BIHAR STATE TOURISM DEVLOPMENT CORPORATION LIMITED

DEPARTMENT OF TOURISM, GOVERNMENT OF BIHAR

PASSENGER ROPEWAY AT MUNDESHWARI HILLS, KAIMUR DISTRICT, BIHAR

EXECUTIVE SUMMARY

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RITES
THE INFRASTRUCTURE PEOPLE

Urban Transport Division
RITES Bhawan-1
Sector-29, Gurugram-122001

EXECUTIVE SUMMARY

0.1 INTRODUCTION

Bihar is one of the oldest inhabited places in the world with a history of more than 3000 years. Bihar is home to many tourist attractions as well as to pilgrimage destinations like Gaya, Patnasahib, which are recognized as the most sacred places of worship for various religions including Hinduism, Buddhism, Jainism, Sikh and Islam. Bihar is visited by large numbers of tourists from all over the world with an annual footfall of more than 6 million. Of the numerous destinations Bihar has to offer, Mundeshwari Temple in the Kaimur District of Bihar are revered by the Hindu devotees and are visited throughout the year.

This temple is an ancient temple dedicated to the worship of Lord Shiva and Shakti. It is believed that rituals and worship have been performed here without a break; hence Mundeshwari Temple is considered one of the most ancient functional temples in the world.

The inscription made on this temple is of middle of 389 AD indicating its ancestry. The stone carvings of the Mundeshwari Bhavani temple are of Gupta period. It is an octagonal temple made of stone. In the Eastern section of this temple, the grand and ancient idol of the goddess Mundeshwari is the center of the main attraction. The mother is in the form of Vaarahi, whose vehicle is Mahish. There are four entrances to the temple, in which one has been closed and one half open. Panchmukhi Shivaling is installed in the central part of this temple. This Panchmukhi Shivling has been constructed with a special stone which changes its color along with the position of the sun and stone. The statue of Vishal Nandi on the west side of the main entrance. The uniqueness of this temple is in animal (goat) sacrifice. Here the goat is sacrificed but it is not slaughtered. The worship of Shakti in the form of Devi Mundeshwari in the temple is also indicative of tantric cult of worship, which is practiced in Eastern India. Mundeshwari Devi is believed to be Mahishasur Mardini, the slayer of the demon Mahishasur, who took the form of a buffalo.

Bihar State Tourism Development Corporation (BSTDC) was established in the year 1980 for the development of tourism in the state of Bihar and for commercialization of tourist resources available within the State. In this context, and to further attract tourism, BSTDC has decided to implement ropeway systems at 6 identified locations. Out of these six, a passenger ropeway system near the Mundeshhwari Hills , Kaimur District of Bihar to facilitate the devotees of Mundeshwari Devi Temple.

RITES Ltd. (A Government of India Enterprise) is appointed by Bihar State Tourism Development Corporation (BSTDC) as consultant, for the preparation of Environmental Impact Assessment (EIA) study for the proposed Ropeway systems. An EIA study has been taken up as per the approved Terms of Reference (TOR) issued by Expert Appraisal Committee (EAC) of Ministry of Environment, Forest and Climate Change (MoEF & CC) for Environmental Clearance of the project vide File No. 10-59/2020-IA-III Dated 19th Febuary 2021 for preparation of EIA/EMP for this project.

The EIA study has been carried out as per the MoEF&CC guidelines and Environmental Protection Act 1986. The study is conducted following other acts and rules related water, air, noise, forest, wildlife, construction and solid waste and R & R act. EIA guidance manual for ropeway manual and Appendix-III of the EIA notification is followed during preparation of EIA report. Ministry of Environment, Forest and Climate Change (MoEF&CC) is the nodal agency in the administrative structure of the Central Government for planning, promotions, co-ordination and overseeing the implementation of India's environmental and forestry policies and programs.

Approach and Methodology: The basic concept is to ascertain the existing baseline conditions and assess the impacts as a result of construction and operation of the project. The changes likely to occur in different components of the environment viz. physical, biological/ecological, and socio-economic etc. have been studied, analyzed and quantified, wherever possible. The accurate analysis of assessment depends upon the reliable data generated/available on environmental attributes. The impacts are assessed for various phases of project cycle namely, Impacts due to project location, project construction, and project operation. The cost of management and monitoring programs are estimated on the basis of mitigation measures suggested for negative impacts and environmental monitoring programme during project construction and operation.

0.2 PROJECT DESCRIPTION

Proposed project is the development of the passenger ropeway system to reach the Mundeshwari temple located in Kaimur District of Bihar. As the project site is located in the Kaimur Wildlife Sanctuary. Hence, it attracts the general condition of EIA notification 2006. As per EIA notification, 2006 and its amendments all "Aerial Ropeway" project located at altitude of 1,000 m above or located in notified ecological sensitive areas are designated as 7(g) Category "A" project and require to obtain prior environmental clearance from Ministry of Environment Forest and Climate change (MoEFCC).

Location and Connectivity: The proposed project site for the development of Ropeway is located at the Mouza Pauran Thana No. 909, Khata No. 97, Khesara No 239 of Pauran village of Kaimur District of Bihar.

Lower terminal point of the ropeway is located at place opposite to the Rest House of Tourism at Base of Mundeshwari Hills. Coordinates of the LTP is $24^0$58'58.95"N $83^0$34'11.1"E. Upper terminal point is located on South Western side to Mundeshwari Temple situated at top of Mundeshwari Hill. This area is approximately situated at a distance of 100 m from the temple premises. Mundeshwari Dham Road connect the Lower Terminal Point of the ropeway. Nearest Railway station is Bhabhua road which is approx. 22km (Aerial Distance). Nearest Airport is Lal Bahadur Shastri (Babatpur) Airport, at about 109 km (aerial distance).

The project envisages construction of buildings at lower and upper terminals and construction of foundation at ropeway towers. Buildings provide basic infrastructure i.e. boarding/de-boarding of passengers, ticket counters, toilets, security, power supply etc.

Need and Justification:

- The pilgrims at Mundeshwari Dham arrive at base of Mundeshwari Hill from Bhabhua, Mohania, Rohtas and other nearby districts of Bihar. The pilgrims also come from Benaras, Chandauli, Mirzapur and other nearby districts of Uttar Pradesh and nearby districts of Madhya Pradesh etc. The temple, situated at Mundeshwari Hill top and at a height of 258 meters above sea level. There is an old path of about 1 km distance with 551 steps, which starts right at the foothills, and goes all the way to top of Mundeshwari Hill for Mundeshwari Devi Temple.
- Ropeway will save the time and arduous journey of the tourist.

Ropeway System: The ropeway system would be Mono Cable Pulsated System which is selected based on Length, capacity and feasibility of the system. The design capacity of ropeway is estimated as 500 PPH. Salient features in brief are as under:

S. No.	Parameters	Description
1.	System	Mono Cable Pulsated System
2.	Lower Terminal Point	A place opposite Rest House of Tourism at base of Mundeshwari Hill
3.	Upper Terminal Point (UTP)	A place near North Western side of Mundeshwari Temple
4.	Alignment	Straight
5.	Length , m	400
6.	Elevation Difference, m	147
7.	Slope length, m	425
8.	Ropeway Capacity, PPH	500
9.	Line speed, m/sec.	0 to 3
10.	Cabin capacity, passenger	4
11.	Type of Cabin	Fully enclosed type with ventilation, manual operated door.
12.	Nos. of cabin	16
13.	Journey Time, sec	224 (approximately 4 Minutes)
14.	Haulage rope	34 mm dia, 6X19 (s), Construction, PP core, Tensile Designation 1770 N/mm^2
15.	Location of Drive gears	UTP
16.	Main drive motor	50 KW. AC. Variable speed, (0 – 1500 r.p.m.)
17.	Location of Tension gears	LTP
18.	Stand by D.G. set	100 kVA and 25 kVA

Control System: Communication system should be available at all the terminal stations and should be interlinked. For this reason, 2.5 sq mm, multi pair armored weatherproof

communication cable as per IS: 8130/84 is required. The wireless system will be provided to communicate while maintenance / rescue operation on line and for other reasons, when communication through telephone system will not be possible.

Manpower requirement: 25 numbers during construction and 21 numbers during operation.

Construction Schedule and project Cost: The proposed passenger ropeway system is expected to be completed in a period of 18 months with an estimated cost of Rs. 7.46 Crores only.

0.3 ENVIRONMENTAL BASELINE DATA DESCRIPTION OF ENVIRONMENT

Description of existing environment conditions for the proposed project facilities in and around the project sites. RITES have carried out field studies to generate primary data on soil, water, air, meteorology and noise quality at the project site. Field study is also carried out for assessing the ecological status in the study area. Additional data, wherever necessary, is collected from various reports, literatures, books and maps, and through discussions with various stakeholders. The project study area is within 500 m radius from the project boundary as per EIA Guidance Manual, however 10 km radius of the study area is considered for the proposed ropeway to collect primary and secondary data and 15 km area is considered for the Eco sensitive features around the project area. The primary data collection was carried out in the months of April-2021 to July-2021.

Physiography: Bhabua district is bounded in the North by Buxar of Bihar and Gazzipur District of Uttar Pradesh, in south by Garhwa District of Jharakhand state in the east by Rohtas District of Bihar and in the west by Chandauli and Mirzapur district of Uttar Pradesh. It is 182 Km away from Capital City Patna and about 65 km from Varanasi in UP. The present district of Kaimur comprises of the whole area of Bhabua subdivision of the old Shahabad district. Kamiur district comprises of Hilly and plain area. The Karmanasha River and the Durgawati River flank the plain area on the western side. Kudra River lies on its eastern side. The river Sone is flowing from the west towards the east. Kaimur district and has an undulating topography, with highly uneven slope. Located at an elevation of about 86 metres from the sea level. The general elevation of the flat terrain with respect to mean sea level is 80-135m and at plateau in the southeren part with elevation upto 500m. The Elevation map of the study area shows that most of the study area is a flat terrain having a general elevation of 70 m. Southeren sides there are a hilly terrain where maximum elevation level is approx. 426m.

Geology: District is mainely divided into two major divisions; the flat alluvial plain in the northern part with general elevation varying from 80 to 135 m amsl and the Bhabua Plateau in the southern part with elevation upto 500m. Local geology is dominated by the sediments of lower gangetic alluvium plain and occasionaily occurence of dedudational hills of the vidhyan sandstones and fernrginous shales.

Soil: The soils of the northern part of the district are mainly derived from the older alluvium. These soils are greyish yellow in colour to light grey, heavily textured and are neutral to slightly alkaline. This kind of soil is fertile. A mixture of gravel, stones and soil are present on the exact location of LTP. Soil in nearby areas of LTP is fertile. No soil was observed adjacent to UTP except some fine and coarse stones and farming activity of paddy was seen 2-3 kms. away from UTP.

Land use pattern: The Agricultural land covers the majority of the land which is about 60.61% of the study area. The project site lies in the forest area, the second highest pattern of the landuse covering about 17.49% of the total land.

Seismicity: Project site lies in the Seismic Zone III indicating Moderate damage risk zone as per the IS: 1893-2002 (BIS, 2002) and corresponds to MSK intensity VII.

Water Environment: The state of Bihar is endowed with abundant surface and groundwater resources, enough to meet the growing demands of different sectors such as agriculture, industry, household, and environment. Bhabua District is rich in water resources like Ground water, Surface Water. All block of the Bhabua District are under safe category. The alluvial area in the district bears good groundwater potential down to depth of around 150 m bgl, with discharge varying between 100 and 200 m^3 /hr. District is drained by the two rivers i.e. Karamnasa river (Western part) and the eastern part by the Durgawati river. Near the project site there is an existing tube well. Sura River is flowing 4 km away from the project site. This is the main source for irrigation in the region.

In order to assess the baseline water quality status of the study area, 3 water samples are collected from the project site and its surroundings. The results of water analysis are compared with IS: 10500-2012 Drinking Water Standards and CPCB standards for water quality. The ground water quality of the area is having the high TDS, Alkalinity, and Hardness. Due to high concentration people unaccustomed to water may experience gastrointestinal irritation from drinking the water. It can also affect the taste of the water making drinks like coffee taste bitter.

Meteorology and Air Environment: The climate of the district is sub-tropical monsoonic, characterized by hot summer, high humidity and dry winter. January is the coldest month when temperature reach up to 4°C. May is the hottest month of the year when temperature touches about 45°C. Generally temperature rises in the month of March and reach highest during the month of May. The district gets easterly wind from June to September, whereas westerly wind blows from October till May. The onsite average wind speed was observed 2.70 m s-1 with frequency of calm winds 12.41% during the study period.

The atmospheric concentrations of air pollutants are monitored at 3 locations for parameters $PM_{2.5}$, PM_{10}, SO_2 , NO_2 , CO under ambient air quality monitoring (AAQM). The results obtained are analysed and compared with ambient air quality standards of Central Pollution Control Board (CPCB) and is found the results within the standards. The pollutant

level near to AAQ1 (**MAA MUNDESHWARI FOREST OFFICE**) and AAQ2 (**NIMIATANTR VILLAGE**)are within the permissible limit as the area is near to the forest. While at AAQ3 (**BHAGVAN PUR GOVT BLOCK OFFICE**) location PM_{10} and $PM_{2.5}$ is high due to the vehicular movement. The proposed ropeway site is not fall under any critically polluted areas notified by Central Pollution Control Board.

Noise Environment: The impact of noise can lead to effects such as noise induced hearing loss and annoyance depending upon the loudness of noise level. Noise level survey is conducted at the project area with an objective to establish the baseline noise levels and assess the impacts of the noise expected due to the proposed development. Noise level survey is conducted at 3 locations. The noise levels were compared with the Ambient Air Quality Standard in respect of noise. NQ1 lies in the silence zone while NQ2 and NQ3 are lies in the residential and commercial zone respectively. Results are compared with the relevant standards that reveal the noise levels are with in the permissible limit.

Ecological Environment

Ecology: Primary data was collected through field survey along the alignment. Secondary data was collected within 15 km radial distance around the project. The secondary data collected from Divisional forest office (Kaimur), Bhabhua.

Flora: 183 trees are located in the project Right of way (RoW) and terminal stations. No Rare, Endangered, Endemic & Threatened species of flora found in the project area.

Fauna: Fauna were studied through primary survey along the alignment & terminal locations duly supplemented by secondary data to cover study area of radius 15 km around the alignment. Altogether 10 Mammals, 3 Reptiles & 277 species of birds were recorded during present study. The plant-animal (birds) interaction was recorded on agro-ecosystem& forest ecosystem. House sparrow, crow, Spotted dove, swift, Pigeon, Robin and common kingfisher were observed near UTP&LTP.

Ecological Sensitive Area within 15km: Ecological sensitive area within 15 km of alignment is Kaimur wildlife sanctuary and it's ESZ.

Socio-Economic Environment:

The demographic, socio-economic conditions of district and project site with area of influence, methodology, social impacts, mitigation measures, quality of life, benefits of the project and major findings of public consultation and stakeholder consultation are discussed in this chapter. The secondary data was collected from census 2011 and other related documents as part of pre-survey activities. The primary data includes recording of village profile, public consultation and stakeholder consultation at village level. During survey it is reported that no private land, structures, community properties and families will be affected due to the construction of the proposed aerial ropeway project. However, there is no scope for Rehabilitation and Resettlement of families for the proposed project.

0.4 IMPACT ASSESSMENT AND MITIGATION MEASURES

The impacts on the various environmental components have been assessed during various phase of the project cycle namely due to the location, project design, possible accident, construction and operation.

IMPACT DUE TO POSSIBLE ACCIDENTS

Landslide: The area where ropeway is proposed is having minimum prone to landslides. Hence, there is no such impact is anticipated.

Earthquake: Project site is located in the seismic zone III as classified in IS: 1893:2002 which indicates the project area comes under the moderate damage risk zone.

Wind & Cyclone: The project area falls under a zone where moderate wind & cyclone are observed. During storm or cyclone passengers inside cable cars will experience horizontal movement of the connection between the track cable and the gondola.

Cloud Burst: Chances of cloud burst impact will not anticipated as no dams are located in this region.

Fire Explosion: The Fire & explosion can cause suffocation due to harmful gases generation & panic in the minds of people that will lead to stamped at lower & upper terminal.

Electrical: The ropeway will run on electricity & hence electrical current can pass through cable cars & wires due to inadequate insulation or accidently.

IMPACT DUE TO PROJECT DESIGN

As the ropeway consists of cable cars, rope, big and heavy machineries, mechanical hazards can cause risks to people working in the area during construction phase & people who will travel through the ropeway in operation phase. Mechanical hazards are like drive/ return sheave shaft failure/ tension system failure, mount assembly parts failure, rollback, slippage/ fall of cabin, entanglement of cabin, swinging of cabin resulting in fall of passengers outside cabin, cabin derailment at station/ broken wires in service/ over speeding of ropeway, brake failure etc. may occur.

IMPACT DURING CONSTRUCTION PHASE

Impacts on Topography, Drainage: Development of stations and intermediate towers will change the topography and drainage of the area.

Impact on Soil: The excavation activity involved for foundation of building and tower will cause erosion of base soil & generation of excavated soil. Soil will be contaminated by oil spillage, digging and construction work. Construction work could lead to stockpiling on site which will lead to soil contamination during windy days & rainy days.

Impact on Landuse: Change of landuse is expected due to the use of forest land for non forest purposes.

Impact on Water Environment: Increase of suspended solids concentration into the water will cause the undesirable taste to the water. Reduction of the photosynthesis process and increase of the water temperature by absorbing solar radiation may threaten the proper development of aquatic plants and lead to the eutrophication of the reservoir. Improper management of wastewater will cause the diseases shigellosis, typhoid fever, salmonella, and cholera. Depletion of water resources.

Impact due to Solid Waste: Improper management of construction waste can cause the inconvenience on roads, choking surface drains, disrupting traffic. Labour camp at the site may lead to sanitation problems in the absence of adequate facilities. Hazardous waste mismanagement ultimately leads major impact on the health and contaminates the water, soil and air environment.

Impact Due To Influx Of People And Associated Developments:

The development of Ropeway will not distrurb the existing environment but will facilitate and provide an easy and fast access to the Temple.

Ambient Air Quality: SPM is expected to be the main pollutant associated with on-site roads (paved and unpaved), stockpiles and material handling.

Ambient Noise Quality: The project is expected to have large scale construction activities. Sources of noise emissions are expected from various construction equipments. Thus, based on the modelling results it can be concluded that all sensitive receptors (i.e. labour colonies) should be located beyond 125 meters from the noise generating source location during construction activities.

Vibration: Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations which spread through the ground and diminish in strength with distance.

Avoid impact pile driving where possible in vibration-sensitive areas. Drilled piles or use of a sonic or vibratory pile driver causes lower vibration levels where levels where geological conditions permit their use.

IMPACT ON BIOLOGICAL ENVIRONMENT

Impact due to Project Construction

Birds: No migratory birds observed during field survey and No migratory birds are recorded by forest department within 15 km radial distance from the proposed project site. There is a

possibility that some groups of resident birds avoid the alignment area and move to other areas.

Mammals: No schedule I or REET species were observed along proposed alignment but Four Horned Antelope, Leopard, Python and Peacock are found within 15km radial distance from the project site. There may be some mortality of small, common species during construction. Many species will move away from the areas of disturbance, returning after habitat re-instatement.

Impact due to Project Operation

Impact on birds: Generation of noise due to movement of ropeway will likely affect resident birds; some birds may be attracted towards Ropeway for food.

SOCIOECONOMIC IMPACTS

BSTDC has planned to construct an Aerial Ropeway Project in Maa Mundeshwari hills. Under the scope of SIA study, the demographic, socio-economic conditions of district and project site with area of influence, methodology, social impacts, mitigation measures, quality of life, benefits of the project and major findings of public consultation and stakeholder consultation are discussed in this chapter. The secondary data was collected from district census 2011 and other related documents as part of pre-survey activities. The primary data includes recording of village profile, public consultation and stakeholder consultation at village level. The field survey took place on 1st July, 2021.During survey it is reported that no private land, structures, community properties and families will be affected due to construction of the proposed aerial ropeway project. However, there is no scope for Rehabilitation and Resettlement of families for the proposed project.

0.5 ANALYSIS OF ALTERNATIVES

Two alternative alignments have been studied for the selection of ropeway alignment.

Alignment 1

Between a place near Rest House of Tourism Department, Government of Bihar at foothill of Mundeshwari Hill and a place on South Western side of Mundeshwari Temple at top of Mundeshwari Hill.

Alignment 2

Between a place near Entry of Staircase on Southern side of Rest House of Tourism Department, Government of Bihar at foothill of Mundeshwari Hill and a place on South Western side of Mundeshwari Temple at top of Mundeshwari Hill.

Alignment 2 crosses staircase and the area marked for Lower Terminal Point belongs to Forest Department as well some part of land belong to Bihar Government. So, for Land acquisition all issues between two departments need to be chased. Further nearby LTP area, one Electric Substation.

After considering the above, recommended alignment i.e. Alignment 1 was chosen

Technology Alternatives: Monocable pulsed Gondola system is recommended for this ropeway.

0.6 ENVIRONMENTAL MONITORING PLAN

Water Quality: The project authorities shall establish a procedure for water quality surveillance and ensure safe water for the consumers. Considering the surface and perennial drains near to the site 5 monitoring locations for surface water and 4 locations for ground water are selected for the purpose of assessing the measure implementations. Water monitoring should be carried out at Four times in a year (Pre monsoon Once in a year for 25 parameters) and Post monsoon 3 times (10 Parameter). The cost for water quality monitoring is estimated of **Rs. 2.6Lakh.**

Air and Noise Quality: To assess the effectiveness of air and noise pollution control, ambient air quality and noise levels shall be monitored during the construction and for at least one year after the completion of the project. The Parameters to be monitored for air quality are PM10, PM2.5, SO2, CO, and NOx. The frequency of air quality monitoring will be Once in Month for Three Season in a Year. Four Monitoring locations are selected for assessing the noise quality of the area. As part of the environmental management, equipment brought on site for construction purposes is checked to determine whether it meets noise generation guidelines. The frequency and duration for noise quality monitoring is same as air. The cost for air and noise quality monitoring is estimated of **Rs. 8.25 Lakh.**

Soil Quality: Soil near to the construction area shall be monitored to ascertain presence of soil pollution due to construction activities. Soil will be monitored near to the Labour camp, Nearest village, UTP. The cost for soil quality monitoring is estimated of **Rs. 0.60Lakh.**

Ecological monitoring for construction phase: The avifauna and mammals monitoring is consider for 3 seasons in a year for 1.5 years (18 Months). The monitoring will be done Near UTP; LTP and Jagadawa lake .The estimated environmental monitoring cost during construction phase is Rs 5.56 Lakh.

Ecological monitoring for operation phase: The avifauna and mammals monitoring is consider for 3 seasons in a year for 3 years. The monitoring will be done Near UTP, LTP and Jagadawa Lake. The estimated environmental monitoring cost during operation phase is Rs 7.59 Lakh.

Establishment of Environmental Cell: The project authority shall establish an Environmental cell in the initial stage of the project. The division shall have one Environmental Engineer/Officer. The task of the environmental Engineer/Officer shall be to supervise and co-ordinate environmental concerns, monitoring and implementation of mitigation measures. The officer will monitor the environmental works in coordination with the Project Head. Cost of such a division has been estimated as **Rs. 37.07 Lakh**.

Environmental Cost: The environmental costs towards environmental monitoring during construction and operation of the proposed project is estimated of **Rs. 24.6 Lakh.**

0.7 ADDITIONAL STUDIES

One public consultation was conducted Mundeshwari Dham and three stakeholder consultations were conducted with the Mukhiyas at Ramgarh, Mather and Umpaur village. Consultations were organized by RITES study team through community meeting at Mundeshwari Dham and individual meetings were held in three different villages in PIA. During consultation issues like project awareness, increase in devotees, tourists and income, employment opportunity, early project construction, travel cost, regional development, tourism, promotion of livelihood and business, boost in economy, benefit of vulnerable group, saving of time etc were discussed. The social field work took place on 1st July, 2021. About 30 respondents have participated in public consultation. The state government's COVID-19 guidelines, social distancing measures were taken care throughout the social survey.

Risk assessments include detailed quantitative and qualitative understanding of risk, its physical, social, economic and environmental factors and consequences. Risk assessment encompasses the systematic use of available information to determine the likelihood of certain events occurring and the magnitude of their possible consequences. The causes of risk may be:
Cable slipped out of the rails at the tower from the upper station can cause the carriages to be knocked off. The accident took place due to negligence.

Cabin lost its hold with the cable and collided with the one cabin of ropeway car and hit another on the way, Hill collapsed midway and trolleys were dangling in the air. Snapping of Rope wire, Power system failure, Collision with entering station: operator failed to slow the vehicle down upon entering the station it causes collision of the ropeway car at the entering station. Holding capacity of soil/Geological aspects, flood, soil erosion and seismicity are also considered during identification of risk.

OPERATION AND MAINTENANCE: A systematic routine maintenance and inspection schedule, based on maintenance and inspection plan, which shall be specified by the designer, shall be developed and set down in writing by the manufacturer of the passenger ropeway. The schedule shall include the specification of lubricant and frequency of lubrication of each element involving moving parts. It shall stipulate that parts showing excessive wear shall be replaced immediately. Condemning limits or tolerances shall be defined. It shall include a schedule for checking and tightening all bolts, especially on rope attachments. Where appropriate for any passenger ropeway, suitable records of the rates of deterioration (such as corrosion, erosion, etc.) shall be maintained. During a periodic inspection, a Safety Officer may inspect towers, sheave assemblies, brakes and braking

functions, and the operation of main drives, auxiliary drives, and evacuation drives where applicable.

SAFETY MANAGEMENT PLANS: Under a safety management plan, the licensed contractor will be required, as per terms and condition of licensing, to submit the names of the people and their corresponding qualifications that will provide service and maintain the installed passenger ropeway equipment. Contractors will need to have this safety management plan in place at each area where passenger ropeways or passenger conveyors are operating.

ELECTRICAL PROTECTION: All overhead electrical power transmission wiring shall be so protected that, in case of collapse or breakage of the power line, it will not come into contact with chairs, cars, cables, or passengers.

DISASTER MANAGEMENT PLAN

The main aim of the disaster management plan is safety of the passenger, quick response to accident and treatment to casualties, evacuation of passengers to safe area, bring the disaster under control within short time and investigation of accident and prepare prevention plan.

Preventive Action: Once the likelihood of a disaster is suspected, action has to be initiated to prevent a failure. Manager responsible for preventive action should identify sources of repair equipment's, materials, labour and expertise for use during emergency.

Emergency Action Committee: To ensure co-ordination action, an Emergency Action Committee should be constituted. The civic administrator may be the Chairman of this Committee.

Emergency Measure: The emergency measures are adopted to avoid any failure in the system. The aim of Emergency Action Plan is to identify areas, population and structures likely to be affected due to a catastrophic event of accident. The action plan should also include preventive action, notification, warning procedures and co-ordination among various relief authorities.

Rescue Operation: Aerial ropeways shall be equipped with adequate and sufficient facilities which shall be readily available to clear the line of passengers and return them within a reasonable time to a terminal, or location, where access for emergency services is available. Sufficient numbers of trained persons for carrying out the rescue operation (the rescue crew) shall be on duty when the aerial ropeway is in operation.

On-site Disaster Management Plan: This plan includes assignment of duties and responsibility to officers, communication mechanism, cabin evacuation plan etc. Important contact numbers are displayed at prominent places and instructions regarding safety measures are communicated to the tourists.

Off-site Disaster Management Plan: Disasters happens all of a sudden like earthquake, flash flood, snow avalanche, landslide etc. In such a situation, an off site emergency disaster management plan is required for rescue operation which includes shifting of passengers to a safer place and providing medical facilities etc.

0.8 PROJECT BENEFITS

The proposed passenger ropeway is envisaged to boost up the better connectivity for the enhancement of tourism potential. This project will add up the new infrastructure to the area facilitating the local people as well as tourist visiting the Temple. This project will improve the basic facilities and resources of the villagers, better connectivity, employment opportunity, increase livelihood opportunities, increase tourism potential, control the labour migration. Being the eco-friendly mode of transport, carbon credit benefit is anticipated.

0.9 COST BENEFIT ANALYSIS

It is expected by the development of new ropeway will give economic return to the state. By encouraging more tourists throughout the India, it is belief it will increase the demand for local industries especially in hotel and resorts, restaurants. The project has IRR of 22.63%. This level of return may be just sufficient to get nullify the same.

0.10 ENVIRONMENTAL MANAGEMENT PLAN

The environmental management plan spells out the set of measures to be undertaken during project construction and operation to mitigate or reduce the adverse environmental impacts and bring them to acceptable levels based on the proposed Environmental Management Plans. The most reliable way to ensure the implementation of EMP is that these plans are integrated into the overall project planning and implementation to make them as an integral component of the project. Environment management plan during construction and operation phase of the project is as follows and the cost of the Environmental management plan is Rs 128.08 Lakhs.

Ecology & Biodiversity Management

Compensatory Afforestation: About 183 trees are likely to be affected (All 183 trees are likely to be Trimmed/transplanted) due to construction of proposed project. Estimated cost of planting new trees, their maintenance & transplantation will be paid as per Stage-I Forest clearance.

Net Present Value (NPV): The net present value of the 1.309 Ha of forest land diverted comes the Subclass open dry deciduous forest. Estimated cost is about (Rs 11.91 Lakh) for wildlife conservation.

CAMPA Fund: The proposed project is located in kaimur wildlife sanctuary. Compensatory Afforestation Fund Management and Planning Authority (CAMPA) are meant to promote afforestation and regeneration activities as a way of compensating for forest land diverted to non-forest uses. Estimated cost diverted for CAMPA fund will be paid as per Stage-I Forest clearance.

Conservation plan for wildlife: wildlife conservation plan for the Schedule –I & Schedule –II is prepared based on the baseline study conducted for the proposed ropeway. The baseline data includes both primary and secondary data. The primary data was collected consultation with forest and wildlife officials during field survey. The secondary data was collected from working plan of Bhabua division supplemented by IBA (Important Bird and Biodiversity Areas). An amount of Rs 20 Lakhs is estimated for conservation of wildlife.
The NPV component is about (Rs 11.91 Lakh) to be deposited with CAMPA fund should be utilized for wildlife conservation purposes in Kaimur Range of Kaimur wildlife sanctuary preferably in the sanctuary area surrounding the ropeway.

Cost of ecological studies: Estimated cost for ecological studies will be estimated is about Rs 31.91Lakhs.

Waste Water Management and Water Conservation: The waste generated during construction and operation is 1.2 KLD and 10.36 KLD respectively. This waste water will managed through Mobile toilets during the construction phase and during operation Biodigester has been proposed. Rain water harvesting system has been proposed to cater the daily demand of the station. A storage tank of 5,000L has been proposed at each terminal.

Energy Conservation Measures: Project area gets the sufficient sunlight during whole of the year. To reduce the power load at each station roof top Solar PV of 15 Kw of system has been proposed. This will generate 47,882 Kwh annually. Solar Roof PV will connect with the grid. BEE star rated DG sets shall be used in all compliant buildings (minimum 3-5 stars rating).

Construction Material Management: The construction material storage site is to be regularly inspected for the presence of uncontrolled construction waste and to set up procedures for mitigating the impacts. The scheduling of material procurement and transport shall be linked with construction schedule of the project.

Borrow area Management: No requirement of borrow area is anticipated for the project.

Air Pollution & Dust Control Measures: Provisions for sprinkling of water may be requirement to control the dust pollution. Idling of delivery trucks will be prevented and material will be transported in covered truck. Low emission construction equipment and machinery will be used. Loose earth will not be left exposed. Good quality fuel, adequate stack height and periodic maintenance are requirement to control the air pollution. Road should be properly maintained to prevent dust pollution.

Noise Control Measures: Construct noise barriers, such as temporary walls or piles of excavated materials between noisy activities and noise-sensitive receivers**.**

Oil Spill control/Management: To control the oil spill from equipment and machinery routine inspections/ckeck up is mandated and good house keeping will be provided. Temporary cement/metal platform will be provided below the construction machineries at maintenance site to capture the spill and the platforms should be at sufficient height to avoid the littering.

First Aid Health System: All necessary first aid and medical facilities will be provided to the workers.

Training: The training programmes should be extended to the workers for their active participation in the project implementation especially following the guidelines for safety, measures of disaster prevention, action required in case of emergency, fire protection, environmental risk etc. The cost of training is kept as **Rs 2.5 Lakhs**.

Soil Erosion Control: Construction will be avoided in monsoon. The excavated soil will be stabilized immediately after the excavation or debris should be sent to disposal site as the earliest to make the site clean and to prevent soil erosion.

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