Management Plan

The overall objective of a disaster management plan is to make use of the combined resources created or available at the site and/or off-site services to achieve the following:

- Protect the hospital's assets
- To minimize the effects of the accident on people and property;
- Safeguard other people, outside the project boundary

- Evacuate people to safe areas with utmost care and with minimum casualties;
- Inform and collaborate with statutory local and state authorities;
- Initially contain and ultimately bring the incident under control;
- Preserve relevant records and equipment for the subsequent enquiry into the cause and circumstances of the emergency;
- Investigate and take steps to prevent recurrence of similar incidents.

4.0 Risk Assessment & Vulnerability Analysis of Possible Disasters

Risk assessment forms an integral part of development of DMP. Risk assessment deals with identifying and evaluating the magnitude of impending risks to which the population is exposed due to occurrence of accidents involved in the project construction and implementation. On the basis of project details and plans, site contours and geographical and environmental setting of the site, the following Hazards have been identified which may possibly lead to disaster.

4.1 Flood

All the coastal villages in the district are flood prone areas. High intensity of rainfall during the monsoons causes severe floods. Proposed location of district hospital Kollam may prone to flood under severe rainfall condition.

4.2 Earthquakes

As per the National Earthquake Zonation Map, Kerala state falls under Zone II which is termed as Low Damage Risk Zone. In the Kollam district minor tremors reported recently in East kallada, West kallda, Sasthamcotta, Puthoor, Provazhy, Mulavana, Chadayamanagalam, Kadakkal. District hospital Kollam does not fall where there is most probability of occurrence of earthquake. However, all the proposed structures are constructed in tune with Indian standard IS: 1893:2015 to reduce the impact on structures and related damages due to earth quake.

4.5 Fire & Explosions

Fire & Explosions can occur at the site. Sometimes they occur in circumstances that are unexpected or unpredictable. Fire incidences can be natural or human generated. Natural fires are generated by Earthquakes, Storms, Lightning and the like. Earthquake and storms can cause devastating fires due to short circuits in damaged houses, fallen power cables, ignition of spilled fuels, gas leakages, etc. Proper insulation, meticulous wiring, leak proof storage etc. should form a part of disaster preparedness. Faulty electrical circuits, defective electrical wiring, poor maintenance of “boilers/electrical equipment”,

cooking gas leakages etc can cause manmade fires. Similarly, accidental leakage of flammable liquids (LPG & HSD) and careless disposal of lighted cigarette butts can also cause devastating fires.

4.6 Flood, Cyclone and Tsunami

Being the coastal adjoin area coastal flooding, cyclone and Tsunami area expected in the project site. As the structures are designed with the maximum flood probability for the 100 years, any impact on the proposed structures are considerably reduced.

4.7 Building Collapse

To protect against building collapse, hardening of the buildings structural systems had provided.

4.8 Epidemiology of Nosocomial Infections

A nosocomial infection, is an infection that is acquired in a hospital. Such infections are spread to the susceptible patient in the clinical setting by various means. In addition to contaminated equipment, bed linens, air droplets and health care staff can also spread infections. The infection can originate from the outside environment, another infected patient, staff that may be infected, or in some cases, the source of the infection cannot be determined. In some cases the microorganism originates from the patient's own skin microbiota, becoming opportunistic after surgery or other procedures that compromise the protective skin barrier. Though the patient may have contracted the infection from their own skin, the infection is still considered nosocomial since it develops in the health care setting.

5.0 Management of Disaster

Disaster Management is defined as ‘the body of policy and administrative decisions and operational activities which pertain to various stages (pre-disaster, disaster occurrence & post-disaster) of disaster at all levels’. It covers the entire range of activities designed to maintain control over disasters / emergency situations and to provide a frame work for helping people to avoid, reduce the effects of or recover from the impact of a disaster.

The disaster management plan for the DHK is prepared so as to cover all three stages of disaster such as;

- Pre Disaster phase - prevention, mitigation and preparedness-Onsite & Offsite
- Disaster response phase / during disaster.
- Post Disaster phase – recovery (rehabilitation and reconstruction).

5.1 Pre Disaster phase - prevention, mitigation and preparedness

The pre-disaster phase includes prevention, mitigation and preparedness activities and all these activities together form 'Disaster Risk Management'. Actions proposed at DHK in the pre-disaster phase in order to manage any disaster are presented in following sections.

5.1.2 Building Design Precaution

The impacts of natural hazards and the costs of the disasters they cause will be reduced by adapting mitigation measures during new construction. A variety of techniques are available to mitigate the effects of natural hazards on the built environment. Depending on the hazards identified, the location and construction type of a proposed building or facility, and the specific performance requirements for the building, the structure can be designed to resist hazard effects such as induced loads.

In view of resisting major building hazards the new construction in the proposal will dully incorporate following structural elements like shear walls, braced frames, moment resisting frames, and diaphragms, base isolation, energy dissipating devices such as visco-elastic dampers, elastomeric dampers, hysteretic-loop dampers, and bracing of non-structural components

5.1.3 Development and Display of Evacuation Plan

A detailed evacuation plan showing the escape route for the inhabitants at the time of emergency had developed for the proposal. The major components of evacuation plan of DHK are;

- Evacuation Routes
- Common Assembling Points
- Emergency Exits
- Short and un obstructed entry and exit provision for the Ambulance during the emergency

5.1.4 Provision of Disaster Alarm

Building will incorporate provision for disaster alarm system for the decaration of emergency

5.1.4 Fire Alarms/Other Measures for fore resistance

The new buildings proposed will be installed with a fire protection and evacuation system. The Evacuation plan will be developed and displayed in the prominent areas of the building. The fire protection and evacuation system will be accompanied with fire and smoke alarm at common areas, so that visitors and all the staff will be are informed in the event of the disaster for initiating appropriate measures for rescue.

Standard firefighting equipment like sprinkler systems, fire extinguishers, sand buckets etc. shall be provided as per statutory requirement. Fire protection system shall be designed and installed as per National Building code (NBC) of India 2005, part IV Fire & Life safety.

Table 02 Details of the Fire Management System Proposed as part of the project

Sl no	Description	Details	Specific Location
1.	Fire Extinguisher	All Fire extinguishers shall be portable and hand held. An operating instruction should be pasted on the extinguisher body, included with an extinguisher signage, which shall be mounted on wall with mounting bracket or on ground for easy identification, etc. Portable ABC type fire extinguisher of capacity 4 Kg fitted with gun metal cap with brackets are located near each staircase landing or inside fire ducts on every floor. 9 Liter Stored pressure mechanical foam squeeze grip cartridge type fire extinguishers are located near electrical room & DG.	Kitchen, Lift, near each fire duct on every floor, Parking, DG, Electrical room.
2.	Hose Reel	One each in every fire duct.	
3.	Wet Riser System	Wet riser shall be provided for each floor with separate wet riser tap off on each floor for connection to fire hydrant landing valve and fire hose cabinet containing first aid box, swinging hose reel, fire man's axe, 63 mm dia canvas hose and nozzles. In addition, wall / floor mounted hand-held type fire extinguishers shall be placed at suitable locations.	One each near landing of every fire staircase.
4.	Yard Hydrant System	Yard hydrants shall be installed at every 45m along the periphery of the building to protect the building from outside. Yard hydrant consist of single headed hydrant valve fixed on the standpipe along with 2x15 meter long fire hose, branch pipe with nozzle kept in the hose cabinet located next to the stand pipe. External hydrants shall be tapped from the ring main connected with internal hydrant system through isolation valve. Three-way fire brigade inlet connections shall be provided to fill the rising main of the hydrant system in case of failure of pumps. Tank filling inlet connection shall be provided to the sump.	Hydrant Stand post to be installed at an equal interval of 45 meter.
5.	Automatic Sprinkler System	All sprinklers are with temperature rating of 68deg. Pendent recessed type for false ceiling area and pendant type considered for car parking area. The sprinklers are designed to cover 9 to 12 sq.mt. each. The sprinkler system is fed by dedicated sprinkler pump; it is possible to feed water from the hydrant pump to the sprinkler system in emergency. The sprinklers in the building shall be fed from different risers, located near the landing of the staircase. Each floor shall be considered as separate zones to be annunciated separately at fire control room. The sprinkler piping network of each floor shall be provided with suitable size of butterfly valve, flow switch and drain assembly. The sprinkler mains at each floor level is connected with a water flow switch, which will transfer audio indications to fire alarm panel in case of water flow in the pipes. The sprinkler system shall be provided	To be installed in all floors at appropriate places and in consultation with local fire authorities

		in all areas except toilets, electrical room, DG, communication, fire control or AHU rooms as per norms. If the void space above false ceiling is more than 800mm additional set of above ceiling sprinklers shall be provided.	
6.	Manually Operated Fire Alarm System	Addressable analogue type fire detection and alarm system shall be provided in all the floors of the building as per National Building Code of India and IS 2189	Manual Call points & Hooters are considered at every floor near staircase.
7.	Automatic Detection & Alarm System	Address able analogue type fire detection and alarm system shall be provided in all the floors of the building as per National Building Code of India.	Automatic detectors to be installed in all floors at appropriate places and in consultation with local fire authorities
8.	Signage	Emergency Exits, Staircases, Lifts, Fire Ducts etc. should be kept in the respective Floor at strategic points.	
9.	Fire Water Storage Tank	Underground Sump & main Fire pumps are required and will be designed based on NBC	Underground
10.	Firewater pumps	Firewater pumps are required and will be designed based on NBC	

5.1.5 Do's and Don'ts Pamphlets

Dos and Don'ts pamphlets for occupants towards each disaster will be prepared and displayed in prominent places of the building.

Figure 02 Sample dos and don'ts Pamphlets

5.1.6 Provision of Common Assembly Points

Common Assembly Points are pre-designated areas where the people have been told to wait after the evacuation process during the event of emergency. The proposal incorporates multiple common

assembly points with sufficient areal extent (0.3 sq mt per occupant) to occupy entire inhabitant of the hospital.

5.1.7 Provision for Circuit Breaker

Circuit breaker always trip the circuit but open contacts of breaker cannot be visible physically from outside of the breaker and that is why it is recommended not to touch any electrical circuit just by switching off the circuit breaker. The proposal incorporates circuit breaker for disconnecting the electricity towards avoiding major disasters at the time of fire.

5.1.8 Staff Education and Training

It is very important for the staff to know about and get trained in using the hospital disaster/emergency manual. Regular staff training by suitable drills should be undertaken at least once in three months.

5.1.9 Constitution of Onsite Disaster/ Emergency Management Cell (EMC)

A Disaster Management Committee (DMC) will be planned for the implementation of total disaster management during emergency. The constitution of Disaster Management Cell proposed for the facility is as presented in **Figure 03** below.

DMC will meet at least once in 3 months to review the working of contingency plan, problem faced in recent disaster and amendment modification to be adopted in future. The Committee will be responsible for overall managing the disaster situation, take administrative decisions as and when required, review the disaster plan and to inform the Government on the situation.

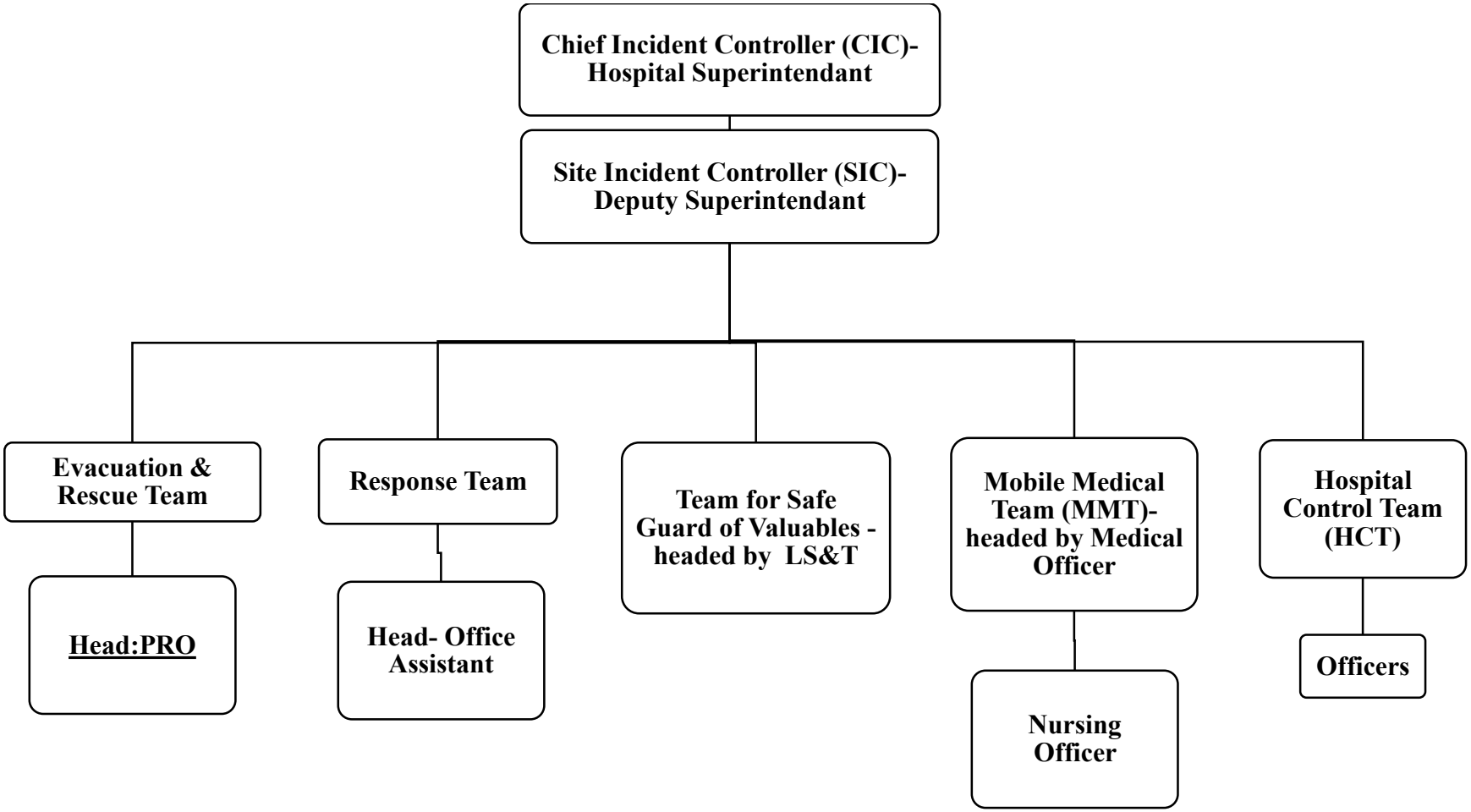


Figure 03 The constitution of Disaster Management Cell

5.1.10 Control Room

Within administrative block a Control Room for disaster management will be earmarked to function. A Control Room will respond immediately during an emergency situation and is equipped with State of the Art communication equipment which enables it to communicate quickly to the affected area and provide immediate support during the Golden Hour of the disaster. This room should also consist of announcing system, fire extinguishers, smoke detectors and sensors. Control room will be occupied by the head of EMC i.e. Hospital Superintendent in this case.

5.1.11 Awareness for the Inhabitants

The inhabitants would be briefed of the disaster management mechanism and evaluation plan in place for facility as it will be 10 times more effective than the any other mitigation measures.

5.1.12 Conduction of Mock Drills

Mock drills activating the Emergency Preparedness Plan will be conducted periodically for ensuring its efficiency during emergency as well as for refinement and updating. The mock drill for an on-site emergency plan will carried out once in six months.

5.1.13 Proper Waste Management

Implementation of proper Hospital Waste Management measures will help to check the spread of diseases from hospital to surroundings. Improper management of waste generated in hospital facilities causes a direct health impact on the community, the health care workers and on the environment. The complete hospital waste management during the operational phase of DHK is presented in this section.

Waste generated from the hospital area is biomedical in nature and to be collected and disposed in tune with the biomedical waste management rule 2016. Bio medical waste should be collected daily (or as frequently as required) and transported to the designated central storage site. While collecting the plastic bag will be sealed /container will be tightly closed, labelled with the 'Biohazard' or 'cyto-toxic' symbol . The bags or containers should be replaced immediately with new ones of the same type. A simple and clear notice, describing which waste should go to which container and how frequently it has to be routinely removed and to where, is to be pasted on the wall or at a conspicuous place nearest to the container. Preferably, it should have drawings correlating the container in appropriate colour with the kind of waste it should contain. Collection timings and duty chart should be put in a prominent place with copies given to the concerned waste collectors and supervisors.

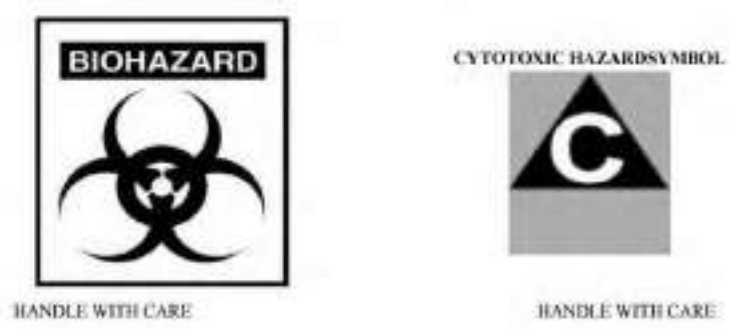


Figure 04: 'Biohazard' or 'cyto-toxic' symbol

Degradable and non-degradable wastes also will collected daily and send to bio gas plant proposed and secondarily storage area. DHK is having a secondary storage room adjoining to STP near Administrative building.

Liquid wastes generated will be transferred to STP as appropriate by gravity through conveying mains.

Biomedical wastes generated from the hospital will stored in secondary storage room and then will transferred to IMGAE for the further disposal. Pharmaceutical waste will be returned back to the supplier. Liquid waste will be treated in STP and septic tank as appropriate. Degradable waste will dispose through biogas plant and non-degradable waste will stored and transferred to vendors.

5.2 Disaster Response Phase / During Disaster.

Three types of disasters can be expected in the a hospital institution as listed below;

- Community Unaffected – Hospital Affected
- Community Affected – Hospital Unaffected
- Community Affected – Hospital Affected

5.2.1 Community Unaffected – Hospital Affected

Such scenarios arise from the internal disasters of hospitals. As such, partial or complete evacuation and transfer of critical patients to networked hospitals is the key to successful response. During such scenarios the facilities arranged in the plot during pre-disaster phase will be under the responsibility of EMC. The EMC will initiate the rescue service in accordance with the evacuation plan and by using facilities within plot.

5.2.2 Community Affected – Hospital Unaffected

During such scenarios, hospitals play a vital role in the larger disaster response being undertaken. For hospitals such scenarios would imply a sudden increase in demand because of the surge in the number of patients seeking medical attention. During this situation EMC will initiate the evacuation actions by activation the MMT and HCT

5.2.3 Community Affected – Hospital Affected

In such situations EMC itself could not manage the disaster, they will inform to District disaster management committee, Fire and Rescue Centre ,Water Authority , KSEB as per the requirement and they will take over the management of disaster.

The various stakeholders who are part of any disaster management during a major disaster are presented below and the general profile of the actions and the responsible officers from the statutory bodies are presented in Table 02

- Kerala State Disaster Management Authority
- State and Central Government departments
- District Disaster Management Authorities
- Local authorities including Municipal Corporations/ Voluntary and civil society organizations
- Red Cross, multinational aid agencies and UN agencies
- Community-village disaster management committees, task forces
- Public sector undertakings
- Private sector undertakings
- Army, navy, air force, coast guard, airport authority, national disaster response force etc.

Table 04 Actions during Disaster Management and Responsible Statutory Authority

Action points	Responsible Statutory Authority
Evacuation of people	Army, Police, Civil Defense, Fire Brigade, and Linkage Team
Recovery of dead bodies and their disposal	Police, Civil Defense and Linkage Team
Medical care for the injured	District Medical and Health Officer
Supply of food and water and restoration of water supply lines	Executive Engineer, Water Authority, Deputy Director of Supply and Relief Team
Restoring lines of communication and information	Communication, District Information Officer.
Quick assessment of damage and demarcation of damaged areas according to grade of damage	Emergency Operating Centre, PWD and Block Development Officer concerned
Cordoning off severely damaged structures liable to collapse during aftershocks	Police, Fire Brigade, Home guards

5.3 Post Disaster Phase

After disaster, the emergency period will be declared within the plot .The emergency period depends on the extent of disaster and the rehabilitation time requirement .The activities within the buildings will be restarted after the withdrawal of the emergency notification.

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