

CHAPTER-1: RISK ASSESSMENT

1.1 INTRODUCTION

Mining are associated with several hazards that pose impacts on employees & surrounding area necessitating adequate implementation of Safety and health measures. Hence, River Bed mine safety is one of the most essential aspects for associated people. M/s Uttarakhand Forest Development Corporation (UKFDC) proposed Sand, Bajri and Boulders mining from Malan Riverbed located at Kotdwar forest range, District Pauri Gharwal Uttarakhand.

Risk assessment is essential for prevention of accidents and there is a need to be aware about the risk of an accident and steps can be taken to prevent the same before its happening.

1.2 HAZARD IDENTIFICATION

Major risk involves in riverbed mining which are as follows-

- River Bed Inundation,
- Uneven/ Irregular mining of sand or bajri,
- Damage of River bank due to access of Entry Points/Ramps,
- Fugitive Emissions,
- Diesel fumes from diesel operated mechanization,
- Accidents Due to Trucks during the loading

1.3 IMPACTS AND MITIGATION MEASURES

1.3.1 Possible Risks Due to Inundation

Mining will be done during the non monsoon periods so there shall be no problem of inundation is likely to happen. Mining will be restricted to a depth of 3 m from surface or 1 m above to water level.

1.3.2 Uneven/ Irregular mining of sand or bajri

Due to uneven/ irregular thickness of sand bed, river bed mining may result in ponds to develop. Excessive mining can change River direction & geometry altering recharging capacity of

replenishment for Proper management of even excavation can overcome this. Excavation should be done in systematic pattern under the supervision of highly skilled mining engineers.

1.3.3 Fugitive Emissions

Due to loading/Unloading operation Fugitive emissions create, due to loading causes impact on health of mine workers. Water sprinkling will be provided for dust settlement.

1.3.4 Diesel fumes from diesel operated mechanization

Health impact due to diesel particulates from emission of diesel operated vehicles which are used for transportation and loading/unloading purposes of sand, bajri and boulders. Regular check and proper maintenance of vehicles should be done.

1.3.5 Measures to Prevent Accidents Due to Trucks

- All transportation within the mining carried out directly under the supervision and control of the management.
- The vehicles will be maintained in good condition and checked thoroughly at least once a month by the competent person authorized for the purpose by the management.
- Road signs will be provided at each and every turning point up to the main road (wherever required).
- To avoid danger while reversing the trackless vehicles especially at the embankment and tipping points, all areas for reversing of trucks/ tippers should as far as possible be made man free.
- A statutory provision of the fences, constant education, training etc will go a long way in reducing the incidents of such accidents.

1.3.6 Other Possible Measures to Avoid Risks/ Disaster Due to River Bed Mining

- The collection of Sand, bajri & Boulders will not be stocked on the banks of the river.
- The minerals will be mined out in a uniform way so that the river flow/course shall not get disturbed in its uniformity.
- The maximum depth can be 3 m from surface of sand deposit and not less than 1 m above to

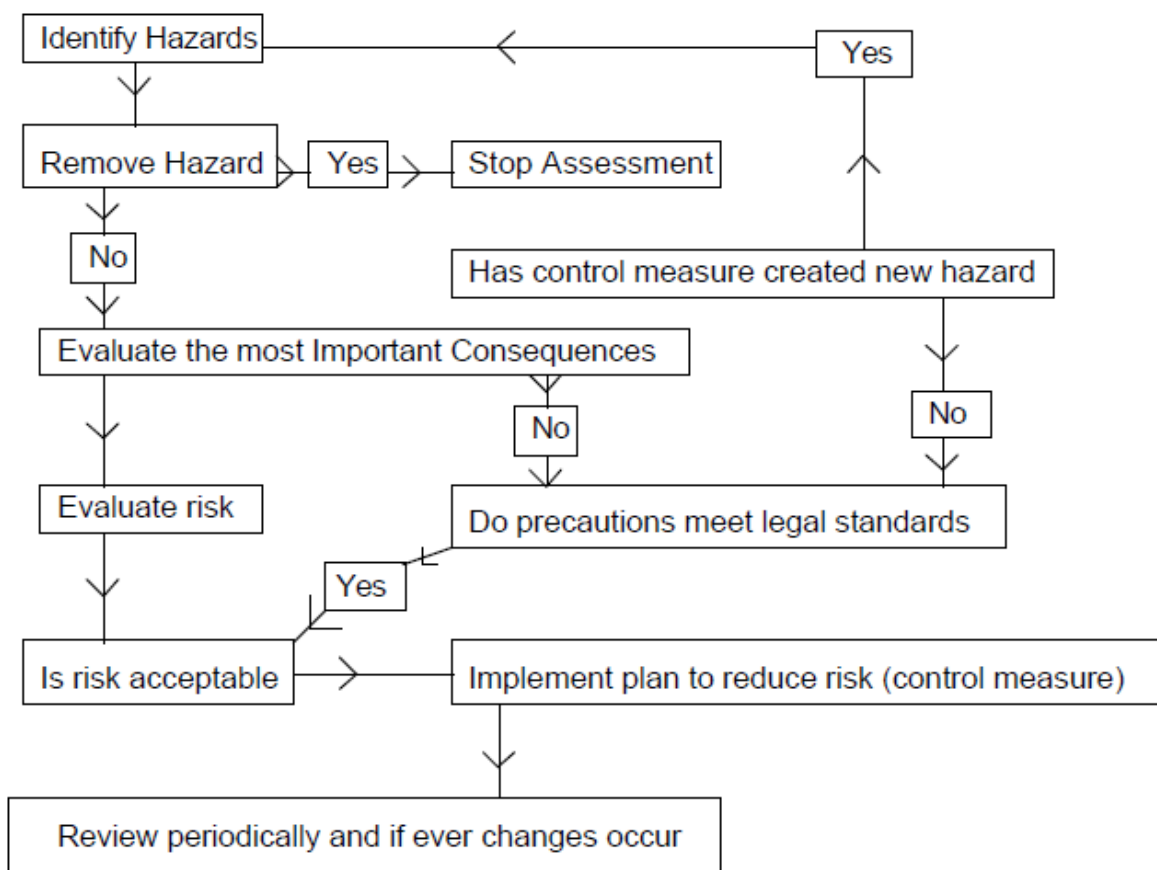
water level.

- River bank areas, under operation will be protected by avoiding unauthorized gravel excavation along rivers as that may cause instability to the river bank.
- Only excavated river bajri/Gravel should be used to deposit against the river bank to form access ramps.
- Water level Markers will be provided on the site.

1.4 MODEL FOR RISK ASSESSMENT

The model for risk assessment in mining is given in **Figure-1**.

Figure 1: Model of Risk Assessment



The risk assessment for riverbed mining following steps are involved-

- Identify the hazard
- Identify activity involves in risk

- Removal of the hazard
- Evaluation of the risk
- Decide on control measures
- Record of the assessment
- Review

CHAPTER-2: DISASTER MANAGEMENT PLAN

2.1 BACKGROUND

Disasters disrupt progress and destroy years of painstaking development efforts, thereby pushing nations back by several decades. The impacts of disasters are particularly strong in case of developing nations in terms of recovery therefore, both pre-disaster efforts in terms of preparedness, capacity building, awareness along with an efficient response mechanism, recovery and reconstruction would lessen the loss of lives and property.

The possible risks in the case of River Bed mining project are Bank Erosion, floods, accidents due to transportation. This disaster management plan sets out the procedures and measures to be taken into account in the event of loss of containment and consequence thereof in the riverbed mining.

M/s UKFDC has casted Disaster Management Plan to ensure that all components of Disaster Management get addressed to facilitate planning, preparedness, operational, coordination and community participation

2.2 AIM & OBJECTIVES

The aim of the DMP is to ensure that the following components of DM are addressed to facilitate planning, preparedness, operational coordination and community participation.

The overall objectives of the Disaster Management plan are:

- (a) To localize the emergency and, if possible eliminate it;
- (b) To minimize the effect of the accident on people and property
- (c) Monitoring & evaluation of actions taken during disasters and providing relief.
- (d) Identify casualties.
- (e) Provide authoritative and factual information for the news media.
- (f) Damage to environment is minimized
- (g) Relief and rehabilitation measures are effective and prompt.

2.3 TYPES OF EMERGENCIES

The type of emergency primarily considered here is the major emergency which may be defined as one which has the potential to cause serious danger to persons and/or damage to property and which tends to cause disruption inside and/or outside the site and may require the co-operation of outside agencies.

An emergency in the river bed mine site can arise due to certain undesired incidents as floods, landslides, flash floods etc.

2.3.1 Definition of On-Site Emergency and Off-site Emergency

An On-site emergency is one where the consequences of an undesired incident remain confined within the mine site. Emergencies at the mine site shall be On-Site Emergencies if the consequences remain confined within the premises of mine site.

An emergency, which is likely to develop or has developed such as to pose a threat to members of public outside the mine site, is termed as an off-site emergency.

2.3.2 Priority in Emergency Handling

The general order of priority for involving measures during the course of emergency would be as follows:

- Safeguard life
- Safeguard environment
- Safeguard property

2.4 STRUCTURE OF THE DISASTER MANAGEMENT PLAN

This Disaster management plan basically comprises of the following elements:

- Outline of Disaster Management Plan
- System of Communication
- Consultative Committee
- Facilities and Accommodation
- First Aid & Medical facilities
- Transport Services
- Functions of Public Relations/ Responsibility of Mine Management

2.4.1 Outline of Disaster Management Plan

The purpose of disaster management plan is to restore the normalcy for early resumption of mining operation due to an unexpected, sudden occurrence resulting to abnormalities in the course of mining activity leading to a serious danger to workers or any machinery or the environment. The disaster management plan may be broadly divided into following steps as:

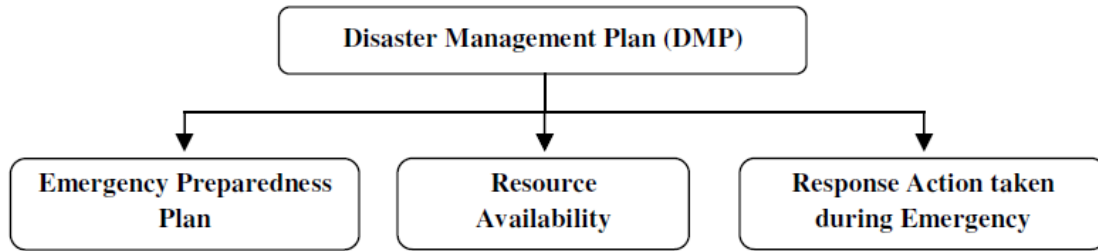


Figure 1: Objective of Disaster Management Plan

2.4.2 System of Communication

There is an internal communication system for the department head and to their line of command with telephone. The telephone numbers and addresses of adjoining mines, rescue station, police station, fire service station, local hospital, electricity supply agency and standing consultative committee members are also maintained for any emergency requirement.

The system of communication has been described in Chapter 3.

2.4.3 Consultative Committee

A standing consultative committee will be formed under the head of mines manager. The members consist of safety officer/medical officer/Asst. manager/ public relation officer/ Foreman/ and environmental engineer.

2.4.4 Facilities & Accommodation

Accommodation and facilities for medical centre, rescue room and for various working groups will be provided.

2.4.5 First Aid & medical facilities

The mine management will have first aid/ medical centre for use in emergency situation. All casualties would be registered and will be given first aid. The centre will have facilities for first aid & minor treatment, ambulance and transport. It will have proper telephone/wireless set for quick communication with hospitals where the complicated cases are to be sent.

2.4.6 Transport services

A well defined transport control system will be provided to deal with the situation.

2.4.7 Functions of Public Relations/ Responsibility of Mine Management

- To make a cordial relation with government officials and other social service organization and

working groups.

- To liaise with representatives of the mine to ameliorate the situation of panic, tension, sentiments, grievances and misgivings created by any disaster.
- To ameliorate the injured, survivors and family members of affected persons by providing material, moral support and establishing contact with relatives of victims.

2.5 OFF-SITE EMERGENCY PLAN

Off-site emergency plan defining the various steps to tackle any off-site emergencies which may affect surrounding areas of the project has to be prepared after due final discussion with local panchayat and revenue officials. As per this plan, actions have to be promptly initiated to deal with any off-site disastrous situation, with help of collector and other officials.

CHAPTER-3: MAJOR DISASTER & MITIGATION MEASURES

3.1 INTRODUCTION

The state is affected by disaster like floods, epidemics, fire, hailstorm, lightening, road accidents, etc. The state is highly vulnerable to multihazards viz. earthquake, landslides, flash-floods, avalanches, Dam Burst, drought, but particularly Earthquake, as the state falls in the highest seismic risk zones of the country i.e. Zone IV and V.

In the disaster prone map of the country, Uttarakhand has attained its position among first five states in respect of natural hazards, i.e., earthquakes, flash floods triggered by cloud burst, landslides, avalanches and forest fires & frequent droughts in summers. These disasters have caused immense loss of property, natural wealth, and human lives.

3.2 HAZARD IDENTIFICATION

3.2.1 FLOODS AND FLASH FLOODS

The average rainfall in the State is 1229 mm, with rainy season normally from mid April to September and higher rainfall is from June to September results into floods in low lying areas and erosion of land. Though most parts of Uttarakhand receive heavy rainfall, the State has a history of floods and inundations. River Malan is the main river existing in the project area.

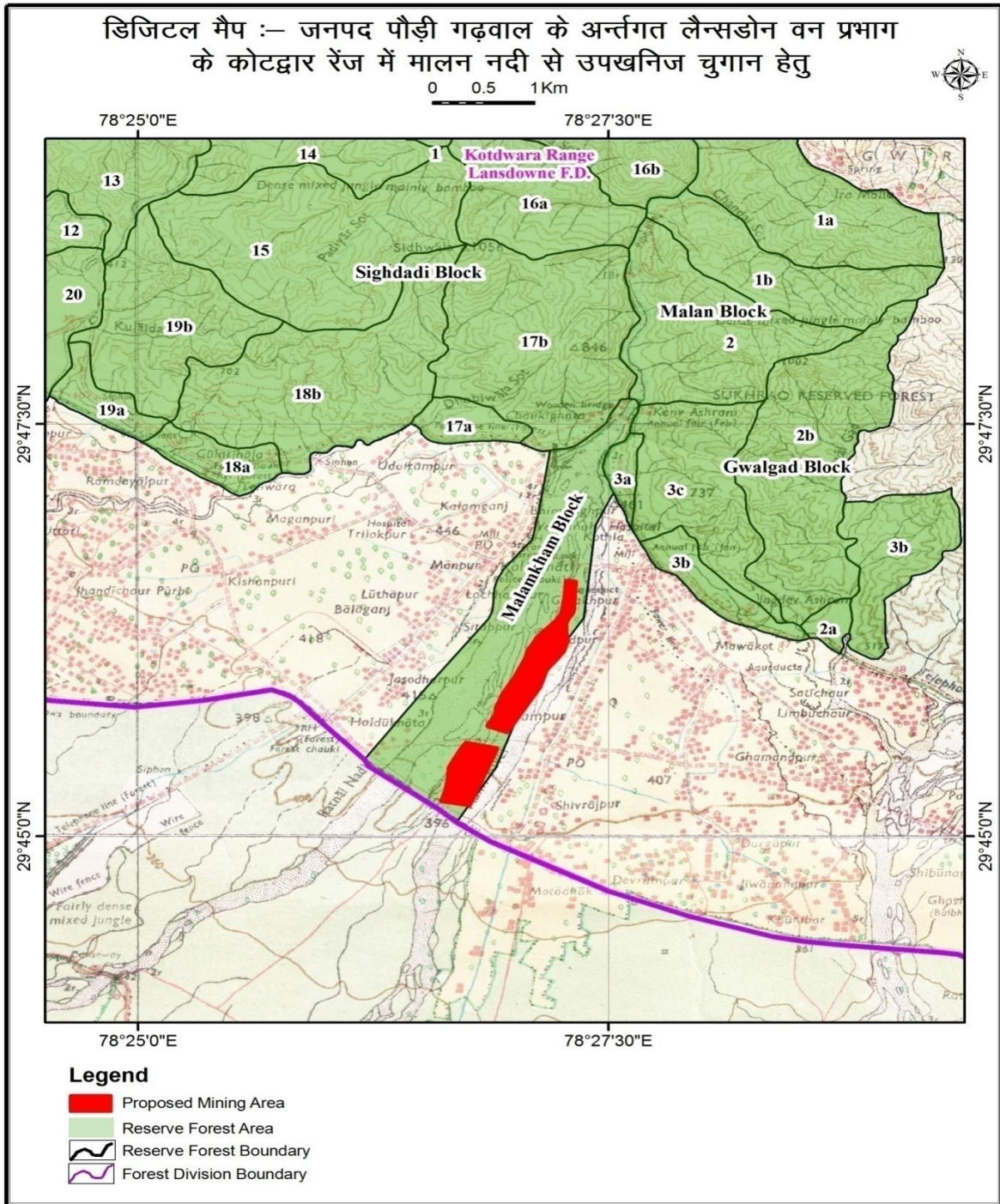
3.2.2 RIVER MALAN PROJECT VICINITY

The total lease area is 71.972 ha out of which 35.356 ha is mineable as per approved Site inspection committee report. Geographical location of mine lease area is covered under Survey of India Toposheet No. 53K/9.

Table 1: River Malan Details

Latitude	29° 45' 9.88" N to 29° 47' 4.15" N
Longitude	78° 26' 42.01" E to 78° 27' 20.43" E

Figure 3: Project Location

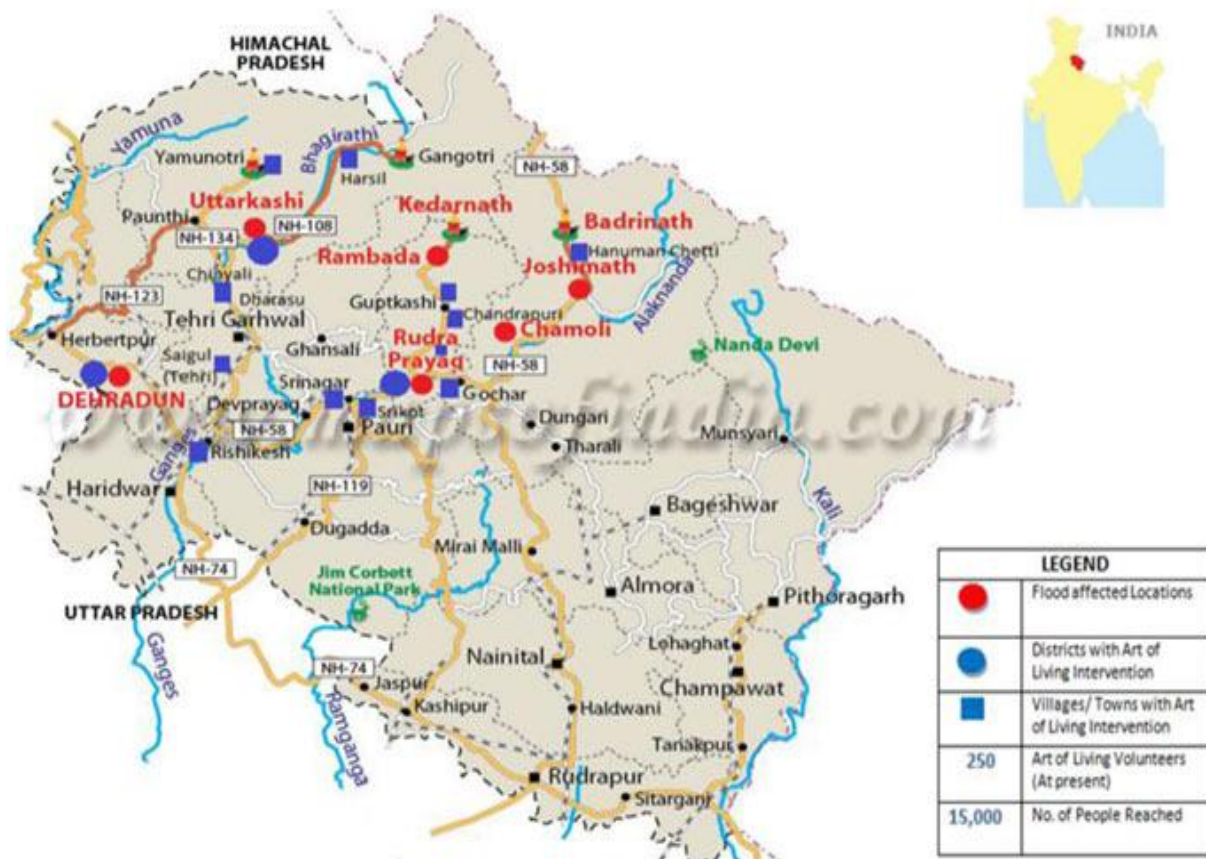


3.2.3 FLOOD HAZARD ZONATION OF THE AREA

The low lying areas are more prone to both flood and flash flood hazard. Flash Floods are very common hydro-meteorological hazards due to excessive rainfall or snowmelt, bursting of dams, cloud burst, etc. Such floods are common due to the high velocity of water with much energetic capacity to carry away everything in its way. The cloudbursts are also responsible for flash floods.

The districts of Bageshwar, Chamoli, Pithoragarh, Rudraprayag and Uttarkashi which were most severally affected in the 2013 flash flood. Cloudburst is an extreme amount of precipitation, sometime with hail and thunder storm, which normally lasts for minutes and usually cause huge sudden flash floods. Occasional cloud bursts in the state result into devastation due to flash floods, breaching of river banks and overflowing of dams in hilly parts of the state. As per Pauri Garhwal District is categorized as “Flood prone area” for under Government of Uttarakhand.

Figure 4: Flood prone area of Uttarakhand



3.2.4 PREVENTIVE MEASURES FOR FLOOD & RIVER BANK PROTECTION

The details of preventive measures to be taken for Flood & river bank protection are given as below:

- No mining will be done during monsoon season.
- Mining will be stopped well before the warning stage.
- Mine Facilities & manpower will be made available for evacuation & warning purposes.
- Adequate width as safety margin will be left on both sides of river banks during bajri collection.
- Mining will proceed along the river in the direction from downstream to upstream in each block.
- Markers showing water level will be provided on the site.
- Access roads/ramps to river bed will be breached before onset of monsoon to permit unhindered flow of river.
- The mineral will be mined out in a uniform way so that the river flow/course shall not get disturbed in its uniformity.
- Alternative Escape route should be used in the case of Emergency.

3.2.5 FLOOD CONTROL MITIGATION MEASURES

Disaster management committee of M/s UKFDC headed by Site Main Controller (SMC) has been formed in such a way to execute timely management the three stages:

- Stage-1- Alert and Warning Stage;
- Stage-2- Disaster Stage;
- Stage-3- Response and Rehabilitation Stage.

Control Mitigation Measures for river bed mine are as follows:

I. AT ALERT AND WARNING STAGE:

- No mining will be done during monsoon season.
- Mining will be stopped well before the warning stage.
- Mine Facilities & manpower will be made available for evacuation & warning purposes.
- Timely warnings will be given to the people in surrounding villages in upstream;
- Passing of warnings in downstream areas giving sufficient time before river overflow for evacuation of villagers;
- Check the water level for issuance of alerts and warnings to locals;

- Rainfall data will be kept updated on daily basis so as to have sufficient time before the water from rainfall could reach upstream areas;
- Ensure coordinated movement of all departments, officials and agencies for combating the disaster;
- Link-up & Coordination with CWC & IMD for effective & timely forecast by means of real time data communication network from the forecasting stations.

II. AT DISASTER STAGE:

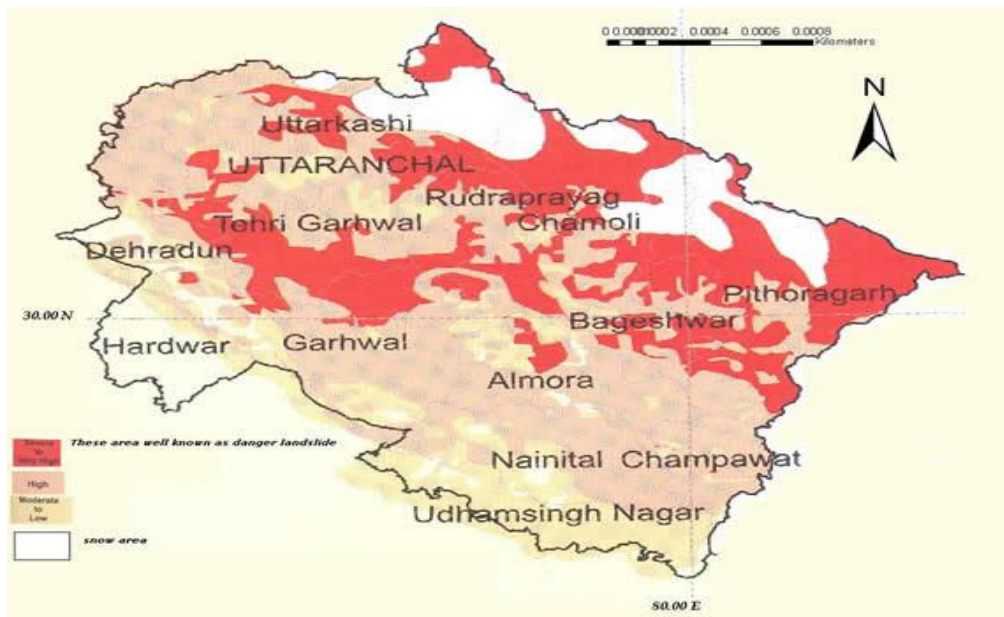
- Assist & coordinate with Govt. Organizations & departments. DM committee of M/s UKFDC will ensure to follow instructions passed by the government.
- Volunteer's Assistance will be provided to Government DM authority for emergency response, as necessary;

III. AT RESPONSE AND REHABILITATION STAGE

- Floating clinics with medical practitioners, doctors & first aiders will roam around the affected villages for treatment & distribution of medicines;
- Assist local administration in rescue and relief operation as required;
- Assistance of police for searching the lost persons, if any;
- Food packets, clothes & shelter arrangement will be provided;
- First aiders & Swimmers will be there to help the victims;
- Training awareness;

3.2.6 VULNERABILITY TO LANDSLIDES/LANDSLIPS/ROCKSLIDES AND SOIL CREEP

The hill slopes are prone to land slides, landslips, rockslides and soil creep. These hazardous features have hampered the over all progress of the region as they obstruct the roads and flow of traffic, break communication, block flowing water in stream and create temporary reservoirs and also bring down lot of soil cover and thus add enormous silt and gravel to the streams. These are of two types, first as slides due to natural factors (These slides are mainly due to geological, tectonic (Thrust, Fault, Seismic Zone, Joints and Fracture Zone and Sheer Zone), additional moisture percolation, surface water percolation and slopes more than 35°.) and second as slides induced by man and his activities (These are induced by human activity in the form of engineering constructions, massive deforestation and erroneous agricultural practices on barren hill slopes, road building , unscientific quarrying etc. A few land slides of the district e.g., Satpuli, Banghat, Patal, Kaliasaur, Lansdowne Landslides are a result of these practices.

Figure 5: Landslide prone area of Uttarakhand**I. AT ALERT AND WARNING STAGE:**

- Mine Facilities & manpower will be made available for evacuation & warning purposes.
- Rainfall data will be kept updated on daily basis.
- Ensure coordinated movement of all departments, officials and agencies for combating the disaster;
- Instruct workers for using safety helmet on mine site and on communication route.

II. AT DISASTER STAGE:

- Assist & coordinate with Govt. Organizations & departments. DM committee of M/s UKFDC will ensure to follow instructions passed by the government.
- Volunteer's Assistance will be provided to Government DM authority for emergency response, as necessary;

III. AT RESPONSE AND REHABILITATION STAGE

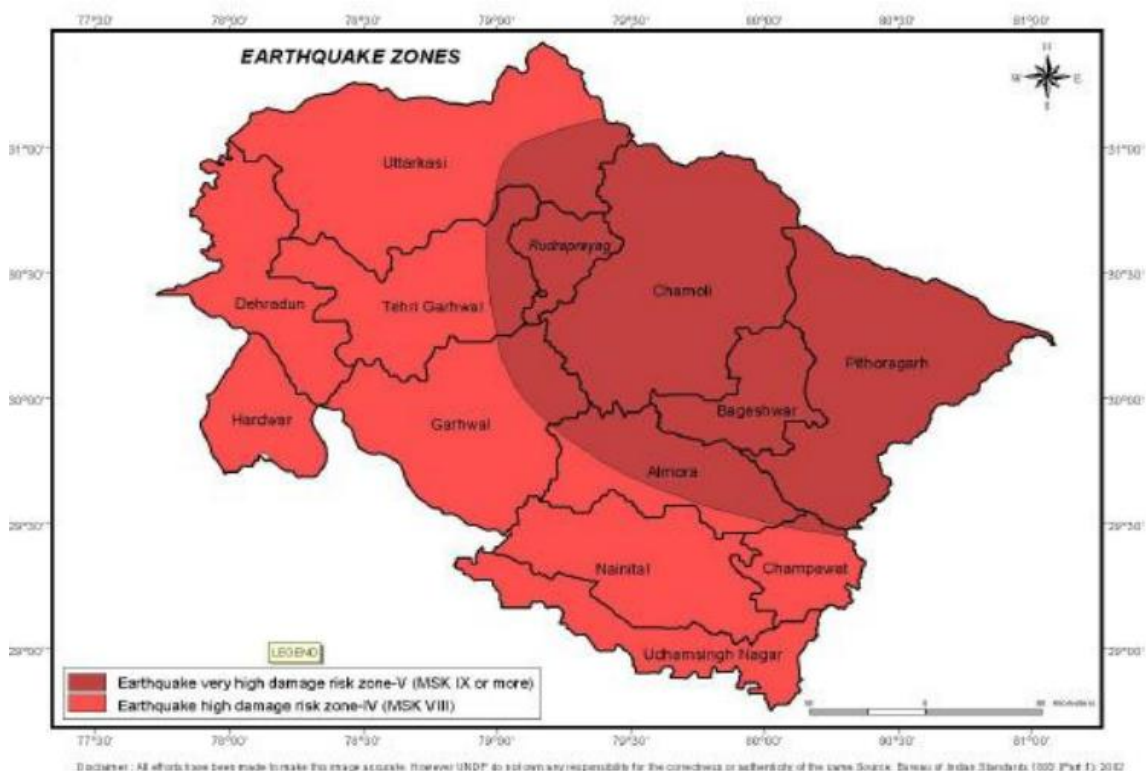
- Floating clinics with medical practitioners, doctors & first aiders will roam around the affected Peoples & distribution of medicines;
- Assist local administration in rescue and relief operation as required;
- Food packets, clothes & shelter arrangement will be provided;
- Training awareness

3.2.7 VULNERABILITY TO EARTHQUAKE

As per earthquake zoning map of India, the entire State can be divided into two zones, i.e. Zone V and Zone IV. The State has experienced many earthquakes of small and large scale with their epicenters located within the Himalayan region. These earthquakes have demonstrated that the seismic vulnerability of the building stocks in the region is primarily responsible for a large number of human casualties. The districts of Bageshwar, Chamoli, Pithoragarh, Rudraprayag and Uttarkashi, which were most severally affected in the 2013 flash flood, also fall within the Seismic Zone V.

As shown in the map four of the thirteen districts of the state (Pithoragarh, Chamoli, Bageshwar and Rudraprayag) fall completely in Zone V (representing damage risk of \geq IX on MSK scale), while five other districts (Uttarkashi, Tehri-Garhwal, Pauri, Almora and Rampur) fall partially in Zone V and partially in Zone IV (damage risk of VIII on MSK scale) and the rest (Dehradun, Haridwar, Nainital and Udham Singh Nagar) fall totally in Zone IV (of the seismic risk map of India).

Figure 6: Earthquake zone of Uttarakhand



I. AT ALERT AND WARNING STAGE

- Mine Facilities & manpower will be made available for evacuation & warning purposes.
- Seismic data will be kept updated on the basis historical event and its interval.
- Ensure coordinated movement of all departments, officials and agencies for combating the disaster;

- Majority of the casualty and damages during earthquakes are caused due to collapse of building and structures. It is needed to be launched effectively to aware the people about the disastrous effects of earthquakes and to prepare them to face these in a better way.
- A comprehensive list of the safe and unsafe structures has to be made incorporating the details about their designing and method of construction.

II. AT DISASTER STAGE

- Assist & coordinate with Govt. Organizations & departments. DM committee of M/s UKFDC will ensure to follow instructions passed by the government.
- Volunteer's Assistance will be provided to Government DM authority for emergency response, as necessary;

III. AT RESPONSE AND REHABILITATION STAGE

- Floating clinics with medical practitioners, doctors & first aiders will roam around the affected villages for treatment & distribution of medicines;
- Assist local administration in rescue and relief operation as required;
- Assistance of police for searching the lost persons, if any;
- Food packets, clothes & shelter arrangement will be provided;
- Training awareness
- Loss of life and property need to be documented and published;

CHAPTER-4: EMERGENCY SYSTEM OF COMMUNICATION

4.1 EMERGENCY ORGANIZATION & RESPONSIBILITIES

In case of an emergency at Mine site, the On-site Emergency Plan will come into action.

Effective emergency plan requires that, in the event of an accident, nominated functionaries to be given specific responsibilities, often separate from their day-to-day activities.

Emergency control organization has been designed by identifying the safe transition from normal condition to emergency condition. For this purpose an emergency response organization with appropriate lines of authority with succession planning and actuating the response management has been formed.

4.1.1 Emergency Organization

Overall objectives of the emergency control organization are as follows:

- To promptly control problems as they develop at the scene.
- To prevent or limit the impact on other areas and offsite.
- To provide emergency personnel, selecting them for duties compatible with their normal work functions wherever feasible.

4.2 IMPORTANT CONTACT DETAILS

4.2.1 Contact Details for High Authorities of UKFDC

The contact details are given as follows-

Designation	Name	Telephone No.	a.) Mobile No.	b.) Mobile No.
Honorable Chairman	Shri Harish Dhama	0135-2714311	-	-
M.D. (UKFDC)	Dr. S Chandola	0135-2657610	9412054439	9568003200
GM Production, Dehradun	Shri Vineet Kumar Pangtey	0135-2713815	9412058613	9568003202
RM (H.Q), Dehradun	Shri B.K.Gangte	0135-2652384	9412057606	9568003210
Internal Audit	Shir S.K Mittal	0135-2712210	9412059045	9568003206

Officer, Dehradun				
Vehicle, Store Incharge	Shri Virendra Kumar	0135-2713814	-	9568003208
R.M (Garhwal), Kotdwar	Shri M.P.S Rawat	01382-224211	9412087351	9568003205

4.2.2 Emergency Contact Details

S. No.	Office	Phone No.
1	Commissioner, Garhwal Division	222563
2	District Magistrate	222250
3	Chief Development Officer	222920
4	District Judge	222596
5	Civil Judge	222525
6	D.I.G., Garhwal Division	222300
7	Sub Divisional Magistrate	222348
8	S.P., Pauri Garhwal	222254
9	S.D.M Pauri	01368 222348
10	S.D.M Srinagar	01346 2511 78
11	S.D.M Satpuli	01386 273685
12	S.D.M Kotdwar	01382 222754
13	S.D.M Lansdowne	01386 262224
14	S.D.M Thalishain	01348 222457
15	S.D.M Yemkeshwar	01382 222754
16	S.D.M Chobattakhal	01386 265370

S. No.	Office	Phone No.
17	S.D.M Dhumakot	01348 222457
18	Police Control Room	222218
19	Chief Medical Officer	222213
20	Nagar Palika, Pauri Garhwal	222237
21	Zila Panchayat	222503
22	District Hospital	222086
23	Garhwal Gas Service	222341
24	Police Station	222218
25	Chief Treasury Officer	222396
26	Regional Tourist Officer	222217
27	Railway Reservation	221500
28	District Education Officer	223495
29	District Election Officer	222217
30	District Information Officer	222283
31	District Panchyat Raj Officer	222454
32	District Development Officer	222420
33	SDO, Telecom (BSNL)	222277,222333
34	Head Post Office	222230
* Pauri STD Code - 01368		

4.3 Disaster Awareness

4.3.1 Public Awareness System

The safety measures to be taken in the event of an emergency shall be made known to the general public who are likely to be affected.

For disclosure of information to the public of the mine site they are briefed about our preparedness and measures taken to face any disaster situation. They are also explained about the Disaster Warning Signals and measures to be taken in case of any disaster in the location and any possible emergency.

On disclosure of the information, particularly during the disaster situation, the Public announcements are being done by Communication Department. To avoid any panic, it is been considered that the necessary announcement will be made for working personnel on-site/off-site of mine lease area and nearby villagers too.

4.3.2 The use of Electronic Media

For bringing the awareness among the external public at large, the use of electronic media like TV, Air & Press coverage is used. The Welfare & Media co-ordinator prepares the Press release to be issued for the local press & other important dailies.

CHAPTER-5: EMERGENCY RESPONSE PROCEDURES

5.1 BACKGROUND

Disaster management committee plays a crucial role during emergency in systematic and proper way. In addition, the implementation of an Emergency Response Plan relies on a number of response functions, which deals with different aspects given as follows-

- Communication and co-ordination
- Medical Services
- Security
- Administration (Logistics and Welfare)
- Co-ordination with external agencies

5.2 EMERGENCY CONTROL CENTRE

The Emergency Control Centre (ECC) is established for emergency operations are directed and co-ordinated. The ECC will be activated as soon as emergency is declared. During emergency all emergency staff will gather in ECC.

The ECC staff is as follows-

- Site Main Controller (SMC)
- Assistant to SMC
- Telephone Attendant
- Messengers
- Key Personnel & Team (Monitoring & Warning Committee Manager, Incident controller & Rescue Team Manager, Relief Team) as per the Disaster Management Committee.

5.2.1 Emergency Control Centre's planning during disaster

The ECC will always be ready for operation and provided with the equipment and supplies necessary during the emergency, which is given as-

- Rescue Tubes & Rescue Cans

- Rescue Ring Buoys
- Dive Bricks & Dive Rings
- Swim Safety Buoys & Pool
- Lifelines
- Spin boards & Head
- Immobilizers
- First Aid Kit

Except all these facility, ECC will have its own lightning facility during emergency.