# UTTARAKHAND METRO RAIL, URBAN INFRASTRUCTURE & BUILDINGS CONSTRUCTION CORPORATION LIMITED

# PASSENGER ROPEWAY FACILITY FROM HAR-KI-PAURI TO CHANDI DEVI TEMPLE IN HARIDWAR CITY

## Executive Summary

**REF NO: (RITES/UE/PROJ/160)**

## September 2021

## Schedule: 7(g), Category A

NABET QCI

Accredited by QCI NABET
QCI Certificate No. NABET/EIA/1922/RA/0193

RITES
THE INFRASTRUCTURE PEOPLE

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

# EXECUTIVE SUMMARY

## 0.1 INTRODUCTION

Haridwar city is a main pilgrimage place of Uttarakhand. Every year lakhs of pilgrims visit here and important events like Maha Kumbh and Ardh Kumbh are organized in this city and every year lakhs of devotees also visit Haridwar city in Kanwar fair. Most of the pilgrims coming to Haridwar also visit Chandi Devi and Mansa Devi after taking Har ki Pauri bath. At present, ropeway facility is available on Najibabad Road where the devotees reach after traveling a long distance by road to visit Chandi Devi Temple. There is also not enough space available for parking of vehicles at that place, due to which pilgrims have to face a lot of difficulties in going to visit Chandi Devi temple and it also takes a lot of time. Due to these difficulties many pilgrims are unable to visit Chandi Devi Temple. In order to ensure proper movement of such a large number of people, along with the development of other means of transport in the city of Haridwar, it is also necessary to provide the ropeway facility from Har ki Pauri to Chandi Devi.

Uttarakhand Metro Rail, Urban Infrastructure & Buildings Construction Corporation Limited (UKMRC) is formulated to plan, design, develop, construct, maintain or operate metro rail or other similar mass rapid transport system of all types and descriptions including mass movers either individually or in association with other undertakings and companies or persons in India and/or abroad. In this context, and to further attract tourism, UKMRCL is now planning to develop a ropeway from Har ki Pauri to Chandi Devi Temple in Haridwar to facilitate the devotees and tourists visiting Haridwar.

RITES Ltd. (A Government of India Enterprise) was appointed by Uttarakhand Metro Rail, Urban Infrastructure & Buildings Construction Corporation (UKMRC), as consultant, for undertaking the Environmental Impact Assessment (EIA) study and preparation of the report for proposed Ropeway systems. RITES, Government of India enterprise was established in 1974. RITES is accredited for aerial Ropeway in "Category A" since 31$^{st}$ January 2011. RITES is accredited by NABET its accreditation number is **NABET/EIA/ 1922/RA/0193.**

An EIA study has been conducted and subsequently this report has been prepared 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 obtaining the Environmental Clearance of the project.

**Approach and Methodology:** The basic concept is to ascertain the existing baseline conditions and assess the impacts as a result of design, 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 from Har Ki Pauri to Chandi Devi Temple in Haridwar city, Haridwar District of Uttarakhand. As per the 7(g) of EIA notification 2006 and its amendments, the ropeway projects are classified under category 'A' in case the project attracts general conditions i.e. site is located in an ecological sensitive area and/or the elevation of the site is 1,000 m above the mean sea level. Such projects require prior environmental clearance from Ministry of Environment Forest and Climate change (MoEFCC), Government of India. As per the letter no. 1044/21-5. dated 24.08.2021 issued by Haridwar Forest Department the alignment is passing through the Buffer zone of Rajaji Tiger Reserve. Therefore, the proposed project attracts the general conditions of the said EIA notification and classified as Category "A", which requires environmental clearance from MoEFCC.

**Location and Connectivity:** The proposed Passenger Ropeway from Har Ki Pauri to Chandi Devi Temple in Haridwar is started adjacent to Deen Dayal Upadhyay Parking at NH-34 to near Chandi Devi Temple at the junction point of pedestrian path, way to Chandi Devi Temple and way to Anjani Mata mandir.

Haridwar is about 230 Km from National Capital New Delhi and about 55 Km from State Capital, Dehradun. Haridwar is well connected with road and Indian Rail network. The Lower Terminal Point of the ropeway is adjacent to the NH-34. Nearest Railway station is Haridwar which is approx. 2 km (NW direction). Nearest Airport is Jolly Grant Airport Dehradun, at about 35 km.

**Need and Justification:**

- Since the ropeway is at Har Ki Pauri to Chandi Devi Mandir itself, so it will connect more people to reach at Maa Chandi Devi temple directly for the pilgrims reaching Haridwar and coming at Har ki Pauri.
- This will reduce the time and effort of the people in reaching Maa Chandi Devi Temple.
- It will generate local employment opportunities during construction and operation of the said project.
- Due to Har Ki Pauri to Chandi Devi ropeway project, there will be increase in tourism in state of Uttarakhand due to better connectivity.

**Ropeway System:** The design capacity of ropeway is estimated as 1800 PPHPD. The technical details of the proposed ropeway are given as under:

| S.No. | Details | Value | Unit |
|---|---|---|---|
| 1. | **Layout** | | |
| | Location of drive station | Bottom | -- |

| S.No. | Details | Value | Unit |
|---|---|---|---|
| | Location of return station | Top | -- |
| | Location of the tensioning system | Bottom | -- |
| | Type of tensioning | Hydraulic | -- |
| | Direction of rotation | clockwise | -- |
| **2.** | **Dimension** | | |
| | Horizontal length | 2281 | m |
| | Vertical rise | 209.35 | m |
| | Inclined length | 2305 | m |
| | Track width | 5 | m |
| **3.** | **Transport Capacity** | | |
| | Hourly capacity per direction | 1800 | PPH |
| | Uphill transportation | 100 | % |
| | Downhill transportation | 100 | % |
| | Drive speed, infinitely adjustable | 1.0~5.0 | m/s |
| | Trip time at max speed | ~ 8 | min |
| | Station speed | 0.25 – 0.3 | m/s |
| **4.** | **Main Drive** | | |
| | Drive Machinery, Type | Overhead | |
| | Electric main drive: | | |
| | Continuous Power Rating | 300 | kW |
| | Starting Power rating | 360 | kW |
| | Voltage | 380 / 440 | V |
| | Frequency | 50 | Hz |
| **5.** | **Evacuation Drive** | | Unit |
| | Evacuation drive 1 ( diesel hydraulic ) | 100 | kW |
| | Evacuation drive 2 ( electric ) | ~ 25 | KW |
| | Evacuation speed, max. | ~ 1.0 | m/s |
| **6.** | **Carriers** | | |
| | Carrier spacing | 60 | m |
| | Carrier interval | 12 | Sec |
| | Passengers per carrier | 6 | P |
| | Number of carriers | 90 | Nos. |
| | The number of other carriers: | | |
| | Service Carrier | 1 | Nos. |
| | Freight Carrier | 0 | Nos. |
| **7.** | **Towers** | | |
| | Number of towers | 13 | Nos. |
| **8.** | **Haulage rope** | | |
| | Diameter | 41 | mm |
| | Actual Breaking Strength | 1086 | kN |
| | Tensile Strength | 1860 | N/mm2 |

| S.No. | Details | Value | Unit |
|---|---|---|---|
| | Tension Force | 400 | KN |

**Manpower requirement:** 100 numbers during construction and 15 numbers during operation.

**Construction Schedule and project Cost:** The proposed passenger ropeway system is expected to be completed in a period of 24 months with an estimated cost of Rs. 149.70 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:** The proposed Ropeway project is located in the Haridwar District of Uttarakhand. Haridwar District lies in the south-western part of the state in between latitude 29°35’ N & 30°40’N longitudes 77°43’ E & 78°22’ E. Haridwar District is bounded on North by the Dehradun district; on North- East by Pauri Garhwal district; on South and western side by the Uttar Pradesh State. The total geographical area of the District is 2360 sq. kms. District is well connected through by the network of metalled road and railway lines. The physiography of the Haridwar distirct comprises is plain except the presence of Shiwalik Mountain range. There is no void features except that the presences of nalla and River. Physiography of the district can be categorized into three- Structural Hills, Upper Piedmont and Lower Piedmont Plains

**Geology:** The Haridwar district is a part of west Indogangetic plain which is composed of Pleistocenec and subrecent alluvium material brought down by river from Himalayan region. The geology of the region belongs to the Cenozoic era. The upper Siwaliks are mostly redaceous consisting of sand stone, boulders, pebbles, conglomerates, shale, slit and clay. The middle Siwaliks in this area is largely consists of lower alterations of clay and sand stone sequence and an upper sequence of massive sand stones. Just below the Siwaliks are the Bhabar area which is characterized by the alluvial, consists of boulder, cobbles, pebbles, gravel with clay and silts.

**Soil**: The soil of the Haridwar has been classified into three broad categories Ultisols, Entisols and Molisols soil. A mixture of sand and soil are present on the exact location of LTP however, soil in the vicinity of LTP and UTP is unfertile.

**Land use pattern:** Open Forest land covers the majority of the land which is about 28.67% of the study area. The second highest pattern of the landuse is moderately dense forest covering the 26.21% of the study area. Settlement covers the 8.88% of the area. Dry River bed covers the 7.38% of the study area while 1.81% is the river perennial in the study area

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

**Water Environment:** Haridwar district shows different hydrogeological conditions due to its variegated geological settings and topography. Shiwalik in extreme north where the ground water occurs in the form of spring and seepage. Haridwar district is rich in the water resources like ground water, surface water. The Groundwater is the main source of water for fulfilling the demands of irrigation, domestic and industrial purposes. The major part of the Haridwar district shows shallow water levels in the range of 10- 15mbgl.

In order to assess the baseline water quality status of the study area, 8 water samples are collected from the project site and its surroundings- 4 ground water sample, 1 tap water sample and 3 surface water sample. The results of water analysis are compared with IS: 10500-2012 Drinking Water Standards and CPCB standards for water quality. All parameter physical parameter, Parameters concerning substances undesirable in excessive amounts, biological parameters are within the acceptable limits. Ground water quality of the Region is good enough for the purpose of drinking without any treatment. Surface water quality is compared with the CPCB water quality standards to check the use based classification of surface waters. The analysed surface water of the Ganga River and its tributary lies in the class “B” it can be use for the purpose of Outdoor Bathing.

**Meteorology and Air Environment:** The climate of the district is hot sub-humid (dry) climate. The temperature begins to rise from March ($27.6^0$C) and reaches to its maximum at during May ($37.2^0$C) with the commencement of monsoon season by the mid of June and the temperature begins to lower by the end of June. During the winter season in the month of December to February the temperature ranges between $24.7^0$C to $17.7^0$C. The total annual rainfall for the state as a whole is about 133 cm and total annual number of rainy days are about 63.

The ambient air quality of the project site and surroundings the monitoring stations are selected on the basis of topography and meteorology of the area. Four monitoring stations are selected and Five parameters ($PM_{2.5}$, $PM_{10}$, CO, $SO_2$ and $NO_2$) are selected and monitoring was carried out for 2 days in a week for 3 months. 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 Average AQI of the study region lies in the satisfactory category. Whereas 98 percentile value of the region lies in the moderate category. It is clear that $PM_{10}$ is the prominent pollutant and contributes majorly to the high values of Air Quality Index. This can be due to the festival season the high vehicular movement near the Highway. The sub indices of NO2 ,SO2 and CO has been found in a 'good' category at all the locations and have no significant impact on human health.

**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 4 locations. The noise levels were compared with the Ambient Air Quality Standard in respect of noise. Noise level during the day and night time is higher at all locations due to the vehicular activities in the areas.

**Ecological Environment:**

**Ecology:** Primary data was collected through field survey along the alignment. Secondary data was collected from 15 km radial distance from the project site.

**Flora:** 38 number of trees are impacted in the project Right of way (RoW) i.e. 5 m on either side of centerline of alignment and proposed stations. 7 number of trees area enumerated from LTP to Tower-5 and 31 number of trees are enumerated from Tower-5 to Tower-13 including UTP. 154 flora species includes Trees, Shrubs, Bamboo and Grass are recorded from the 15 km radial distance from the project site.

**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. In Core zone (0.00m to 500m) 8 numbers of mammals, 8 numbers of birds and 2 species of reptiles are observed. The Schedule –I species recorded from Core zone are Indian Elephant, Indian Leopard, Swamp deer and Peacock. Altogether 32 species of Mammals, 68 species of Birds and 7 species of reptiles were recorded during present study in Buffer zone (500m to15000m). The strong plant-animal (birds) interaction was recorded on agro-ecosystem& forest ecosystem.

The Schedule-I Mammals reported in buffer zone are Indian Tiger, Indian Leopard, Leopard Cat, Hog Deer, Sloth Bear, Wolf, Blackbuck, Fishing cat, Indian Pangolin, Indian Elephant, Swamp Deer. Schedule –I Birds are Indian Peacock and Oriental pied Hornbill. Schedule –I Reptiles are Python, The Common Indian Monitor Lizard and Marsh Crocodile. Apart from that Monkey, Langur, Common Mongoose, two species of Otter, Wildcat, Indian red fox and Jackal are also reported which fall under Schedule –II. A total of 32 mammals, 07 Reptiles and 68 birds are reported in buffer zone.

**Ecological Sensitive Area within 15 km**: Ecological sensitive area within 15 km from proposed development activity includes buffer zone of Tiger reserve.

**Socio-Economic Environment:** Under the scope of Social Impact Assessment study, the demographic, socio-economic conditions of district and settlements located within 10 km radius, approach and methodology, potential social impacts, mitigation measures, benefits of the project and major findings of public consultation are discussed in this chapter. The secondary data was collected from district census handbook (DCHB) 2011, project literatures, ropeway guidelines and other related documents as part of pre-survey activities. The primary data was collected through public consultation and discussion with other stakeholders at project level. The field survey took place on July 2021.

## 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 IV 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 the high damage risk zone. During storm or cyclone passengers inside cable cars will experience horizontal movement of the connection between the track cable and the gondola. This situation may cause injuries to passengers.
- **Cloud Burst:** Chances of cloud burst impact will not anticipated in this region.
- **Fire Explosion:** Likely Threat of fire and explosion in lower and upper terminal being busy area and car parking and POL storage activities, however, in a ropeway project, fire can mainly cause due to electric spark in electrical room, fire in the surrounding forest area, fire in fuel storage places, etc. 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.
- **Flood:** All the structure will be developed according to the Uttarakhand Building Bye laws. Relevant local and Indian standard will be followed.
- **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 Lower Terminal Stations and Upper terminal stations and 13 numbers of intermediate towers will change the topography of the area.
- The Tower will be located in the Dry river bed of Ganga . Water from the river Ganga is diverted to Har ki pauri near the Bhimgodda Barrage. Near Tower 2, 3 and 4, water will only be available at the time of opening of the gates of Bhimgoda barrage which is generally opened during the high water flow. Therefore, there is no such impact on the change of drainage.
- **Impact on Soil:** A mixture of sand and soil are present on the exact location of LTP however, soil in the vicinity of LTP is unfertile. No fertile soil was observed adjacent to UTP except some fine and coarse stones. The excavation activity involved for foundation of building and tower will cause generation of excavated soil. Near tower-5 Fertile soil was observed.
- **Impact on Land use:** Change of land use is expected due to the use of forest land and irrigation land for the purpose other than the defined purposes.
- **Impact on Water Environment:** Pile driving, dredging, sand compaction and other construction work in water cause resuspension of sediments and turbid water. Muck generation during the construction of Pile foundation at Stations and Towers. Site runoff and drainage may contain increased loads of suspended solids and contaminants. Increase of suspended solids concentration into the water will cause the undesirable taste to the water. Sewage and wastewater contain bacteria, fungi, parasites, and viruses that can cause intestinal, lung, and other infections. Leakage of lubricant oil and sewage to the surface water body, can threat the aquatic ecosystem.
- **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:** Devotees are already reaching the temple with the existing ropeway and track. The development of Ropeway will not disturb the existing environment but will facilitate and provide an easy and fast access to the Temple directly from Har ki pauri to Chandi devi.
- **Ambient Air Quality**: During the construction phase, 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 construction activities. Sources of noise emissions are expected from various construction equipments.

- **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.

**Impact On Biological Environment**

- **Birds:** Potential impacts on birds include degradation of feeding habitat (1 km radial distance from LTP) in the short term resulting in habitat changes but after construction period is over the habitat will be rejuvenate. Construction may cause impact on food sources for birds. The predominant bird species observed at project site are Peacock, Myna, Spotted dove, Swift, Pigeon, Sparrow, common kingfisher and house crow. No migratory birds observed during field survey. There is a possibility that some groups of resident birds avoid the alignment area and move to other areas of Ganga River.
- **Mammals:** Three schedule I or REET (Rare, Endangered, Endemic and Threatened) species were recorded along proposed alignment. These animals are Indian Elephant, Indian Leopard and Swamp Deer. Many species will move away from the areas of disturbance, returning after habitat re-instatement.

**Potential Social Impact**

The social impacts of the ropeway project are assessed in three stages i.e. design, construction and operation. No private land, no private structures and families are affected. The existing trekking path at UTP station would be affected. One public toilet would be affected near proposed LTP station. Apart from this other indirect impacts are discussed in the chapter such as impact on laundry bay, socio-cultural disruption, health impacts, cultural conflicts, pressure on existing crowd, loss of income of auto drivers. The mitigation measures are also suggested accordingly in the report. Considering the project impacts, it is anticipated that there is no scope of rehabilitation and resettlement of families for the proposed project.

## 0.5 ANALYSIS OF ALTERNATIVES

During feasibility study 06 alignments were studied for the ropeway. The location of the terminal station towards Chandi Devi Mandir is same in all the options and study/survey was done for the terminal station towards Har Ki Pauri with 06 different locations. Out of the above 06 options, after preliminary study, 04 options were canceled and 02 options were studied in detail. Based on various surveys, feasibility study, ease of construction, ease of operation and discussion with other stakeholders, Alignment no 1 has been selected as the final preferred alignment.

## 0.6 ENVIRONMENTAL MONITORING PLAN

**Water Quality:** Monitoring will be conducted during construction to confirm that discharge from the sewage treatment plant and runoff from exposed areas. 3 monitoring locations for surface water and 2 locations for ground water are selected for the purpose of assessing the

measure implementations. Duration for Ground water Quality / Drinking water should be carried out at Twice in a year (Pre and Post monsoon) and for Surface Water Quality Four times in a year (Pre monsoon Once in a year for25 parameters, Post monsoon 3 times for 10 Parameter). The cost for water quality monitoring is estimated of **Rs. 4.8 Lakh.**

**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, once a month for three season after the completion of the project. The Parameters to be monitored for air quality are $PM_{10}$, $PM_{2.5}$, $SO_2$, CO, and NOx. 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 LTP, Labour Camp, Tower 5 and UTP. The cost for soil quality monitoring is estimated of **Rs. 0.60 Lakh.**

**Ecological Monitoring for Construction Phase**: The avifauna and mammals monitoring is consider for 3 seasons in a year for 2 years. The monitoring will be done at Rajaji National Park, plantation sites and Bhimgoda barrage of Ganga River. During operation phase the avifauna and mammals monitoring is consider for 3 times in a year for 3 years.

**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 Rajaji National Park, plantation sites and Bhimgoda barrage of Ganga River. The estimated cost for ecology and biodiversity monitoring is **Rs 15.75 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**.

## 0.7 ADDITIONAL STUDIES

Project level consultation process involved various groups such as shop keepers, devotees, pilgrims, tourists, drivers, hotel owners, monks and other stakeholders. Four public consultations were conducted in Deen Dayal Upaddhyay parking, Hari Ki Pauri, Chandi Devi temple and in existing ropeway parking area. The issues like awareness about project, increase in tourists and devotees, traffic issue, increase in income and shop keeping business, better integrated transportation, employment opportunity, loss of income of auto drivers, saving of time and money, crowd management, mobility, disaster management

measures, development of tourism, affordable travel fare, protection of wild animal, engagement of local labour etc were discussed. The presence of about 64 participants was ensured during focus group discussion and public consultation at project level. The field survey took place on 21st and 22nd July, 2021. 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.

**Risk Assessment and 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.

## 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 India, it is belief it will increase the demand for local industries especially in hotel and resorts, restaurants. The cost of the ropeway project is Approx. **Rs. 149.70 Cr.** The project has IRR of 28.6%. 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 152.01 Lakhs**.

- **Ecology & Biodiversity Management**
- **Ecology & Biodiversity Management Compensatory Plantation:** About 38 trees are likely to be affected (All 38 trees are likely to be removed) due to construction of proposed project. Estimated cost of planting new trees, their maintenance & plantation is about 10.58 Lakhs.
- **Net Present Value (NPV):** The net present value of the 0.29 Ha of Shayampur reserve forest land diverted for the proposed development activity. Estimated cost of planting new trees, their maintenance & transplantation is about 1.81 Lakhs.
- **Cutting cost:** There are 31 trees impacted for the proposed development activity. The amount will be deposited for the values of trees are Rs 1.24 lakhs.

- **Conservation plan for wildlife:** The core and buffer zone is consisting of many Schedule –I & Schedule –II Fauna. Many species are impacted due to proposed

development activity. An amount of Rs 20.00 Lakhs need to be estimated for the utilization of wildlife conservation purposes in Shyampur range of Haridwar forest division, preferably in the buffer zone of RTR area surrounding the ropeway.

- **Waste Water Management and Water Conservation**: The waste generated during construction and operation is 5.6 KLD and 52.4 KLD respectively. This waste water will be treated through the mobile toilets during the construction phase and during operation phase by the Advanced Eco reactor. The estimate cost of proposed STP is Rs.30 lakhs.
- **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). The estimate cost of proposed solar panel is Rs.18 lakhs.
- **Solid Waste Management Plan:** After implementation of the recommended mitigation measures for the construction phase of the proposed project, there is no residual impacts will be expected from the project. Environmental monitoring will be necessary to ensure the implementation of correct disposal requirements for the various wastes generated from construction works. The estimate cost for solid waste management system is Rs. 1.4 lakhs.
- **Hazardous Waste Management:** The Contractor will ensure that hazardous wastes are labeled, recorded, stored in impermeable containment and for periods not exceeding mandated periods and in a manner suitable for handling storage and transport.
- **Traffic Circulation during Operation:** Pt. Deen Dayal Upadhyay parking has two levels of parking floor which will be extended to 4 levels in due course, increasing the current parking capacity of 1,000 to around 2,000 cars. Traffic will be coming to Pt. Deen Dayal Upadhyay Marg from national highway and from interior roads of Haridwar which will be easy to manage due to huge parking lot at Har Ki Pauri
- **Construction Material Management:** Procedures for storage, handling and transport of construction material shall be prescribed in SH&E method statement approved for construction. 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/check up is mandated and good housekeeping 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 programs 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 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.

*****