HAZARD IDENTIFICATION AND RISK ASSESSMENT METHODOLOGY

All types of industries face certain types of hazards which can disrupt normal activities abruptly. Similar river bed mines also have risks which need to be addressed for which a disaster management plan has been formulated with an aim of taking precautionary steps to avert disasters and also take such action after the disaster which limits the damage to a minimum. In the sections below, the identification of various hazards, probable risks during the operational phase of the mining, maximum credible accident analysis and consequence analysis are addressed either qualitatively or quantitatively.

Risk assessments will help mine operators to identify high, medium and low risk levels. This is a requirement of the Occupational Health and Safety Act 2000. Risk assessments will help to prioritize the risks and provide information on the need to safely control the risks. In this way, mine owners and operators will be able to implement safety improvements. Major Risks involved in River Bed Mining are following:

1. River Bed Inundation
2. Soil Erosion
3. Uneven/ Irregular mining of sand.
4. Disturbance of Ground water Level.
5. Damage to River bank due to access of Ramps.
6. River bank collapse due to close proximity of river bed mining.
7. Surface degradation due to road network.
8. Sand storage stacks stability Failure.
9. Failure of Pit slope.

Mitigation measures and Disaster Management Plan:

Possible Risks Due to Inundation & Its Control

Mining will be done during the non monsoon periods so there shall be no problem of inundation is likely to happen. Mining is done by excavating the mineral in 1½ meter slice at a time with a maximum of 2 such slices.

Possible Risks Due to Soil Erosion & Its Control

Mining will be done in accordance with approved mining plan to prevent such consequences. Mining will proceed along the river in the direction from downstream to upstream in each block. No mining will be done across the river nalla.

Possible Risks Due to Uneven/ Irregular mining of sand

Due to uneven/ irregular thickness of the minerals, river bed mining may result in ponds to develop. Proper management of even excavation can overcome this. Mining will be done for ½ meter thick strip at a time in the direction of river, to avoid ponding effect and maintaining the uniform surface.

Disturbance of Ground water Level

Excavation will be carried out up to a maximum depth of 3 meters from surface of sand deposit and not less than one meter from the water level of the River channel whichever is reached earlier.
Mining of Boulder, Gravel and Sand (Minor Mineral) at Rattewali Block/PKL B-10 (Area-45.00 Ha) Village- Rattewali, Tehsil-Barwala, District-Panchkula, Haryana by M/s Tirupati Roadways

Possible Risks Due to Fire & Its Control
The operation does not anticipate any fire disaster (only use excavators that are diesel based engines on-site for boulder gravel and sand collection).

Measures to Prevent Accidents Due to Trucks and Dumpers

- All transportation within the main working should be 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.

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

- Collection of minerals/working shall be started from the center towards the bank periphery in ½ meter slice so that the river course could not get affected.
- The minerals will be mined out in a uniform way so that the river flow/course shall not get disturbed in its uniformity.
- River bank areas, under operation will be protected by avoiding unauthorized gravel excavation along rivers as that may cause instability to the river bank.

Natural Hazards in the Panchkula district

The following are the hazards that have a probability of occurrence in Panchkula, based on the history of their occurrence in the district and their probability:
1. Earthquake
2. Flood
3. Fire/Forest Fire
4. Landslide
5. Accidents
6. Epidemics
7. Industrial/Chemical Hazard
8. Lightening & Cloud Burst
9. Nuclear Attack
10. Terrorist Attack
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Hazard Risk</th>
<th>Name of Hazard</th>
<th>Risky Elements</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| 1       | High Risk Hazards | Earthquake | - Human Life,  
- Cattle life,  
- Transport  
- Houses,  
- Infrastructure  
- Development Activities etc. | The whole district comes under zone IV. District has no any experience of any high intensity of EQ. |
|         |             | Flood | - Agriculture crops  
- Transport  
- Construction Activity  
- Drinking water  
- Cattle & its food  
- Vulnerable groups  
- Electricity  
- Rice Mills  
- Livelihood  
- Trees (Plantation) | The Chaggar River passes through the district with its tributary, Kaushalaya. Kaushalaya Dam is also built on this tributary, quite close to the city habited area. During heavy rainfall, the provision to open gates as per the requirement is there. Low lying areas are prone to water stagnation. |
|         |             | Fire | - Human Life (Physical Vulnerable group)  
- Cattle life  
- Houses & property  
- Crops in fields  
- Malls | Fire incidents are more frequent in the forests of Morni and Pinjore and generally occur during summer season. Fires in the industrial areas, garbage bins, urban areas are also common. |
|         |             | Landslide | - Human Loss  
- Infrastructural damage  
- Vegetation cover | Morni and Kalka have hilly terrain and deforestation due to urbanisation growth rate is increasing the risk. Landslide would take place in hilly region but it would affect the daily lives of people down the hills, in the plain areas of district in terms of transportation and resources accessibility. |
| 2       | Moderate Risk | Road Accidents | - Human Life  
- Transport network | Road accidents are very frequent in the district. Road safety measures at identified spots where road accidents |
### Mining of Boulder, Gravel and Sand (Minor Mineral) at Rattewali Block/PKL B-10 (Area-45.00 Ha)

Village- Rattewali, Tehsil-Barwala, District-Panchkula, Haryana by M/s Tirupati Roadways

#### Hazards

<table>
<thead>
<tr>
<th>Hazards</th>
<th>Further Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cold wave</strong></td>
<td>Cold wave during the winter season and heat wave during summers are seasonal and affect largely to the economically weaker section.</td>
</tr>
<tr>
<td><strong>Heat Wave</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Lightening/Cloud Burst</strong></td>
<td>Lightening can strike to any human or animal in open space. Cloud Burst creates situation of flooding (discussed above)</td>
</tr>
<tr>
<td><strong>Rail Accidents</strong></td>
<td>Rail accident has low probability but preparedness against such disaster is important to consider, as once it happens, damage would be huge.</td>
</tr>
<tr>
<td><strong>Industrial/Chemical Disaster</strong></td>
<td>Industrial area is located in the Panchkula city area. So, preparedness against such disaster is important to consider due to the vicinity around Phase-I &amp; II.</td>
</tr>
<tr>
<td><strong>Terrorist Attack</strong></td>
<td>Terrorist attacks are a rare phenomena. But they can strike at important buildings to the government and crowded places. Not only the lives and property damage is caused by terrorist attacks but Psychological Trauma and Depression engravens the victims and relatives that becomes a big challenge to deal with and bring the state back to normalcy.</td>
</tr>
</tbody>
</table>

**EARTHQUAKE**

Earthquake Panchkula lies in Seismic Zone IV. This means only one-step less from the highest degree of vulnerability. An earthquake strikes suddenly, without an early warning and may cause huge building or infrastructural damage leading to human or personal loss. Therefore, preventive measures for ensuring safety of buildings, structures, communication facilities, water supply lines, electricity and life are of utmost priority.

**FLOODS**

Floods have been a recurrent phenomenon in Haryana from time immemorial. Many part of the state of Haryana are prone to flooding. The devastating floods hit Haryana many times. In 1977, 1978, 1980,
Mining of Boulder, Gravel and Sand (Minor Mineral) at Rattewali Block/PKL B-10 (Area-45.00 Ha)
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1983, 1988, 1993 and 1995, 1996 floods occurred in Haryana. Floods have been causing extensive damage not only to standing crops but also loss of lives and cattle. The floods in Haryana can occur because of some natural reasons such as its physiographic situation which makes a depressional saucer shape zone around the Delhi-Rohtak-Hisar-Sirsa axis and it has a poor natural drainage system and sometimes the heavy precipitation becomes a major contributing factor in causing flood as such in case of Rohtak flood, 1995. The state receives an average rainfall of about 650 mm. In flood manual of Haryana, there are 102 vulnerable points in Haryana which need special attention during monsoon.

History of Flood in Panchkula
History of Flood in dist. Panchkula has already been given in Chapter-2.

Landslide
Morni block and the Kalka Sub-division are the only two hilly regions in entire Haryana. Morni counts as the only hill station that Haryana has. The topography of northern Panchkula is sub-mountainous with steep natural slope and the rivers originating from the hills passes downstream. This causes the soil to run off which is a big cause for landslides in hilly areas that are in close proximity to river flow.

Occupational Health and Safety in River Bed Mining
Occupational health and safety (OHS) is a cross disciplinary area concerned with protecting the safety, health and welfare of people engaged in work or employment. DGFASLI (Directorate General Factory Advice and Labour Institutes) working under the Ministry of Labor provides assistance to the State enforcing agencies, training and educating them in the field of occupational health and safety in the industries.

A. Occupational Health

Pre Placement and Periodical Health Status
- Pre /post-employment checkup will be carried out and following test will be conducted:
  - Hematological Test
  - Biochemical Test
  - Urine
  - E CG
  - Spirometer
  - Audiometry Color Vision
  - Health Review System
  - Medical Fitness From FMO
- Medical Record of Each Employee will be maintained and updated with finding

B. Frequency of Medical Examination
- For Mines Employee= Once in three Years
- For Technical and non-Technical=Once in 6 Months

C. Personal Protective Devices and Measures
- Mask for prevention of dust
- Ear Muff
- Safety Helmets
- Safety Belts
- Leather Hand Gloves
- Safety Shoes/Gum boots

D. Anticipated Occupational & Safety Hazards
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- Musculoskeletal disorder
- Noise Induced Hearing Losses
- The Health impact due to diesel particulates from emission of diesel operated vehicles and equipment
- Physical Activity
- Silicosis due to sand/Bajri mining
- Dehydration
- Skin Disorder
- Dust Exposure

The Occupational Health Surveillance Program:
A team of qualified doctors and nurses will visit periodically for health check up of all the workers, team and its record will be maintained properly.

Impact on Human Health
This project will have an impact on the human health due to Boulder, Gravel and Sand, increased dust, creation of breeding grounds for disease vectors, population influx which might introduce new diseases in the area, and inadequate sanitation facilities may result in severe health Impact.

Implementation of Occupational Health and Safety Measures
Occupational Health & Safety measures result in improving the conditions under which workers are employed and work. It improves not only their physical efficiency, but also provides protection to their life and limb. Management will consider the following safety measures:
- Safety clauses in contract order
- Dedicated safety team
- Inspection and maintenance of equipment’s and accessories
- Pre placement and periodic health check up
- Removal of unsafe conditions and prevention of unsafe acts
- Detailed analysis of each and every incident
- To provide standard PPEs and ensure its uses for mining safety
- Periodic inspection by internal and external safety experts
- Celebrations of various safety events for awareness
- Medical facilities & first aid boxes will be established in the mine premises.
- Health Awareness Programs and camps will be organized
- The mine workers will be provided all necessary PPE, especially dust masks for their safeguard from dust, Ear Plugs/Ear Muffs for noise, boots etc. and measures for other hazards.
- Under initial vocational training, the workers will be given training related to all safety and health aspects.

Conclusion
River Bed Mining does not involve a hazardous process with no risk related to Fire and Explosion. HIRA shows no major Impact and can be mitigated with proper maintenance and use of PPE to avoid likely accidental scenario.