

# CABLECAR TO MT. KILIMANJARO



A BUSINESS PLAN BY AVAN LIMITED



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## EXECUTIVE SUMMARY

Mount Kilimanjaro is the largest freestanding mountain in the world and is Africa's highest mountain. It is a famous touring destination of Africa and is visited by a large number of people. This mountain rises from surrounding coastal scrubland to an amazing height of 5,895m. There are many routes to climb this mountain, but the best one is the Machame route featuring amazing views of scenic beauty.

This research report assesses the feasibility of developing a cableway on Mt. Kilimanjaro. In undertaking this research, we reviewed all the relevant municipal and district planning literature, visited a short list of proposed sites, defined a market catchment for the proposed cableway and conducted market research into the demand and supply conditions for tourism attractions in the district. We considered the weather conditions of the proposed sites and assessed the broad social, environmental and infrastructural characteristics for each alternative short-listed site. A preferred site was selected. This is in the South Western side of Mt. Kilimanjaro. The start terminal station site lies entirely within the premises of Machame.

The base station for the cableway will occupy fully transformed land currently thickly infested with vegetation. An existing access road runs from the Machame town centre almost all the way to the proposed base station site through Barangata and through extensively transformed farmland. The road through Barangata will need to be extended by about 500m beyond where it presently ends at the Machame Gate Village to provide access to the cableway base station.

The cableway will run from the base station (@ 1800 m altitude) up a mountain spur adjacent to the Barangata Region to the top station (@ 4000 m altitude). One, or possibly two, intermediate stations will need to be constructed at points along the mountain spur. The pylons will be constructed on untransformed land not vegetated with any rare or endangered species. A development cost has been obtained from a cable car construction company. Based on this, together with the market demand research, a feasibility assessment has been developed.

Development of a cableway facility at the selected site would not be without potential challenges, which will have to be overcome if such a development was to attract capital funding and ultimately operate sustainably. These challenges include the need to improve the condition of the roads providing access to the proposed site and the need to more thoroughly develop tourist attractions in the neighbourhood of the selected site in order for the cable way and other surrounding facilities to attract sustainable numbers of cultural, business and eco-tourists.



## INTRODUCTION TO THE PROJECT



CABLE CAR SYSTEM



CABLE CARS ARE A WORLD-CLASS TOURISM ATTRACTION ALL OVER THE GLOBE

The project constitutes a carefully engineered balance between environmental sustainability & conservation constraints on the one hand and a world-class tourism attraction on the other.

The facility will be designed in such a way as to accommodate increased tourist numbers whilst ensuring that only minimal and sustainable impacts on the ecology and environment will occur. The project will unlock the tourism potential of Kilimanjaro National Park region by extending access to the escarpment to a broader range of tourists and enhance the competitiveness of the region with regard to adventure tourism. The project will serve as a catalyst to attract more domestic and international visitors to this region and provide a magnet to a host of other experiences and attractions in the area. The project will extend across the tourism value chain and the other economic sectors that supply services to the tourism industry to the economic benefit of the region. We have assessed the potential of other practical opportunities in this regard.

### WHY A CABLEWAY?

The Kilimanjaro Mountain is home to the Kilimanjaro National Park World Heritage Site (WHS). The mountain is a key tourist attraction and one that should be accessible to all who want to enjoy its beauty. This includes tourists with limited time, people with disabilities and those less adventurous tourists. Additionally increased visitor numbers are putting strain on the environmentally limited existing access routes to the escarpment. It is in the best interests of the WHS that many more visitors are able to enjoy the scenic beauty of the escarpment in an environmentally sustainable manner, rather than the limited numbers of hikers presently capable of climbing its rugged escarpment passes and peaks and people who are able to afford a helicopter trip.

### WHY NOT MORE HIKING PASSES, HELICOPTERS OR ROADS?

Cableways are outdoor elevators.

They are also the least expensive, least environmentally impactful and safest way to get large numbers of people of all ages, levels of fitness or disability and temperament up steep slopes and mountains.

Roads by contrast are highly disrupting to the environment and facilitate unmanaged intrusion into the areas they penetrate.

Helicopters are noisy, expensive and more visually intrusive than cableways. This severely constrains the capacity of this mode of elevation. The cableway will provide a critical mass attraction for the



Mt. Kilimanjaro, which will add to the tourism bed nights, sold in the region and attract new visitors. Currently the mountain passes, which are most easily accessible to tourists, are being heavily overused and alternatives for getting to the escarpment need to be assessed.





A large, semi-transparent circular logo featuring the letters 'A' and 'V' in a stylized, outlined font. The 'A' is on the left and the 'V' is on the right, both with a slight 3D effect. The background of the circle is a gradient from light to dark blue.

***DESCRIPTION OF PROJECT***

## DESCRIPTION OF THE PROJECT

### LOCATION

The site lies in the Machame region of the Hai (Moshi) District Municipality.

The study tests the feasibility of constructing a reversible cableway (two cable cars operating in a jig back manner) between a base station and a top station on the escarpment top of the mountain. The study was confined to sites entirely within the boundaries of Kilimanjaro National Park.

Currently the area has one developed tourist node, the Machame Cultural Centre.

Following is a list of currently operational activities of Machame Cultural Centre:

A warm welcome in a local Chagga household hike through dense natural forests and farms for acclimatization along fast flowing streams before climbing the mountain. Three different views of snow-capped Mt. Kilimanjaro, where local ancient Chagga legends recount tales of an iron hut that brought them strength. A visit to several development projects in the area (coffee production, traditional irrigation, afforestation, cross-breeding, bee-keeping, schools, health care, food processing, etc.)

Sieny-Ngira tour (4-6 hours). The tour starts from the Machame Cultural Tourism Centre (Kyalia) and takes you through Kalali market to Masama. Sieny catchment forest is historically a sacred place of natural forests, bridges and caves where local people worshipped during the traditional festivals. Another attraction is the natural bridge called 'Daraja la Mungu' or God's Bridge'.

Nronga tour (5 hours) Walk uphill from Kyalia to Nronga village. Visit the milk purification centre run by women and the Kalali women's group specializing in cheese-making. If your visit is on a Monday, you can enjoy the colourful weekly market.

Environmental tour (5 hours): Get a glimpse of how the locals make pottery for food and water storage. The guide will explain how the conservation activities such as rainwater harvesting undertaken in the area are ideal for a rural setting.

Nkuu tour (5-8 hours): From Kyalia, walk through fertile banana and coffee farmlands and learn about an intensive inter-cropping system of mixed crop farming. Also, participate in cooking a traditional Chagga meal before return.

Mfuranungun view point (6-8 hours). See Moshi town, Lake Nyumba ya Mungu (House of God) and learn about horticultural practice at Nkwewe. Hike to Marukeni before descending to the river Semira rich in trout.

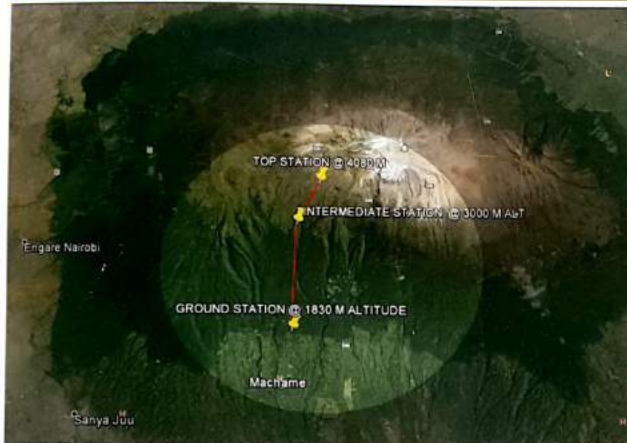


IMAGE SHOWING THE PROPOSED ROUTE



**CHAGGA TRIBE**

Ng'uni hike (2 days). The Sieny-Ngira tour can be combined with a hike to Ng'uni. At Ng'uni, learn to build the oldest Chagga traditional house called 'Mbili'. Meet Mzee Urassa who will brief you on stingless bee-keeping.

Lyamungo tour (2-3 days) The tour starts at Kyalia and leads you to Lyamungo village where you can learn about coffee production. Visit the Narumu Women Pottery Centre, natural forest and the source of the Weruweru River. (Note: Tours can be undertaken on foot, but transport can be organized on request.)



**LAKE NYUMBA YA MUNGU**



**COFFEE PLANTATION IN KILIMANJARO REGION**





POPULAR HIKING ROUTES OF KILIMANJARO

The seven established routes to climb Mount Kilimanjaro are - Marangu, Machame, Lemosho, Shira, Rongai, Northern Circuit and UmbWe. The Marangu, Machame, and UmbWe routes all approach from the south of the mountain (MWeka is used only for descent). The Lemosho, Shira and Northern Circuit routes approach from the West. The Rongai route approaches from the north. The illustration below depicts a three-dimensional view of Kilimanjaro's climbing routes and a close up of the approaches to the summit.

Selecting a route is a tough choice for most. To find the best Kilimanjaro route for you, considerations should be taken for the route's scenery, difficulty, foot traffic and its altitude acclimatization characteristics.

It is estimated that tourists climb Kilimanjaro using the routes in the following percentages: Machame (45%), Marangu (40%), Lemosho (8%), Rongai (5%), Shira (1%), Northern Circuit (0%), UmbWe (0%).

For purposes of this study only the escarpment zone within Kilimanjaro National Park above the Machame camping site will be studied for potential cableway top station sites.



MACHAME ROUTE TRAIL

### MACHAME ROUTE

Known as the "Whiskey" route, the Machame route is now the most popular route on the mountain. Compared with Marangu, the days on Machame are longer and the walks are steeper. The Machame route is considered a difficult route, and is better suited for more adventurous folks and those with some hiking or backpacking experience. The route begins from the south, then heads east, traversing underneath Kilimanjaro's southern ice field before summiting. The minimum number of days required for this route is six days, although seven days is recommended. The Machame route is scenically beautiful and varied. However, due to the heavy crowds, it loses some of its splendour.

The proposal is confined to sites entirely within the boundaries of the Kilimanjaro National Park. One of the key issues that this project will need to address is access to the site, and there are several aspects to this, including community agreement, environmental impacts and constraints and cost.





MACHAME GATE



MACHAME ROUTE TRAIL



ROAD TO MACHAME GATE



***ASSESSMENT CRITERIA***

## ASSESSMENT CRITERIA FOR ROUTE



APPROACH ROAD FROM KILIMANJARO AIRPORT



MACHAME ROAD LEADING TO KILIMANJARO NATIONAL PARK

We established a list of criteria (or potential obstacles) to consider in finding the most feasible site for a cableway development. These are:

### ROAD ACCESS

The fewer roads that need to be constructed the better. This is both from a cost and environmental perspective. Roads create rural sprawl and require huge capital investment. The more we can rely on existing infrastructure the more affordable the project. The preferred site base station is closest to a public road (500 metres).

### COMMUNITY SUPPORT

The preferred site is at the end of a road providing access to many homesteads and is in a traditional authority area. As such community support for the project is vital. No project developed on community land will be successful without full community support. The costs and benefits of the development need to be fully explained to the people impacted by the development. As such community members need to understand that:

There will be increased traffic on their access road (Up to a 1000 vehicles per day)

There will be a visual impact for nearby homesteads.

Upgraded infrastructure such as electricity pylons and water pipes will need to be constructed through the Barangata region.

There will be about 100 new direct jobs created.

Ancillary developments on the route to the cableway site will also be stimulated, greatly increasing the number of new jobs and small business opportunities generated in the region but also changing the nature of community life in the region.





SHIRA CAVES ON THE MACHAME ROUTE

#### CONFLICT WITH HIKERS AND OTHER SITE USERS

The preferred cableway route has been placed on a route which doesn't clash with the route utilised by hikers so minimal conflict with existing site users below the escarpment is anticipated. Facility will also be beneficial to hikers and other site users as a place to purchase supplies and find refuge in stormy weather.

#### ENVIRONMENTAL SUSTAINABILITY

See separate section on environmental issues.

#### SUITABLE TERRAIN

The preferred site has sufficient land at the base to develop appropriate infrastructure and a suitable area on the escarpment top for development.

#### PANORAMIC VIEWS

The top station site has outstanding panoramic views of Mount Meru and the south West region of Kilimanjaro. The site will also allow for short hikes to the Shira Cave area.



VIEW OF THE PEAK FROM THE TOP STATION SITE








***SOCIO ECONOMIC PROFILE***

## SOCIAL AND ECONOMIC PROFILE OF KILIMANJARO REGION

Districts of Kilimanjaro Region		
Map Before Creation of Siha District	District	Population (2012)
	Hai	210,533
	Moshi Rural	466,737
	Moshi Municipal	184,292
	Mwanga	131,442
	Rombo	260,963
	Same	269,807
	Siha	116,313
	<b>Total</b>	<b>1,640,087</b>

DISTRICTS OF KILIMANJARO REGION

Moshi, the noticeably clean capital of the densely populated Kilimanjaro region sits at the foot of Mt Kilimanjaro and makes a good introduction to the splendours of the north. It's a low-key place with an appealing blend of African and Asian influences and a self-sufficient, prosperous feel, due in large part to it being the centre of one of Tanzania's major coffee-growing regions. Virtually all visitors are here to climb Mt Kilimanjaro or to recover after having done so.

The total population of Kilimanjaro region is 1,640,087 persons.

The economy of this area is characterised by low levels of development and economic activity on the margin of the modern economy. 40% of the potential workforce is not economically active.

In conclusion, the Moshi Local Municipality's economy is largely undeveloped and characterised by a large public sector presence, a high rate of unemployment, low labour force participation and low levels of household income. The implications of this for the development of a cable car in the municipality are as follows:

The development will create much needed jobs in the region.

The cable car cannot expect to draw much tourism spending from within the municipality.

The low skill level in the economy will necessitate comprehensive training of employees drawn from the local area.

### NATIONAL TRENDS

Tanzania Cultural Tourism Programme is a sustainable pro-poor tourism initiative that engages local communities in various tourism activities for the purpose of delivering the services to earn an income from tourism. Tanzanians are proud of receiving tourists in their rural areas where authentic culture of the people can be perfectly explored and various benefits gained by the community.

Cultural Tourism contributes to Community Development through providing employment to local people who works as Tour Guides, Coordinators of Cultural Tourism Enterprises, traditional dancing, storytelling, food service provision, accommodation service provision (home stays & camping) and through direct sales of goods and services to tourists.

Cultural Tourism creates an opportunity for local people to sell goods and services directly to tourists. On the other hand, communities benefit indirectly through tax or levy on tourism income or profits with proceeds.

Currently Cultural Tourism Enterprises provides direct benefits (income) to Enterprise Coordinators, Tour Guides, Food Service Providers, handcraft makers (majority are women groups), story tellers, traditional dancers, farmers, traditional healers, blacksmith and home-stay service providers just to mention a few.




PROGRAMS IN CULTURAL TOURISM INVOLVING LOCAL COMMUNITY



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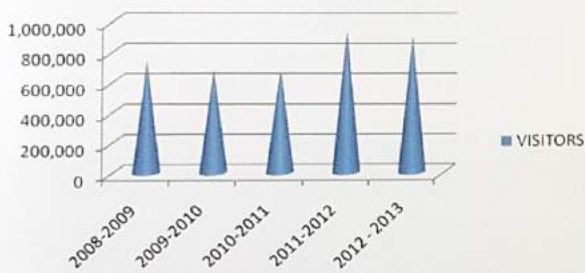
PROGRAMS IN CULTURAL TOURISM INVOLVING LOCAL COMMUNITY



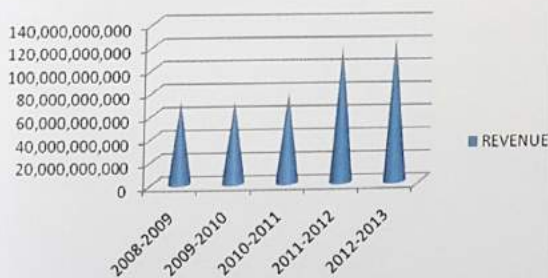


LOCAL POTTERY GOODS

**VISITORS STATISTICS FOR FIVE YEAR  
2008/2009 - 2012/2013**



**GRAPH SHOWING INCREASE IN TOURISM OVER THE YEARS  
REVENUE FOR FIVE YEARS 2008/2009 -  
2012/2013**



GRAPH SHOWING INCREASE IN REVENUE GENERATION FROM TOURISM

Many poor and disadvantaged groups in rural areas are indirectly benefiting through Cultural tourism in Tanzania. Indirect benefits include supported development projects by development fees collected. Projects supported are schools, hospitals, water supply, orphanage centres and much more.

**TOURISM TRENDS**

- Travel and tourism is one of the world's largest and fastest growing industries, which, unlike other retail industries bring the market to the product. The Travel and tourism industry is a high-growth industry within Tanzania and is seen to play, on account of its labour intensity, a major role in addressing unemployment levels within the country.
- The popularity of Mount Kilimanjaro as an international tourist destination generates an **estimated US\$ 50 million** in revenue annually.
- The report, *Tourism in Africa: Harnessing Tourism for Growth and Improved Livelihoods* explores how tourism has been a key tool for economic development throughout the world, and how Sub-Saharan African countries can start or continue to utilize tourism as a source of growth and poverty alleviation. Written primarily for national and local policy makers, as well as potential investors, the report provides an illuminating analysis of the tourism industry, its economic value and potential.
- Tanzania is home to a host of tourist attractions, including Ngorongoro Crater and the Great Migration of the Wildebeest across the Serengeti Plains. Mount Kilimanjaro, located near Moshi in the northern part of the country, has iconic status as the tallest mountain in Africa attracting thousands of visitors from across the world each year. The revenue from the park supports approximately 400 guides, 10,000 porters, 500 cooks, and contributes 13% of the country's overall gross domestic product, according to the report. In addition, the report says that roughly US\$13 million of the park's revenue is used to help improve the lives of the poor around the mountain slopes; the area has the highest school enrollment rate (100%) and adult literacy rate (85%) in the country.
- While Mount Kilimanjaro has been successful at generating revenues for the park and for the locals, the report highlights some pertinent challenges which need to be addressed to continue to build on its success. These include the dangerous working conditions for porters and guides as well as the increased environmental degradation around the slopes, particularly with regard to the trail erosion during the wet periods.





### KEY LESSONS FOR TANZANIA'S TOURISM

- The success of Kilimanjaro includes its capacity to generate revenue for the park and the local people.
- The Kilimanjaro National Park General Management Plan was developed with public involvement to ensure that all interests, cultures traditions and surroundings are respected.
- Kilimanjaro staff associations must be strengthened to improve the local regulatory framework, safeguard the rights of members and increase the pro-poor benefits that hiking the Kilimanjaro brings to the community.
- The government must enhance infrastructure to keep up with rising park prices and tourist expectations.



CURRENTLY, MAJORITY OF THE PEOPLE VISITING KILIMANJARO ARE HIKERS





VIEW OF KILIMANJARO NATIONAL PARK AS SEEN FROM ONE OF THE LODGE IN MACHAME





60% OF TOURISTS VISITING KILIMANJARO ARE FOREIGNERS



TOURISM PROVIDES EMPLOYMENT OPPORTUNITIES AMONGST





POPULAR TOURIST ATTRACTION OF TANZANIA: SERENGETI NATIONAL PARK DURING THE GREAT MIGRATION



POPULAR TOURIST ATTRACTION OF TANZANIA: TARANGIRE NATIONAL PARK



POPULAR TOURIST ATTRACTION OF TANZANIA: NGORONGORO CRATER



**MARKET ANALYSIS**



**Five year visitors' statistics trend  
2008/2009 - 2012/2013**

S/N	YEAR	TOTAL NUMBER OF VISITORS
1	2008-2009	736,829
2	2009-2010	679,006
3	2010-2011	682,218
4	2011-2012	942,664
5	2012 – 2013	901,892



EXISTING EMPLOYMENT OPPORTUNITIES MAINLY CONSIST OF GUIDES AND PORTERS

The KILIMANJARO National Park and Mountain have globally significant plant and animal biodiversity, with unique habitats and high levels of endemism. However, these special resources are increasingly under threat from commercial uses, animal husbandry, timber plantations and cropping. On both sides of the international boundary there are local populations dependent on the mountains for all or part of their livelihood. Rangelands in areas of high conservation value have been degraded by a grazing regime based on communal access and ineffective regulatory capability.

Given the outstanding tourism potential of the area, a key challenge is the development of infrastructure and capacity to support the involvement of local communities in sustainable tourism activities associated both with existing protected areas and proposed community conservation areas. This activity can be built upon by charging of community tourism levies (paid by visitors to protected areas) is generating funds to enable local communities to invest equity in tourism developments in the KILIMANJARO National Park. This provides both direct employment opportunities and enhances opportunities for the involvement of local communities in eco-tourism activities compatible with biodiversity conservation.

Private sector developers are encouraged to partner communities and conservation agencies to build capacity for sustainable eco-tourism. Entrepreneurs from the private sector are also encouraged to contribute to training programmes to develop tourism industry skills amongst persons living in local communities.

A very high 60% of all foreign tourists to Tanzania visit a game reserve or national park, revealing the very important role played by parks and game reserves in the attraction accommodation of foreign tourists to the country. The country has several very large park systems. The private lodges cater to the upper level of the price and service levels. The parks cater to a more modest level of price and service. Many of the private game reserves are located adjacent to government-owned parks. The private reserves take advantage of the ecological benefit obtained from being near the parks, and provide significant levels of additional environmental protection by providing wildlife habitat.

In terms of nature-based tourism, Tanzania has excellent natural assets. It has a very good range of natural-environment types, from ocean shores to mountain heights. It has a solid set of national parks and other types of protected areas, run by both national and private agencies, that provide experiences, tourism infrastructure and site management at world class levels. But most importantly, Tanzania has a sophisticated and modern tourism business system that enables the country to penetrate international markets to a significant degree.



MAP SHOWING EXISTING TOURISM ACCOMODATION IN THE STUDY AREA

### THE SUPPLY OF NATURAL AND CULTURAL HERITAGE SERVICES

On average, the natural and cultural heritage services are the highest scoring services due to the high quality of the natural and cultural assets present. This is recognised by the Park being given the status of a world heritage site, precisely because of the globally outstanding quality of natural and cultural assets. Importantly, not only is the protected area of high quality, but also the buffer in all the municipalities has high quality assets.

### TOURISM ACCOMMODATION IN THE AREA

There are at least 50 resorts, hotels and other accommodation facilities within a 30km radius of the site and at least an additional 250 resorts, hotels and other accommodation facilities within an 80 km radius of the site. This amounts to a total of 300 facilities hosting guests who are potential cableway users.



EXISTING ACCOMMODATION IN THE KILIMANJARO REGION



MACHAME HUT CAMPSITE ON MACHAME ROUTE



## IS THERE A MARKET FOR A CABLEWAY?

Name	Country	Details
Wings of Tatev	Armenia	5.7km long, finished 2010 and cost \$18m (R180m)
Cairns Skyrail	Australia	7.5km long, winner of multiple tourism and environmental sustainability awards
Sandia Peak Tramway	USA	4.35km long, used throughout the year for summer and winter activities.
Merida Venezuela	Venezuela	12.5km long with an altitude increase of over 3000m it peaks at 4765m above sea level. It is being rebuilt after 50 years of use.
Aiguille du Midi Cable Car	France	Rises from 1035m to 3842m with the second span being 2,867 metres long
Kitzbühel 3S Cable Car	Austria	In 2005 this 3,642 cableway cost 13.5m euros and has 19 cabins.
Gulmarg Gondola	India (Kashmir)	Goes to a height of 3747m and carries 600 people per hour

### EXAMPLES OF LONGEST AND HIGHEST SUCCESSFUL CABLEWAYS AROUND THE WORLD

The cable car will be a unique development that attracts people to the area and will provide the easiest and only way for many people to access the escarpment. Currently only hikers can enjoy the escarpments of Kilimanjaro. We believe the cable car will fill the gap and provide this access to the most scenic parts of the KILIMANJARO to a whole new market of people. These include:

- School groups
- Tour buses
- Disabled people
- Time sensitive tourists
- People with limited finances → Park revenue saves no. of days
- Elderly people

**None of the existing cable cars in Africa can compete with the proposed KILIMANJARO Cable car in terms of altitude achieved and length of ride. Additionally none are within 300km of the site so do not pose serious competition.**

#### STRENGTHS

- Rich history of the local area
- Proximity to World Heritage Site
- Proximity to the A23 highway
- Scenic views
- Proximity to other tourist sites
- Largely undeveloped area.

The rich history of the KILIMANJARO should be considered strength for the development of a cable car in the area. Perhaps the most distinctive feature of the proposed cable car is its proximity to Kilimanjaro National Park (**UNESCO WORLD HERITAGE SITE**)

#### OPPORTUNITIES

- Capitalising on the international spotlight on the area for being a world heritage site.
- Possibility of home visits at surrounding homesteads
- Highest Cable car in Africa

#### LIST OF ANCILLARY BENEFITS/OPPORTUNITIES:

- New accommodation at Cableway Bottom station
- Hiking and walking
- Conferences and Wedding receptions
- Bird watching
- Trail running, mountain climbing and abseiling
- Music and cultural festivals.





***CABLE CARS IN OTHER  
WORLD HERITAGE SITES***

## WORLD HERITAGE SITES CONNECTED BY 'CABLE CARS'

There are many World heritage Sites around the globe which are provided with cable car facility for the tourist, making it easily accessible for all types of tourists. The records shows us that there is an substantial tourism revenue boost generated after the inception of the cable cars. Below is the list of cable cars around the world built in **UNESCO World heritage Sites**.

- 1) Canadian Rocky Mountain Parks Sulphur Mountain, Alberta, **Canada**
- 2) Cape Floral Region From Cape Town to Table Mountain, **South Africa**
- 3) Champaner-Pavagadh, Gujarat, **India**.
- 4) China Danxia Cable cars at Danxiashan NP, **China**
- 5) Dolomites There is a cable car on Marmolada, **Italy**
- 6) Great Wall Great Wall at Badaling and Mutianyu, **China**
- 7) Greater Blue Mountains, Katoomba, **Australia**
- 8) Hallstatt-Dachstein Dachstein-Welterbe-Seilbahnen, Dachstein-Welterbe-Seilbahnen, **Austria**
- 9) Huanglong, **China**
- 10) Huangshan, **China**
- 11) Itsukushima Shrine Miyajima Ropeway, **Japan**
- 12) Lushan National Park, **China**
- 13) Macao, **China**
- 14) Masada, **Israel**
- 15) Monte San Giorgio, **Italy**
- 16) Mount Emei, including Leshan Giant Buddha, **China**
- 17) Mount Qingcheng and Dujiangyan, **China**
- 18) Mount Sanqingshan, **China**
- 19) Mount Taishan, **China**
- 20) Mount Wutai, **China**
- 21) Mountain Resort, Chengde, **China**
- 22) Pergamon Up to the Acropolis, **Turkey**
- 23) Rio de Janeiro Sugarloaf Mountain, **Brazil**
- 24) Sacri Monti of Piedmont and Lombardy Sacro Monte of Varallo Sesia, **Italy**
- 25) San Marino and Mount Titano There's a cable car from Borgo Maggiore to the historical city centre of San Marino, **San Marino**
- 26) Swiss Alps Jungfrau-Aletsch, **Switzerland**
- 27) Swiss Tectonic Arena Sardona Up to the Cassonsgrat, **Switzerland**
- 28) Teide National Park, **Spain**
- 29) Upper Middle Rhine Valley Lower Middle Rhine Cable car crosses the Rhine from Koblenz to the Fortress of Ehrenbreitstein - both within the inscribed area, **Germany**
- 30) Wet Tropics of Queensland Skyrail, **Australia**
- 31) Wudang Mountains, **China**
- 32) Wulingyuan, **China**
- 33) Zacatecas, **Mexico**

CAPE FLORAL REGION , CAPE TOWN, SOUTH AFRICA



TEIDE NATIONAL PARK, SPAIN



MASADA, ISRAEL





CHAMPANER PAVAGADH, INDIA



WET TROPICS OF QUEENSLAND, AUSTRALIA



DACHSTEIN SALZKAMMERGUT, AUSTRIA



MOUNT SANQINGSHAN, CHINA



MOUNT HUANGLONG, CHINA



GREATER BLUE MOUNTAINS, AUSTRALIA



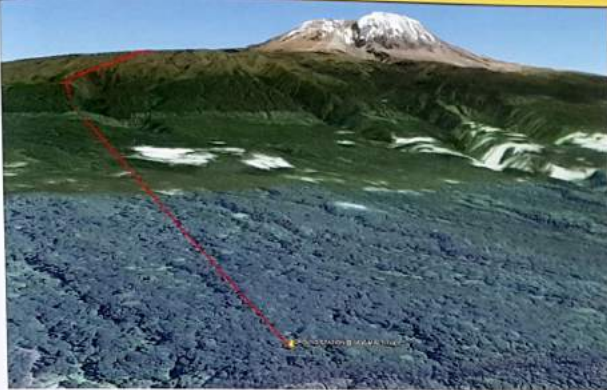




***CABLE CAR SYSTEM***



## CABLE CAR SYSTEM



VIEW OF THE ROUTE FROM BASE STATION



VIEW OF MT. MERU FROM INTERMEDIATE STATION

In terms of technical aspects, a typical ropeway vehicle has no motor, no service brake and no control panel, as these facilities are installed directly in the station buildings.

Because of the way it is integrated into the natural environment and the differing characteristics of the area, every station is unique. There is therefore a wide choice of types of station, such as long or short, the middle station and the top station.

The build costs, operating costs and maintenance of each system were forensically compared, as was the capacity, turn-around time, queue length and wait times each system offered. Ride comfort and tourism experience was also a determining factor.

The gondola option is a very versatile solution in terms of capacity as the capacity can be increased or decreased by adding or removing gondolas. The size of the gondolas as well as the type and quality of gondolas can be designed according to the needs and budget. Gondolas can be used for both routes. This option consists of a ropeway system with cabins running from the bottom in a straight line to the top without any disembarking options in between. The data for this system will be as follows:

### BASE STATION TO INTERMEDIATE STATION

#### 6 PERSONS GONDOLA CABIN

- Total no. of cabins: 20
- Capacity per cabin: 6 persons (500kg)  
Distance to be travelled: 8.0 kms  
Capacity: 275 persons per hour (two way travel)
- Time to get from base station to intermediate station : 26 minutes
- Main Power: 2 x 2000kW

### INTERMEDIATE STATION TO TOP STATION

#### 6 PERSONS GONDOLA CABIN

- Total no. of cabins: 10
- Capacity per main cabin: 6 persons (500kg)
- Distance to be travelled : 4.0 kms

Capacity: 120 persons per hour

Time to get from base station to intermediate station: 12 minutes

Main Power: 2 x 2000kW

The total Capital Cost from the base station to the top station is estimated to be around **USD 40 million** (Including modern station buildings).



MONO CABLE GONDOLA SYSTEM



BI CABLE GONDOLA SYSTEM WITH GONDOLA CAPACITY OF 6 PERSONS



ROTATING GONDOLA SYSTEM



GONDOLAS STACKED







BASE STATION AT HARTBESPOORT CABLE WAY, SOUTH AFRICA



TOP STATION AT KITZBUHEL, AUSTRIA

## OPERATING COSTS

The operating costs consist mainly of the following items

- Energy costs – a function of the drive size and the average number of hours that the system runs per day
- Operators – consisting of one system operator per embarking/disembarking side of each section, one operator managing the embarking/disembarking of the cabin at each station, ticket sales personnel at bottom station and one technician on duty during operation.
- Management – One manager with office equipment.
- Miscellaneous – Provision for miscellaneous items.

## MAINTENANCE COSTS

The average annual maintenance cost for similar installations is in the order of 3% to 4% of initial capital outlay, approx. **1,60,000 USD**.

## LAND REQUIREMENT

The size of land required for the top and bottom stations is a function of the extra facilities envisaged at the stations. The minimum size of enclosed station buildings is around 10m x 20m to cover all the ropeway equipment and landing areas. The need for extra shops and restaurants increase this space requirement. The major function that requires space is parking. It is anticipated that around 5000 sqm of land will be required at the base station.

## WEATHER

Cableways can be designed according to specific weather conditions, which include anticipated maximum wind speeds. Although the norm is to design the systems to be operational in wind speeds up to between 40km/hr and 60km/hr, systems have been designed in the world that can operate in much higher wind speed conditions, at extra cost. Notwithstanding the maximum wind speed at which the system is designed to operate, the system structures are designed to withstand winds up to 160km/hr.

There are two wet seasons. November to December and March to May, with the driest months between August to October. Rainfall decreases rapidly with increase in altitude; mean precipitation is 2300mm in the forest belt (at 1,830m), 1300mm at Mandara hut on the upper edge of the forest (2,740m), 525mm at Horombo hut in the moorland (3,718m), and less than 200mm at Kibo hut (4,630m), giving desert-like conditions. The prevailing winds, influenced by the trade winds, are from the southeast. North-facing slopes receive far less rainfall. January to March are the warmest months. Conditions above 4000m can be extreme and the diurnal temperature range there is considerable. Mist frequently envelops much of the massif but the former dense cloud cover is now rare. The ice cap and glaciers are in rapid retreat but this local evidence of climate warming may also be due to the loss of humidity caused by



long deforestation of the mountain's foothills (Thompson et al, 2003), by farm clearances and by fires set by honey-harvesters.

In the KILIMANJARO 75% of rainfall is between 12h00 and 24h00. This means that mornings are the best times for cableway trips. The mean rainfall per event is 76 mm at Kilimanjaro National Park. Thunderstorms in the late afternoon and early evening cause the most rainfall with peak rain being between 19h00 and 21h00. Storms tend to be short and shallow. Escarpment Weather stations experience fewer high intensity events than lower stations. Whilst there are a 137 rain days in Kilimanjaro National Park per annum, most rain occurs in the afternoon and will not interfere with the cableway visitor numbers in a significant manner.

The prevailing wind is an easterly in Kilimanjaro National Park. Most wind experienced is fairly low, however wind speeds do increase as altitude increases. 50.7% of days within the study area are considered as calm as measured by the Weather Station at Kilimanjaro National Park.



***TECHNICAL SPECIFICATION***

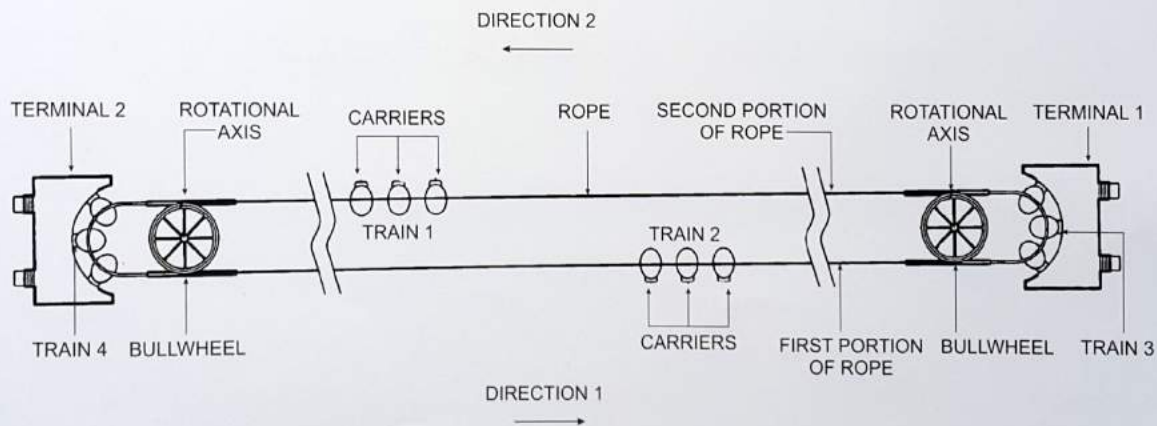
## TECHNICAL SPECIFICATION

### CABLE CAR ENGINEERING



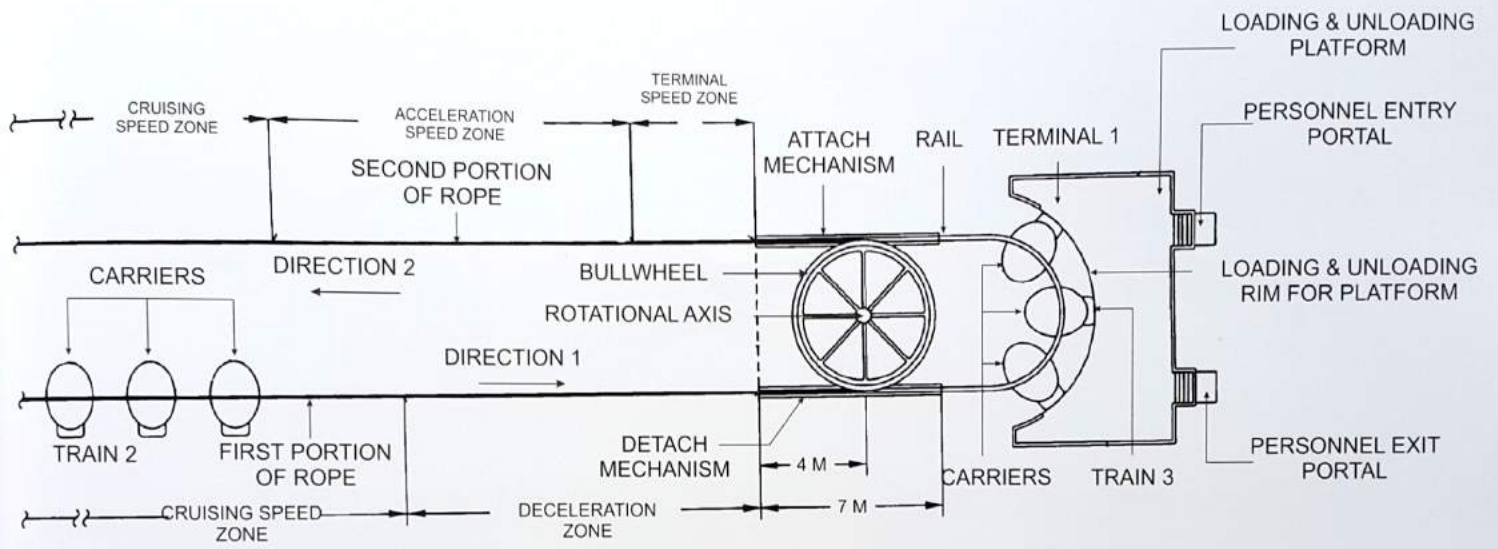
Aerial cableway based for transporting of people up the KILIMANJARO can be done by a gondola system consisting of a series of small gondolas.

In comparison to monocable gondola lifts, bicable gondolas, with their separate track and haul ropes, can be designed with much longer rope spans and can therefore be built in difficult terrain where monocable gondolas cannot. In the case of bicable gondolas, the position of the haul rope beneath the track rope produces a restoring moment in the case of lateral carrier swing. That explains their superior stability in side winds compared with monocable gondolas. The lower frictional forces in the system and the comparatively small masses to be moved in the direction of travel, with the track rope remaining more or less at rest, reduce the peripheral forces in the drive and hence energy costs.

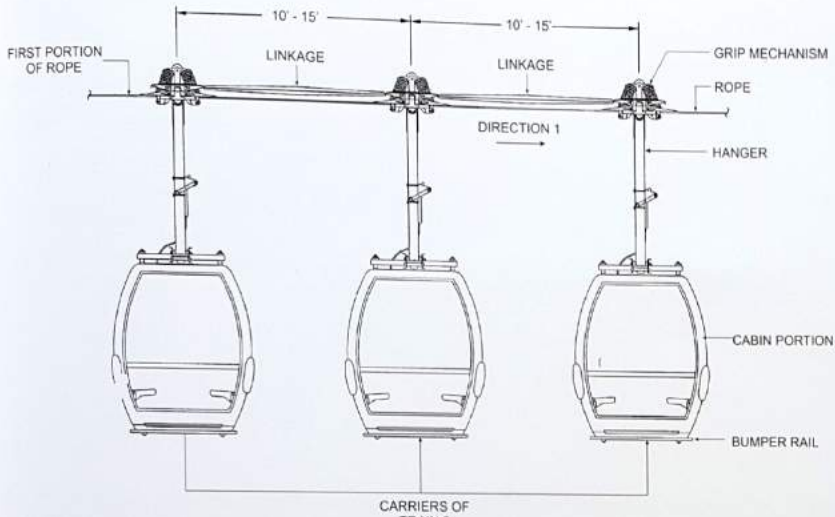


SCHEMATIC PLAN OF TYPICAL AERIAL ROPEWAY TRANSPORT SYSTEM

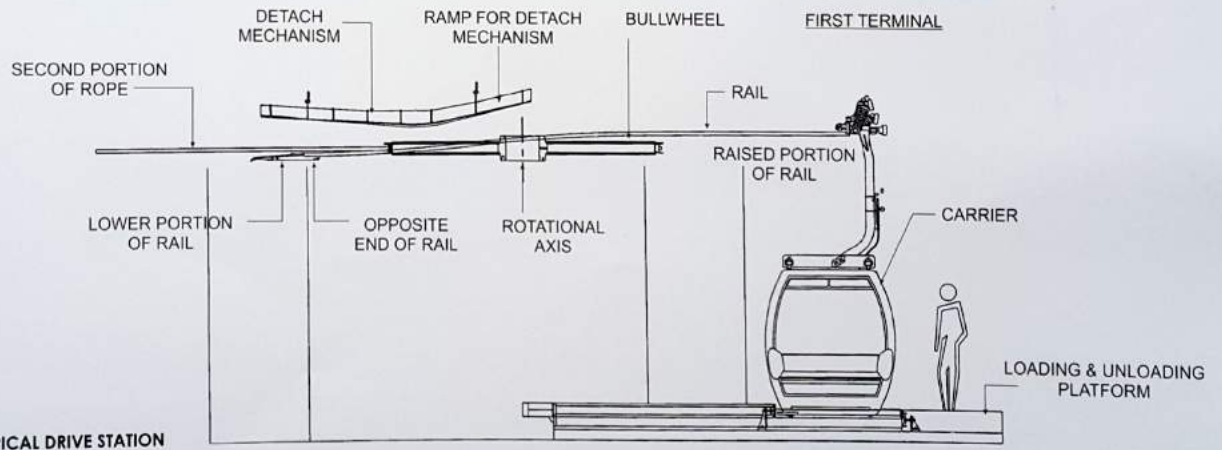




DETAILED PLAN OF PORTION OF A TYPICAL AERIAL ROPEWAY TRANSPORT SYSTEM



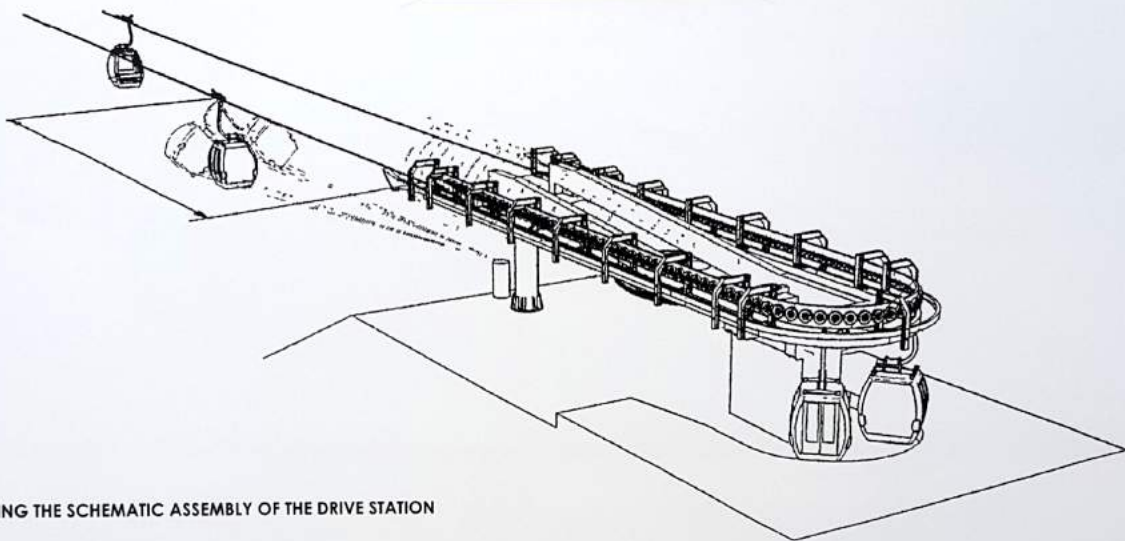
DETAILED ELEVATION OF TYPICAL GONDOLA



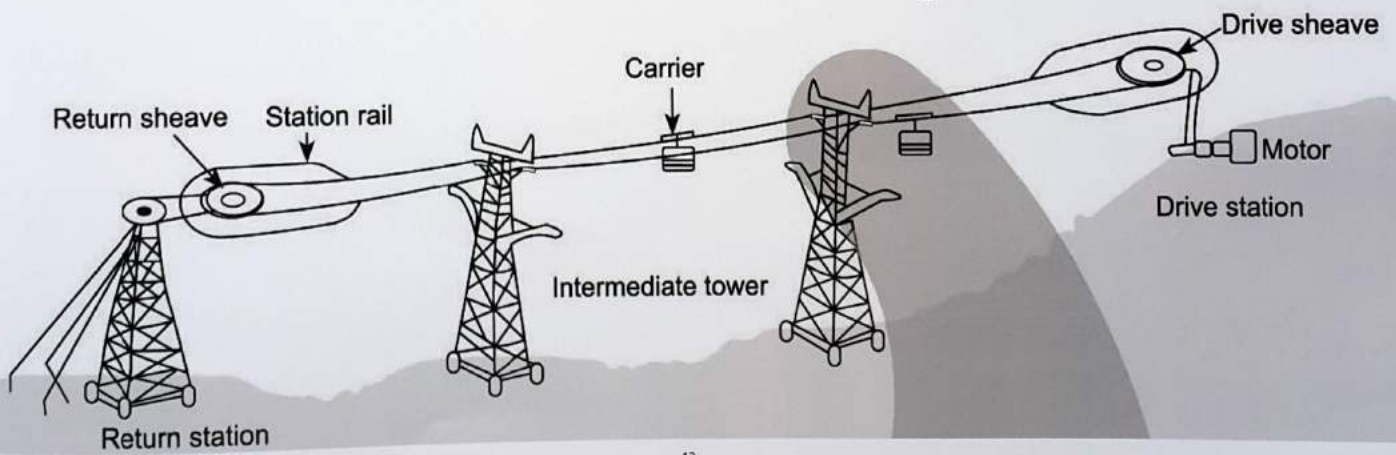
DETAILED ELEVATION OF A TYPICAL DRIVE STATION



DRIVE STATION



SKETCH SHOWING THE SCHEMATIC ASSEMBLY OF THE DRIVE STATION







EXAMPLES OF DRIVE STATION ASSEMBLY





EXAMPLES OF DRIVE STATION AND THE GONDOLA ASSEMBLY

The drive station consists mainly of a concrete building, including the track ropes anchoring drums; the track ropes saddles supports, the embarkation quays, the machinery room, the control room and public access facilities.

The station electro-mechanical equipment consists of:

- Main winch
- Deflecting sheaves complete with fixed shaft, bearings and supporting frames, deflecting sheaves for haul rope (one of these mounted on a counter Weights sliding on vertical guides).
- 1 set of safety and control devices as per relevant norms and codes
- 2 steel carrying rope shoes with support structure;
- 4 set of clamps for truck ropes fixation on the drums;
- 4 automatic gates complete with all around handrails;
- 4 cabin guides
- 2 buffers

For a gondola system the two groups (motor + gear speed reducer) together are able to operate the installation at maximum speed (6 m/s).

The return station consists of a concrete made building, including the track ropes anchoring drums, the track ropes saddles supports, the embarkation quays and public access facilities.

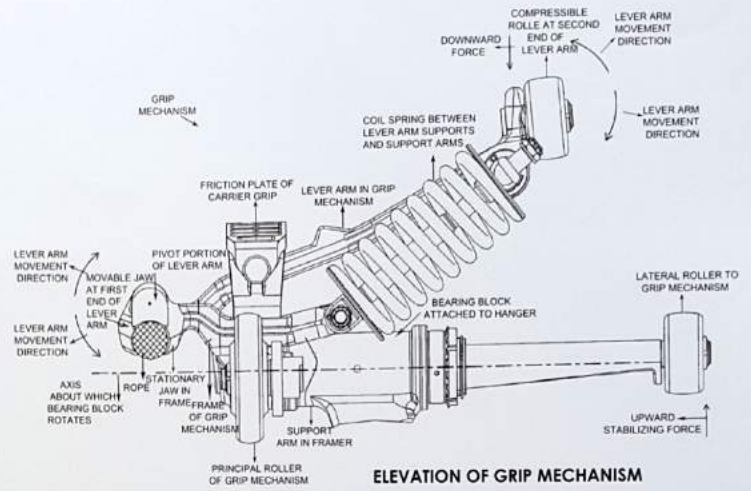
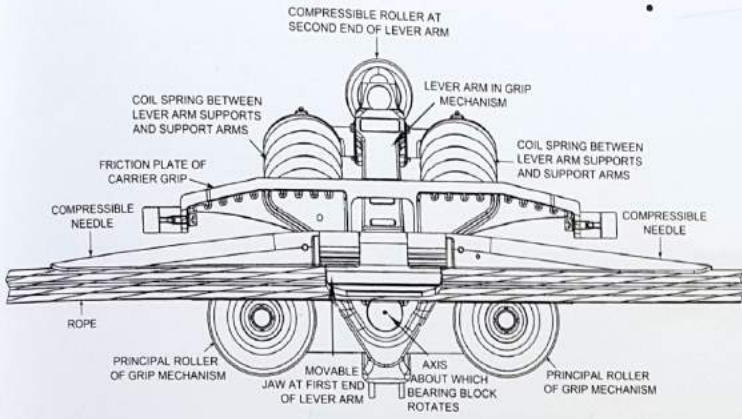
The station electromechanical equipment consists of:

- 2 steel carrying rope shoes
- 4 set of clamps for track ropes fixation on the drums.
- 4 automatic gates complete with all around handrails.
- 4 cabin guides.
- 1 hand operated winch for rescue cabin handling.
- 2 buffers
- Line

The track line is equipped with:

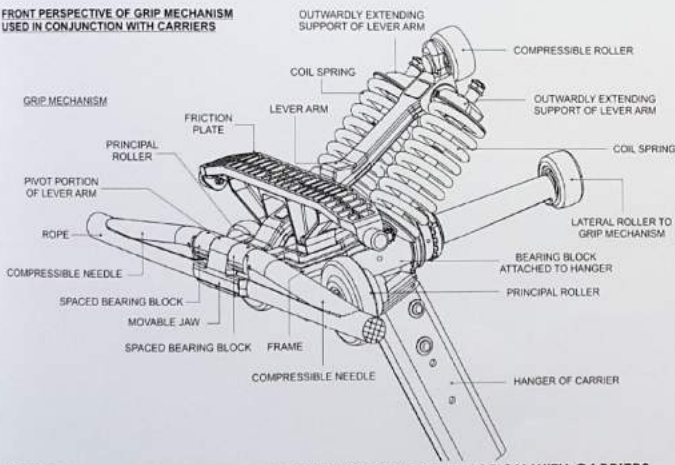
- 2 + 2 carrying steel ropes closed
- 1 haul rope (or 2 half haul ropes)
- Suspended haul rope supports





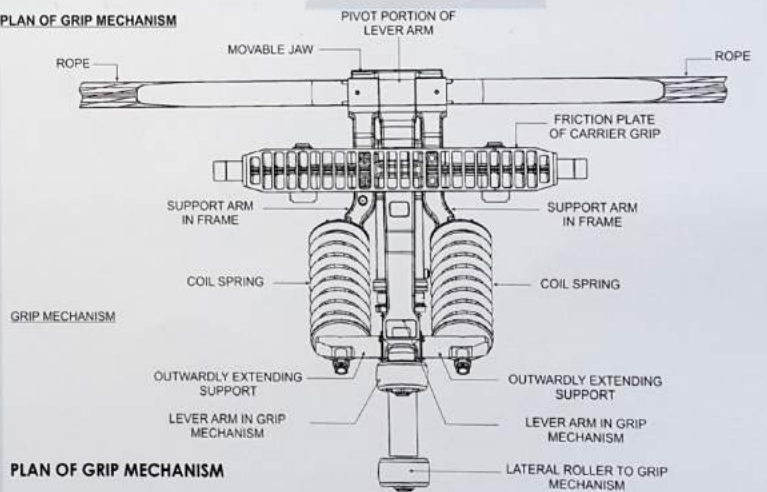
ELEVATION OF GRIP MECHANISM

FRONT PERSPECTIVE OF GRIP MECHANISM USED IN CONJUNCTION WITH CARRIERS



FRONT PERSPECTIVE OF GRIP MECHANISM USED IN CONJUNCTION WITH CARRIERS

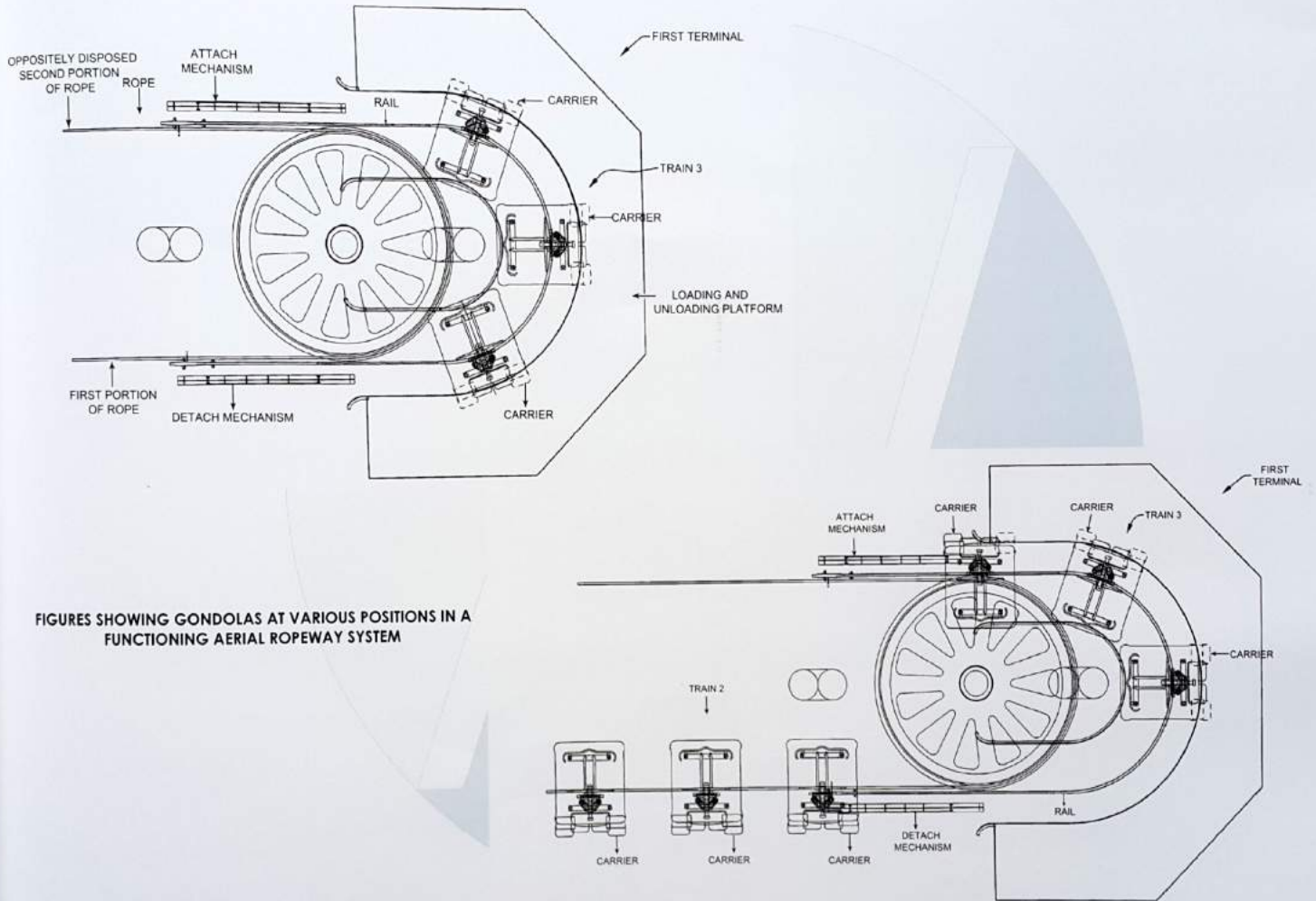
PLAN OF GRIP MECHANISM



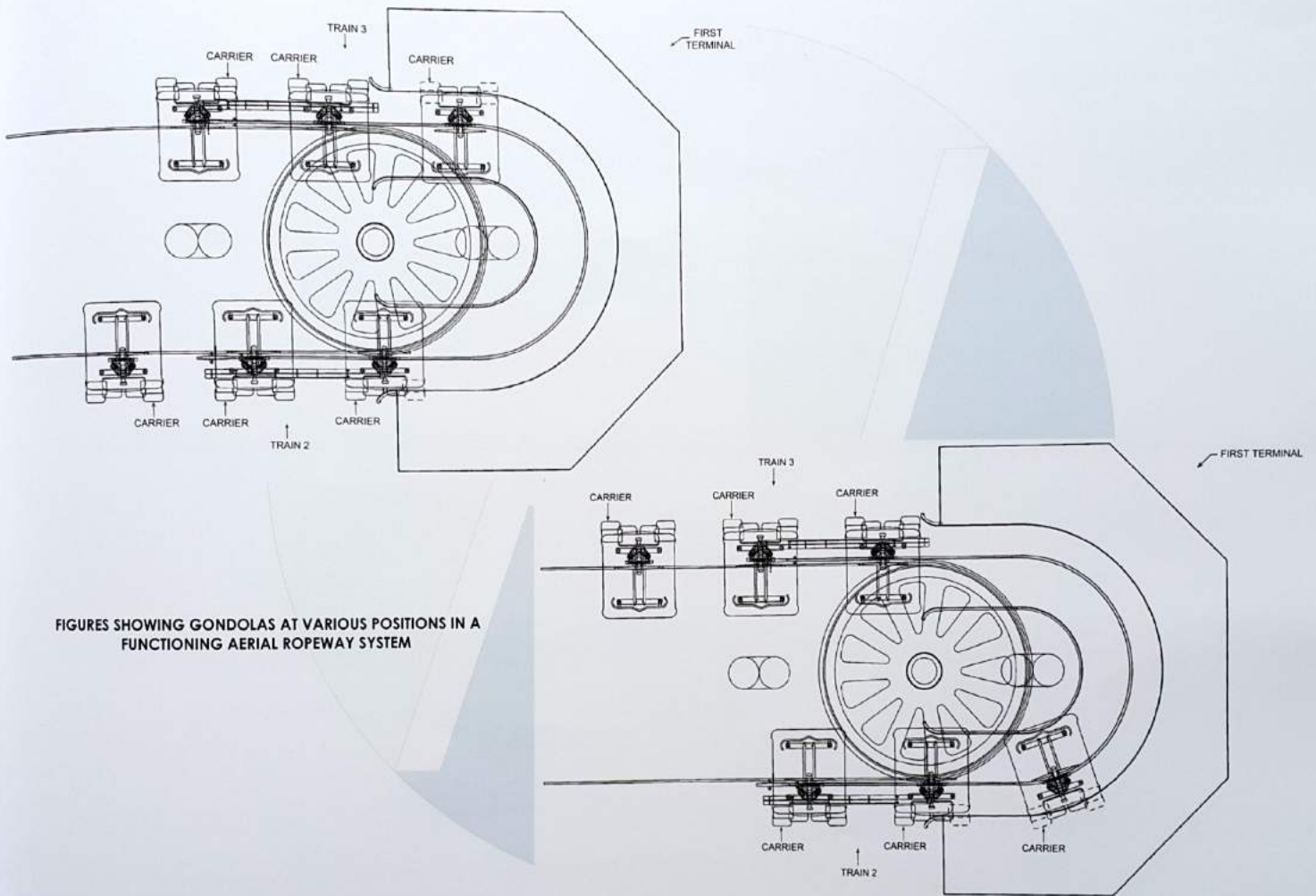
PLAN OF GRIP MECHANISM



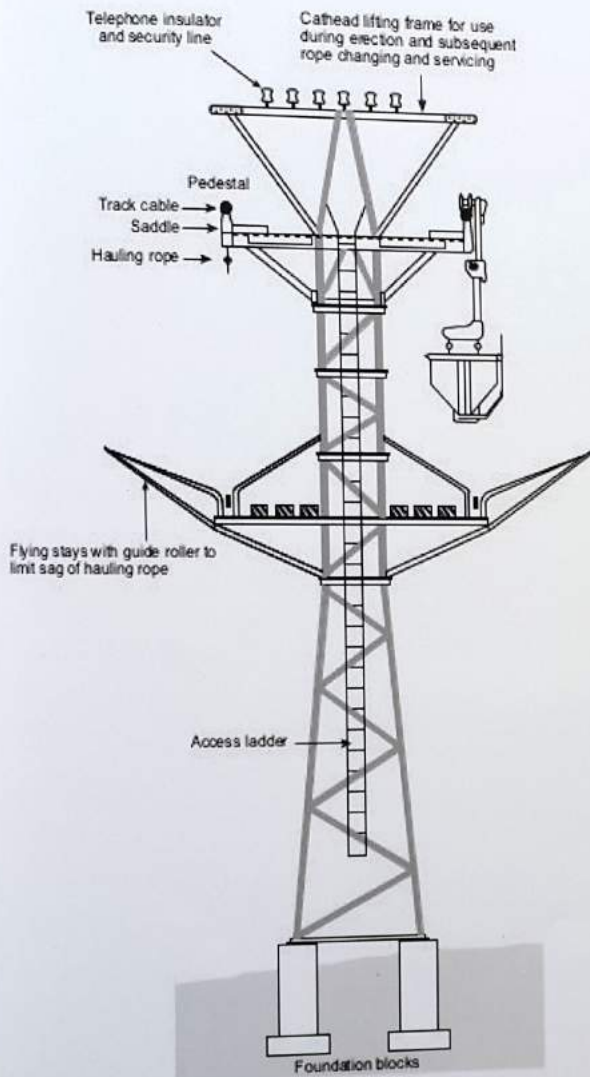




FIGURES SHOWING GONDOLAS AT VARIOUS POSITIONS IN A FUNCTIONING AERIAL ROPEWAY SYSTEM



FIGURES SHOWING GONDOLAS AT VARIOUS POSITIONS IN A FUNCTIONING AERIAL ROPEWAY SYSTEM



Steel structure lattice type towers complete with carrying rope shoes, haul rope rollers, ladders and maintenance walkways.

For a normal cable car system, one or two main vehicles are foreseen for each drive section, each one consisting of:

1 sixteen wheels carriage complete with safety track rope brake, hanger articulation shaft, one haul rope-anchoring unit (drum or/and electronically controlled safety shoes).

1 steel hanger

30 nos passenger gondola aluminium alloy made complete with automatic door.

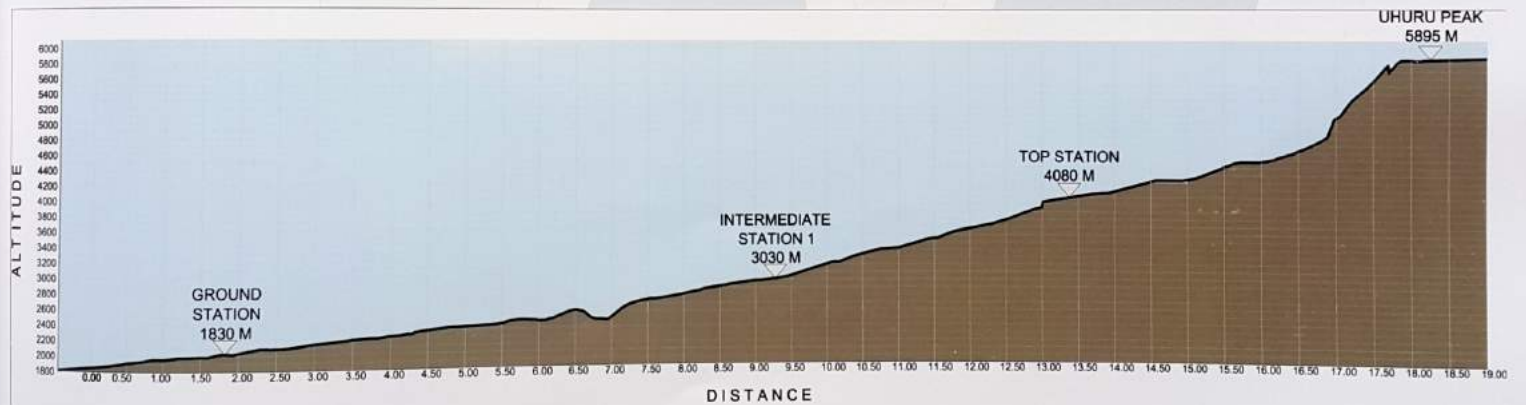
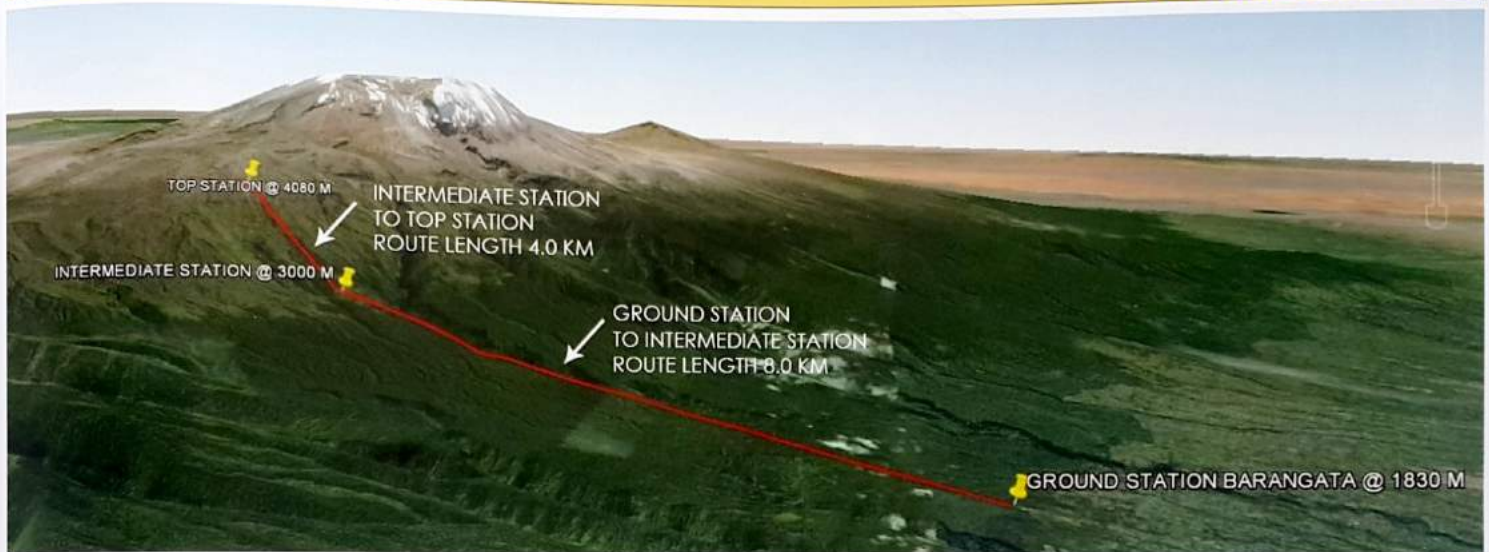
The proposed route provided consists of two sections of distances of 8000m and 4180m, with one intermediate station where people get off. This route is feasible from a technical point of view.



A large, light blue circular graphic containing a stylized, double-outlined 'AV' logo. The letters are white with a light blue outline, and the 'V' is positioned below the 'A'.

***CONCEPTUAL DESIGN***

# CONCEPTUAL DESIGN



## BASE STATION

### DESIGN REQUIREMENTS:

- 1) Parking area for 200 cars , 50 buses : 5000 sqm
- 2) Ticket counter : 40 sqm
- 3) Waiting lounge : 150 sqm
- 4) Washrooms : 60 sqm
- 5) Drive station with loading unloading platforms and stacking area for gondola : 245 sqm
- 6) Control room : 15 sqm
- 7) Administration : 20 sqm
- 8) Staff restrooms : 35 sqm
- 9) Souvenir shop : 15 sqm
- 10) Cafeteria : 300 sqm
- 11) Store : 12 sqm
- 12) Generator back up : 65 sqm

The proposed base station is at a distance of 1.35 km from Machame Gate inside the Kilimanjaro National Park boundary. The architectural character of the base station would be designed to merge with the existing green landscape.

The parking area is purposely located outside the park at a distance of about 1.0 km from the base station so as to avoid the entry of vehicles inside the park to minimise the environmental impact.

Electric buses will be provided for specially abled and elderly people.

Utmost care will be taken to reduce the built foot print of the station to avoid cutting and clearing of existing trees and also to make itself sustainable and energy efficient.

1500 sqm land will be required for the base station within the boundary of the National Park and 5000 sqm of land will be required for parking outside the boundary of the Park.

The pylons required for the ropeway (the precise number and nature of which will be dependent on the final route alignment selected) will have a very small development footprint. The process of construction of these pylon bases will, however need to be surveyed as well in terms of potential biodiversity concerns. The actual potential impacts of the construction processes associated with these base stations will be taken into account, with preferably no road created during the construction process.



LOCATION OF MACHAME GATE



PROPOSED LOCATION OF BASE STATION



## INTERMEDIATE STATION



### DESIGN REQUIREMENTS:

- 1) Drive station with loading unloading platforms and stacking area for gondola : 245 sqm
- 2) Control room : 15 sqm
- 3) Viewing platforms : 200 sqm
- 4) Washrooms : 60 sqm
- 5) Café : 100 sqm
- 6) Store : 25 sqm
- 7) Medical help counter: 15 sqm
- 8) Waiting lounges: 100 sqm
- 9) Souvenir shop : 25 sqm
- 10) Staff restrooms : 35 sqm
- 11) Generator back up : 65 sqm

The proposed intermediate station is at an altitude of 3000 m. It is located near Machame Hut camping site with breathtaking panoramic views. The total foot print of the station is around 900 sqm which will be preferably located on a flatter piece of land for the ease of construction at higher altitude.



EXAMPLES OF INTERMEDIATE STATIONS

## TOP STATION

TOP  
STATION  
AREA : 1454 SQM

CABLE CAR  
ROUTE

### DESIGN REQUIREMENTS:

- 1) Drive station with loading unloading platforms and stacking area for gondola : 245 sqm
- 2) Control room : 9 sqm
- 3) Viewing platforms : 200 sqm
- 4) Waiting lounges : 100 sqm
- 5) Washrooms : 45 sqm
- 6) Cafe : 100 sqm
- 7) Medical help counter : 15 sqm
- 8) Souvenir shop : 15 sqm
- 9) Store : 25 sqm
- 10) Staff restrooms : 35 sqm
- 11) Generator back up : 65 sqm

The proposed top station is at an altitude of 4080 m. It is located near Shira camping site. The total foot print of the station is around 850 sqm which will be preferably located on a flatter piece of land for the ease of construction at higher altitude.



EXAMPLES OF TOP STATIONS



***ENVIRONMENTAL IMPACT  
ASSESSMENT***



## ENVIRONMENTAL ASSESSMENT

Cableways can have a positive impact on the environment, especially in very fragile environments where increased human footfall has a negative impact. The cable way will be built without placing any new roads inside the park boundaries and during construction helicopters can be utilized to deliver construction materials.

Tourists will be able to travel to the escarpment top and walk on controlled walkways without creating erosion and depositing litter along the existing mountain passes. Tourist numbers are only going to increase and visitors need to be afforded access to the scenic beauty of the KILIMANJARO without damaging escarpments.

Revenues generated by the cable car and other fees earned will assist in protecting the existing WHS. Visitors will also take back with them an increased appreciation of the WHS with attendant goodwill towards the mountain and its scenic beauty.

In an environmentally sensitive part of Australia, the Cairns Skyrail constructed without roads over pristine rainforest enables 1000s of visitors to enjoy the scenic beauty of the area without the heavy environmental impact of people traipsing through the forest.

### OVERVIEW OF THE IDENTIFIED POTENTIAL ENVIRONMENTAL IMPACTS

The purpose of this section is to provide an overview of the potential environmental impacts associated with the proposed KILIMANJARO cable car and related environmental management matters, and provide a preliminary assessment as to their implications, and related environmental feasibility for the implementation of the project.

It is conventional to place potential environmental impacts into two broad categories, as being of a biophysical or socio-economic nature. However, as the socio-economic implications and impacts of the cable car are also dealt with in other sections of the overall feasibility report, the main focus in this section is on the potential biophysical impacts of the cable car, with also the visual, aesthetic impact being dealt with a manner appropriate to this preliminary study.

It is also acknowledged that impacts are not always as neatly categorized into particular groups. For example, solid waste and littering, or soil erosion may have negative biophysical impacts, but it may also have socio-economic impacts as well, for example on aesthetics, sense of place or other human values placed on a particular area. For this reason, after the consideration of the potential biophysical impacts, there is a more integrated section, which considers the key environmental management issues during both the construction and operational phases of the development.

During the relevant parts of these following sections the measures that could be applied to mitigate any negative impacts and enhance any positive impacts that could be associated with the cable car are also discussed.

In the discussion of the potential environmental impacts a preliminary study area has been selected which encompasses the anticipated locations of the base station, the various intermediate pylon locations which are dependent on the final alignment selected, and the location of the top cable car station.

## POTENTIAL BIOPHYSICAL ENVIRONMENTAL IMPACTS

The biophysical environmental is comprised of air, water, soil and rocks, biological communities and the ecological processes which link them together within a particular ecosystem. A brief discussion of these components and a preliminary assessment of the potential impacts of the cable car on them are provided below.

## POTENTIAL IMPACTS ON AIR QUALITY

There is presently a high air quality in the area, due to the remote and undeveloped nature of the environment, with no formal agriculture, industry or dense urban settlements in the immediate environs. The main source of potential air pollution at the moment is from any burning of veldt which may occur periodically, either through natural causes such as lightning, or by the local communities to improve pasturage. However, these impacts are transient and not of great significance.

The clear, pure air of the KILIMANJARO can be considered to be one of its primary resources, for local inhabitants and tourists alike, and therefore this quality must be stringently protected.

## AIR IMPACT ASSESSMENT

The cable car motors are electrically operated and no direct air pollution is anticipated therefore from this source. The cable car has probably the least impact on air quality on various assisted forms of transport to gain access to the top station.

Any potential impacts on air quality are likely to be associated with the ancillary facilities associated with the cable car, such as at any stores, restaurants or accommodation units associated with the cable car bottom and top main station, and any related worker accommodation facilities. In these areas there should be the use of electricity, gas or modern smokeless stoves used for heating and cooking to mitigate against any potential impacts from this source.

Another source of air pollution is from waste, either from human sewage or the waste generated from the ancillary facilities. However, this can also be controlled by the installation of the appropriate waste management facilities and their proper management and maintenance. In the case of the uppermost station of the cable car, it is envisaged that all waste will be removed to the base station rather than attempting to dispose it off in any way in this area. In the case of the removal of solid waste from the lower station, a system of solid waste storage and removal to the nearest accredited solid waste disposal site would need to be instituted, either by municipality or through the use of a suitable contractor. These air quality controls can be readily incorporated into an Environmental Management Plan (EMP) which would be required to be compiled for the construction and operation of the cable car. With these measures in place, impacts on air quality are not likely to be significant.



PHYSICAL DATA			
CLIMATE	SOIL	WATER	RISKS
Rainfall Temperature Air quality Wind Noise Micro-climate	Geology Geomorphology Relief Soil productivity Erosion	Surface water, underground water, estuary and ocean water quality and quantity Temperature Eutrophication Salinization	Erosion Flood stream Earthquake Storm

SOCIO ECONOMIC DATA	LAND USE	Forest Agriculture Fisheries Hunting Urban Industrial Recreational Parks
	PATRIMONY	Archaeological Historical Spiritual Human health Landscape
	MAN MADE	Infrastructures Buildings Industries Transportation Communication Services Capital
	RISKS	Fire Change in life style Resettlements



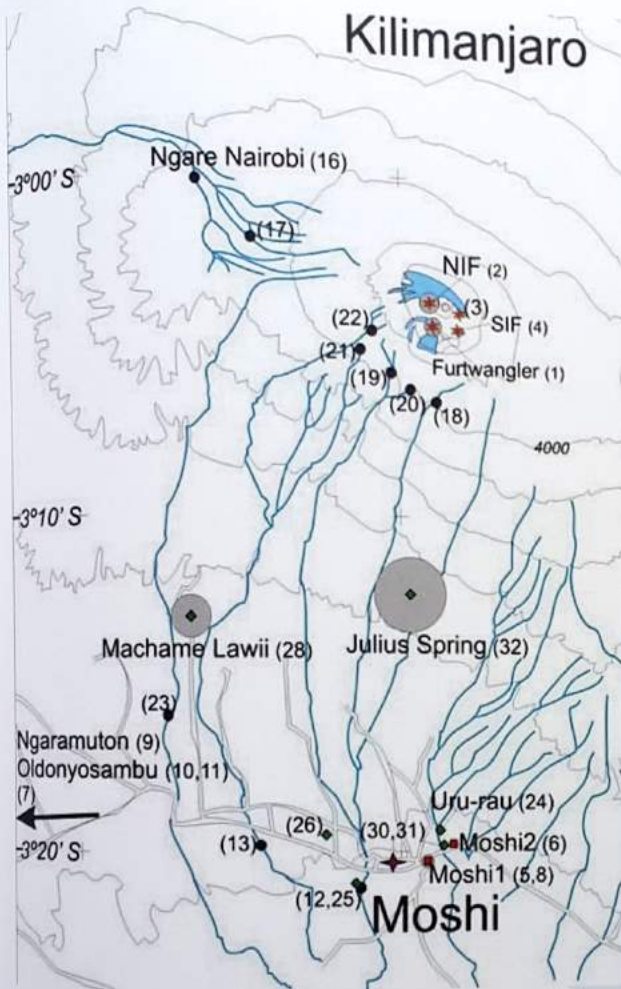
Laws (Water, air wildlife, land uses, parks, reserves, industries, EIA...) Planning documents	REGULATION	LEGAL DATA
Treaties Conventions Donors requirements	INTERNATIONAL	
Habits Rights	CUSTOMARY	

Trees	Domestic	Habitats
Crops	Mammals	Wetlands
Aquatic plants	Birds	Mangroves,
Plankton	Fish	Forests,
Other plants	Other vertebrates	Mountains
Pest species	Invertebrates	Estuaries
Rare, endangered species	Pest species	Animal corridors
FLORA	FAUNA	ECOSYSTEMS
BIOLOGICAL DATA		



# Kilimanjaro

## WATER IMPACT ASSESSMENT



The cable car stations themselves would have a very small footprint, which would not significantly affect the amount of runoff and water yield within the catchment. However, and in particular in the case the base station, where ancillary structures and other areas such as for parking may create relatively substantial areas of hardened impermeable surfaces in the form of roofs and paved surfaces which would increase the amount of storm water run off.

The potential local impacts of increased storm water runoff are discussed in terms of the soil erosion threats in the following section dealing with potential impacts on soil resources during both the construction and operational phases. Appropriate mitigating measures in the form of a properly formulated and implemented storm water management plan are assessed as being able to acceptably mitigate any negative impacts associated with storm water runoff.

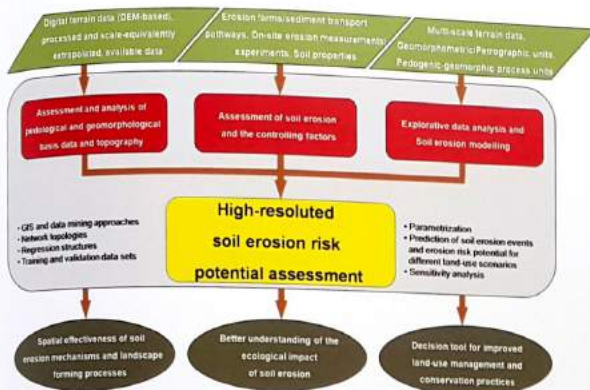
The potential impacts on water are more likely related to affect water quality, both from pollution and soil erosion leading to high sediment loads occurring in streams draining the area which were previously relatively pure.

Potential sources of pollution are identified as being associated with inadequate or inefficient methods of wastewater disposal associated with the cable car stations and also the ancillary facilities that would occur around them, such as shops, restaurants and accommodation.

In the case of the uppermost station, it would be best if these facilities were kept to the minimum. Special systems would have to be employed. These would either use containment tanks to store wastewater in them, with perhaps dry toilet systems to further reduce the amount of wastewater that will be required to be disposed of.

At the main station at the bottom, where the additional facilities are likely to be clustered, the main challenge will be to manage wastewater generated from this station and its environs in such a manner as to prevent pollution of either ground water or the streams of the area. There are various solutions that can be applied with the appropriate engineering expertise which can mitigate against any potential sources of pollution related to the disposal of waste. If these are properly designed, constructed and operated, the potential negative impacts on water resources can be avoided.





## POTENTIAL IMPACT ON SOIL RESOURCES

Impacts on soil resources are considered in terms of the direct impacts on the soil of a particular area, which is a natural resource, being transformed or covered by a development footprint, and the indirect impacts on soil resources related to soil erosion due to badly managed storm water runoff, and trampling of vegetation which creates bare soil vulnerable to erosion.

## SOIL IMPACT ASSESSMENT

Impacts on loss of soil resource as a result of the development footprint are not identified as significant.

In the case of the indirect impacts, there will be the need to control run off from the developed area through a well designed and implemented storm water management plan for both the construction and operational phases. This should be able to be effectively implemented. In fact there would be the potential to rehabilitate the area of the base station not actually in the development footprint from its present condition to an area where present erosion and soil degradation could be rehabilitated.

The development footprint areas of the pylons and the top cable car station are small in size, and the loss of the soil resources that would be covered by these developments are small.

However, these areas occur in areas which are vulnerable to the soil erosion, in particular in the case of the pylon stations which would be placed on knolls of land between the base station and the top station.

Particular care would need to be taken during the construction process to prevent soil erosion from the exposure of bare soil during the construction process, and also to ensure storm water runoff to be properly managed during the operational stage.

Due to their locations, it would be highly desirable to move all construction materials to these pylon and top station locations by means of helicopter. Any construction roads to these points may be impractical, and would also have the potential to create far more significant impacts than the actual development footprint areas themselves, in terms of lack of habitat, potential for soil erosion, and aesthetic impacts as well.

With proper planning and implementation and, where necessary on-going monitoring and management, it is considered that soil erosion could be effectively mitigated to not be a significant impact.

It is also to be noted that the present situation of trails that are used up and down the KILIMANJARO in these parts have caused severe erosion in places, with little or no efforts apparent to mitigate these impacts or rehabilitate eroded areas. In comparison to the trails system, **the cableway's potential impacts is a minimal**, and it is for these sorts of reason that cableways are often selected in various parts of the world.

There is also the potential to enhance the present impacts on trail soil erosion through appropriate mitigation measures that could be linked to an overall environmental management plan for the area within which the cable car is located.

### POTENTIAL IMPACTS ON BIODIVERSITY

Impacts on biodiversity are related to particular species or communities of concern. In a consideration of these potential impacts there has been review of the existent Geographic Information System (GIS) Data Bases for the area and the mapping and tabling of this data in a focussed study area containing within which the cable car route and its surrounding environs.

Vegetation is vulnerable and does need to be taken into account in planning development in an area, and care should be taken to reduce further impacts on vegetation of this type, to prevent it from falling into the endangered or critically endangered categories.

However, a review reveals that none of the vegetation types within which the cable car project is located falls into any of the Critically Endangered, Endangered or Vulnerable categories.

The reason for this is that, taking the full extent and occurrence of these vegetation types into account, due to their nature and location; there have been to date very few developments of either formal agriculture or development in these areas. As a consequence, very little of the types of vegetation occurring in the study has been lost, and therefore, from this perspective of biodiversity conservation none of the vegetation occurring warrants being placed into the Critically Endangered, Endangered or Vulnerable Categories.



## FLORA AND FAUNA

The west of Kilimanjaro sits in a tropical bowl. There are five different climatic zones within the Kilimanjaro National Park.

These zones are:

**Lowlands:** Between 2,600 and 5,900 feet (790-1,800 meters), this is the subtropical area. An area with heavier rainfall, its vegetation is dominated by banana, coffee, and other plants grown as crops.

**Rainforest:** Between 5,900 and 9,200 feet (1,800-2,800 meters), this is a subtropical rainforest rich with plant and animal life. The widest variety of flowering plants range in this zone.

**Moorland and heather:** Between 9,200 feet and 13,100 feet (2,800-4,000 meters), this area has less vegetation and is dominated by a few plant and animal species, including groundsels, lobelias, heather, and tree moss. Trees disappear above 13,000 feet.

**Alpine or high desert:** Between 13,100 and 16,400 feet (4,000-5,000 meters), this arid, semi-desert zone has no trees and few plants. Sage grass, hearty helichrysum flowers, moss, and thistles are common there.

**Arctic or summit:** Above 16,400 feet (5,000 meters), this is an arid zone with intense sunlight, thin air, and heavy snow and ice. Few to no plants grow there.

The southern and western slopes of Mount Kilimanjaro are wetter than its northern and eastern sides.



IMPATIENS KILIMANJARI



MOUNTAIN GLADIOLUS IN THE LOWLAND



KNIPHOFIA THOMSONII



KNIPHOFIA THOMSONII



HELICHRYSUM FLOWERS



**FOUR STRIPPED GRASS MOUSE**



**BLUE MONKEY**

Animals are more numerous down in the forest zone than anywhere else on the mountain; unfortunately, so is the cover provided by trees and bushes, so sightings remain rare.

As with the four-striped grass mice of Horombo, it tends to be those few species for whom the arrival of man has been a boon rather than a curse that are the easiest to spot, including the blue monkeys, which appear daily near the Mandara Huts and which are not actually blue but grey or black with a white throat.

These, however, are merely the plainer relatives of the beautiful colobus monkey, which has the most enviable tail in the animal kingdom; you can see a troop of these at the start of the forest zone on the Rongai Route, by Londerossi Gate and a few near the Mandara Huts too. Olive baboons, civets, leopards, mongooses and servals are said to live in the mountain's forest as well, though sightings are extremely rare; here, too, lives the bush pig with its distinctive white stripe running along its back from head to tail.

Then there's the honey badger. These are the most powerful and fearless carnivores for their size in Africa. Even lions give them a wide berth.

Of a similar size, the armadillo has enormous claws but unlike the honey badger this nocturnal, long-nosed anteater is entirely benign. Both armadillos and honey badgers are rarely, if ever, seen on the mountain. Nor are porcupines, Africa's largest rodents. Though also present in this zone, they are both shy and nocturnal and your best chances of seeing one is as road kill on the way to Dar es Salaam.

Further down, near or just above the cultivated zone, bush babies are more easily heard than seen as they come out at night and jump on the roofs of the huts. Here, too, is the small-spotted genet with its distinctive black-and-white tail, and the noisy, chipmunk-like tree hyrax.

One creature you definitely won't see at any altitude is the rhinoceros. Although a black rhinoceros was seen a few years ago on the north side of the mountain, it is now believed that over-hunting has finally taken its toll of this most majestic of creatures; Count Teleki is said to have shot 89 of them during his time in East Africa, including four in one day, and there are none on – or anywhere – near Kilimanjaro today.

Heath, moorland and above

Just as plant-life struggles to survive much above 2800m, so animals too find it difficult to live on the barren upper slopes. Yet though we may see little, there are a few creatures living on Kilimanjaro's higher reaches.





**COLOBUS MONKEY**



**BUFFALO ARE OCCASIONALLY SEEN, PARTICULARLY ON THE SHIRA PLATEAU AND THE SADDLE AND NEAR KIKELELWA CAMP ON THE RONGAI ROUTE**

Above the tree line you'll be lucky to see much. The one obvious exception to this rule is the four-striped grass mouse, which clearly doesn't find it a problem eking out an existence at high altitude.

Indeed, if you're staying in the Horombo Huts on the Marangu Route, one is probably running under your table while you read this, and if you stand outside for more than a few seconds at any campsite you should see them scurrying from rock to rock. Other rodents present at this level include the harsh-furred and climbing mouse and the mole rat, though all are far more difficult to spot.

For anything bigger than a mouse, your best chance above 2800m is either on the Shira Plateau, where lions are said to roam occasionally, or on the northern side of the mountain on the Rongai Route. Kenya's Amboseli National Park lies at the foot of the mountain on this side and many animals, particularly elephants, amble up the slopes from time to time.

Buffalo are occasionally seen, particularly on the Shira Plateau and the Saddle and near Kikelelwa Camp on the Rongai Route

Grey and red duikers, elands and bushbucks are perhaps the most commonly seen animals at this altitude, though sightings are still extremely rare. None of these larger creatures live above the tree-line of Kilimanjaro permanently, however, and as with the leopards, giraffes and buffaloes that occasionally make their way up the slopes, they are, like us, no more than day-trippers.

On Kibo itself the entomologist George Salt found a species of spider that was living in the alpine zone at altitudes of up to 5500m. What exactly these high-altitude arachnids live on up there is unknown – though Salt himself reckoned it was probably the flies that blew in on the wind, of which he found a few, and which appeared to be unwilling or unable to fly. What is known is that the spiders live underground, better to escape the rigours of the weather.





**THE MALACHITE SUNBIRD**



Kilimanjaro is great for birdlife. The cultivated fields on the lower slopes provide plenty of food, the forest zone provides shelter and plenty of nesting sites, while the barren upper slopes are ideal hunting grounds for raptors.

In the forest, look out for the noisy dark green Hartlaub's turaco, easy to distinguish when it flies because of its bright red under-wings. The silvery-cheeked hornbills and speckled mousebirds hang around the fruit trees in the forest, particularly the fig trees. There's also the trogon which, despite a red belly, is difficult to see because it remains motionless in the branches. Smaller birds include the Ruppell's robin chat (black and white head, grey top, orange lower half) and the common bulbul, with a black crest and yellow beneath the tail.

Further up the slopes, the noisy, scavenging, garrulous white-necked raven is a constant presence on the heath and moorland zones, eternally hovering on the breeze around the huts and lunch-stops on the lookout for any scraps. Smaller but just as ubiquitous is the alpine chat, a small brown bird with white side feathers in its tail, and the streaky seed-eater, another brown bird (that often hangs around the huts). The alpine swift also enjoys these misty, cold conditions.

The prize for the most beautiful bird on the mountain, however, goes to the dazzling scarlet-tufted malachite sunbird.

Metallic green save for a small scarlet patch on either side of its chest, this delightful bird can often be seen hovering above the grass, hooking its long beak in to reach the nectar from the giant lobelias or feeding on the lobelias.

Climbing further and we come to raptor territory. You'll rarely see these birds up close as they spend most of the day gliding on the currents looking for prey. The mountain and augur buzzards are regularly spotted hovering above the saddle.

These are impressive birds in themselves – especially if you're lucky enough to see one up close – though neither is as large as the enormous crowned eagle and the rare lammergeyer, a giant vulture with long wings and a wedge tail

**WHITE-NECKED RAVEN, A COMMON VISITOR TO THE CAMPSITES ON KILIMANJARO**



VARIETY OF SUNBIRDS IS FOUND IN THE REGION



VARIETY OF SUNBIRDS IS FOUND IN THE REGION



HORNBILL FOUND IN THE REGION



## BIODIVERSITY IMPACT ASSESSMENT

The KILIMANJARO can be considered to be a generally sensitive habitat. However, in terms of the presence of endangered or critically endangered representative plant communities this not the case, as they are well represented in large areas of undisturbed vegetation. However, due to the fragility of the landscape, and susceptibility to such aspects as erosion, the area can be considered to be environmentally sensitive.

In regard to individual species, the small footprint of the development, the fact that the base station can be located in a highly disturbed zone, the wide distribution of species of importance in the study area and elsewhere, and the effective planning, control and management of development at the top can mitigate against any significant negative environmental impacts on biodiversity.

## POTENTIAL VISUAL IMPACTS

Although there is some degree of overlap, visual impacts can be conveniently considered to be essentially comprised of two sorts, obstruction and intrusion.

### OBSTRUCTION IMPACTS

This is where an object, such as a new building, obstructs an existing view of the viewer from a particular vantage point. If this were considered to be an attractive view, which is obstructed, then this would be assessed as a negative impact, the impact being roughly in proportion to the amount of obstruction, which occurs. However, in the case of the cable car, due to its nature and location, obstructive negative impacts are not identified as being significant.

### INTRUSIVE IMPACTS

Intrusive impacts are associated with more general views of the landscape. A negative intrusion is where a desirable or attractive landscape view is altered by the introduction of a new object within it, which is considered to be less desirable or attractive than the presently viewed landscape. This is likely to be brought about when the new object is markedly different from, or not in character or harmonious with, the present view of the landscape.

Although the appreciation of intrusive impacts is essentially subjective in nature, it is likely that there would be many who would consider that the visibility of the cable car and its accessory facilities would be considered to be an intrusive negative impact. This would include those who considered the high KILIMANJARO as a "Wilderness Zone" with pristine and almost sacrosanct qualities associated with it. This consideration of these negative impacts would be associated with both the ascent of the cable car to the top and, perhaps even more strongly, with the presence of these structures on the KILIMANJARO.

The persons that would be directly affected by the cable car on an on-going, permanent basis would be those in the local community where the cable car will be located. Therefore, besides the views of the tourists and others to the area, the views of these directly affected parties are important to obtain and assess in terms of their potential impacts on the feasibility of the project.

It is considered that it is highly unlikely that the views of those most opposed to the cable car on aesthetic, visual grounds would ever be changed. However, certain aspects of location and the measures that can be taken, can at least mitigate these views, and also demonstrate that a sensitive approach to the potential negative impacts has been adopted in the project. The situation and related measures include:

- The fact that the cable car is located in an area of the KILIMANJARO National Park where there are presently no major tourism facilities of an ecotourism nature, which would be impacted on by the visual presence of the cable car.
- **Great care will be taken to ensure that all structures associated with the cable car are as harmonious and appropriate to the unique setting as possible. Creative Architecture and the use of appropriate finishes and material, for example, the use of local stone and colours in sympathy with those of the local landscape, can be used to mitigate the negative impacts on the one hand, and at the same time create structures that might be considered appropriate, interesting and appealing to others.**



Visual impacts are of a subjective nature, and some may consider the appearance of the cable car as unacceptable within the context of the KILIMANJARO . In the case of the local community, their views will also need to be canvassed. In their case the strong positive socio-economic benefits associated with the cable car are assessed as being likely to outweigh any concerns that they may have in regard to its potential negative visual impacts.

With the appropriate mitigating measures, the visual impacts of the cable car are assessed as being not so significant as to prevent it occurring by the relevant permitting authorities.

Management of the potential impacts associated with construction and infrastructure:

The preparation and planning of the cable car will precede the formal environmental permitting processes for this project. These permitting processes will include the EIA regulations, which apply in **TANAPA** region.

Due to the significant nature of the cable car proposal, the formal permitting process will follow the "full environmental impact assessment (EIA) process of both a scoping phase and an environmental impact report phase.

It is the purpose of this section to identify and elaborate on and recommend those measures which should be incorporated into the phase of the project to prepare it later for any formal environmental permitting processes which will be applied to it before it may be commenced with.

There should be the formulation and implementation of an Environmental Management Programme (EMP), which would include all the necessary mitigation measures to be incorporated into the detailed planning, design and construction of the cable car and all accessory structures.

This EMP would be further amended and finalized as part the formal environmental permitting EIA processes. This EMP would include the considerations of the required input from a broadly based stakeholder participation process, where the various concerns of the various stakeholders will be taken into account, the input and guidelines provided by various specialists, and the requirements of the relevant authorities.

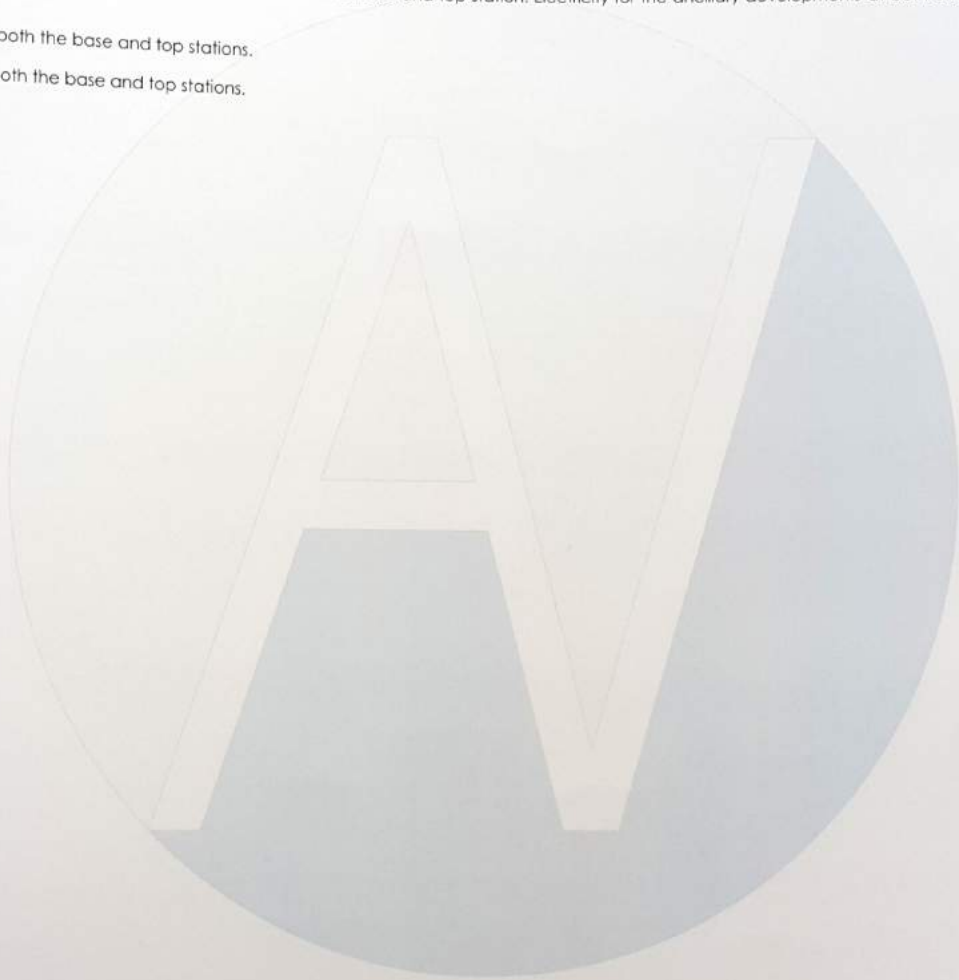
### **THE COMPONENTS OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME WOULD INCLUDE, BUT WOULD NOT BE NECESSARILY RESTRICTED TO THE FOLLOWING COMPONENTS:**

- Preconstruction activities such a detailed site surveys, mitigation measures to apply to avoid impacts on species of importance and other measures to be put in place before any actual construction processes are commenced with.
- Construction management measures to ensure that all appropriate measures are implemented to mitigate environmental impacts during the construction process.
- Post construction rehabilitation measures and also any other measures to enhance the environmental qualities of the wider environment within which the development is occurring, for example in regard to the removal of existing vegetation and erosion areas that presently occur in the area.

Concerning the aspect of infrastructure provision to enable the construction and operation of the cable car, the commissioned specialist engineering services report would describe the provision of the necessary engineering services for the cable car and its ancillary structures, and would be required to take into account the prescribed environmental management measures in the EMP. These engineering services and their related environmental considerations would include:

- a. Any required road upgrading to enable vehicular traffic to reach the base station.
- b. The provision of potable water at both, the base station and the top station noting that, if necessary, the top station could be provided with water brought up from the base station by means of the cable car.

- c. The provision of sufficient electrical supply to run the cable car, at both the base and top station. Electricity for the ancillary developments at both ends of the cable car would also be required.
- d. The disposal of wastewater from both the base and top stations.
- e. The disposal of solid waste from both the base and top stations.



## CONSTRUCTION AND INFRASTRUCTURE ASSESSMENT

The construction of the development is in some respects in a challenging environment, which is also presently limited in regard to the required engineering infrastructure.

However, with proper planning and management, as guided by a self formulated environmental management program, there are not environmental impacts identified at this stage that are significantly negative to prevent the development proceeding in the manner proposed.

Consideration of Potential Impacts in terms of on-going processes:

The longer-term potential impacts of the proposed cable car during its on-going operation have the potential, if not properly managed, of having significant negative impacts associated with them. These potential impacts are therefore required to be identified as fully as possible in advance, and taken into account in the formulation and implementation of an environmental management programme (EMP) for the operational phase of the development.

This operational EMP will include measures to address the potential environmental impacts associated with:

- The presence of greater numbers of people at the top of the high KILIMANJARO. There will be the need to both protect them from hazards in this potentially dangerous environment, and to also protect the environment from their presence as well. There will be the need to prevent trampling, littering, uncontrolled movements and to ensure that there is in all respects environmentally appropriate behaviour in this environment. The need to establish the limits of the carrying capacity of the environment at the top of the KILIMANJARO would need to also be established as a component of the on-going environmental management programme for the cable car.
- At the base station it will be important that there is the proper implementation of all environmental management measures with the on-going EMP. In addition, it is most important that there are measures and appropriate monitoring and enforcement to ensure that there is not the uncontrolled proliferation of inappropriate ancillary developments and activities at the base station, which would detract from the unique experience that the cable car is intended to provide.
- There will be the need to ensure that there is the implementation of appropriate environmental management measures in regard to solid waste management and the prevention of littering, the prevention of soil erosion, impacts on any species of importance, and the required monitoring, reporting and policing of all aspects of environmental management.
- The enlisting of the assistance and involvement of the relevant environmental management and conservation bodies in Kilimanjaro National Park region and also UNESCO (bearing in mind the proximity of the project to their World Heritage Site) will also have to occur.
- The positive participation and contribution of the local affected communities within Kilimanjaro National Park region will also be essential if the long term, sustainable and environmentally acceptable management of the cable car project.



## INFRASTRUCTURAL REQUIREMENTS

Even assuming that the proposed development simply provides day access facilities, a minimal level of infrastructure is required for the development to be successful. The most pressing infrastructural concern is the state of the roads surrounding the proposed site to ensure that tourists with low vehicles have no problems in accessing the site. Upgrade of the road network, substantial signage that advertises and provides directions to the proposed site will need to be erected.

### POOR STATE OF ROAD

Substantial landscaping and civil engineering on the site itself will need to be undertaken in order for a parking area to be built. With the emphasis on tour groups and day visitors, most visitors to the cable car would be expected to bring their own vehicles. In addition to parking for visitors, the parking area should also have space for parking for buses. The size of the proposed site and its topography may make providing sufficient parking a major challenge. The supply of electricity and water to the proposed site could also be a challenge in the context of difficult terrain in the Municipality but on account of the proximity to homesteads should just be a case of extending the electricity lines and water pipes from that area.

Basic summary of major infrastructural requirements

- Upgrade of main road linking
- Tarring of the small dirt road leading to the proposed site
- Provision of signage and major intersections
- Construction of parking space at the proposed site
- Extension of water and electricity supply to the proposed site

### COMMUNITY IMPACT ASSESSMENT

The local Barangata community will benefit in the form of land rental income, employment opportunities and new business opportunities. Given the large capital costs of the development, immediate profit returns in terms of a dividend flow to investors in the cableway will not be large. The core development would be in the form of a cableway with a café, restaurant and bar at the top station. Only the potential for other ancillary and independent business opportunities at the bottom station is high. This could include craft shops, bars, restaurants, cafés, outlets for merchandise linked to the cable car, accommodation and other traditional KILIMANJARO activities such as day hikes and adventure activities organised by persons from the local community.

### CONCLUSION AND RECOMMENDATIONS

The cable way is technically feasible. Whilst a cableway in the environment envisaged is an expensive development there is sufficient precedent in Tanzania and around the world to suggest the venture would be financially feasible. The market demand assessment suggests that the cableway will attract significantly increased numbers of tourists to the area, building on the already significant tourism demand in the study area. There is no fatal flaw identified in the initial environmental assessment to suggest it should not proceed to a business planning and implementation phase with a full environmental impact assessment to be undertaken prior to development commencing. Community engagement needs to be conducted in a sensitive manner.

**QUESTIONS ???**

## FREQUENTLY ASKED QUESTIONS AND COMMENTS

### WHAT ABOUT THE WEATHER, STRONG WINDS, RAIN AND MIST?

Many cableways around the world only operate during challenging seasons (often the mid-winter snow skiing season) and weather conditions are a concern however users will have a variety of options to choose from on the summit which could influence their decision to ascend. On days when it is misty at the base station it is often clear on the escarpment making for a memorable trip. On autumn, winter and spring days when it is raining at the base it is often clear or snowy on the escarpment. On days when snow is prevalent on the escarpment many tourists will be attracted to the summit because of the extreme weather conditions. The cableway can present an opportunity to ascend to better weather or to a chance to enjoy the snow. The cableway will operate below the escarpment and can operate comfortably in winds of up to 100km/h and the superstructure will be designed to withstand prolonged winds of up to 160km/h.

### WHAT ABOUT THE SAFETY AND SECURITY OF THE PASSENGERS?

There are many cableways all over the world that operate in poor weather. Adequate safety measures would need to be in place and this should not be seen as an inevitable obstacle to successful operation. Cableways operate in much colder climates and at much higher altitudes than the proposed KILIMANJARO cableway. Cable cars are designed as Faraday cages and occupants will be completely safe in the event of an electric storm.

### IS THERE COMMUNITY SUPPORT?

Community engagement, participation and support is crucial to the success of this project, which will not proceed without the said community support.

### DOES THE PROJECT IMPACT ON THE WORLD HERITAGE SITE?

All required EIA's will be undertaken if the proposed cableway development progresses to implementation. Conservation areas have developments in them all over Tanzania. We believe that a cableway is the least impactful means of facilitating access of large numbers of tourists to wilderness areas. It can be argued that cableways are significantly less impactful than roads, bridle paths, hiking trails and helicopters. Conservationists realize the importance of enabling tourist access to these areas and support such access if it can be planned and undertaken in a sustainable manner that is not damaging to the environment.

### WILL THE BLEAK TOP OF THE ESCARPMENT BE APPEALING TO VISITORS?

Cableway users will enjoy lush views on the way up and down, plus get to enjoy an unfamiliar alpine landscape with wildlife and livestock on the escarpment top as well as beautiful panoramas.





***INTERNAL REVENUE RETURN  
(IRR)***

**Mt. Kilimanjaro Aerial Cableway - IRR for 10 year period**

YEARS	AFTER	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
<b>Income Statements</b>											
Gross revenue											
Foreign ticket sales		2,58,06,250.00	2,71,64,473.68	2,85,94,182.83	3,00,99,139.82	3,16,83,305.07	3,33,50,847.44	3,51,06,155.20	3,69,53,847.58	3,88,98,786.93	4,09,46,091.50
Resident ticket sales		2,10,00,000.00	2,21,05,263.16	2,32,68,698.06	2,44,93,366.38	2,57,82,490.93	2,71,39,464.13	2,85,67,856.98	3,00,71,428.40	3,16,54,135.16	3,33,20,142.27
Restaurant sales		5,62,500.00	5,92,105.26	6,23,268.70	6,56,072.31	6,90,602.44	7,26,949.93	7,65,210.45	8,05,484.69	8,47,878.62	8,92,503.81
Gift shop sales		10,50,000.00	11,05,263.16	11,63,434.90	12,24,668.32	12,89,124.55	13,56,973.21	14,28,392.85	15,03,571.42	15,82,706.76	16,66,007.11
Tax on revenue	18%	(31,93,750.00)	(33,61,842.11)	(35,38,781.16)	(37,25,032.80)	(39,21,087.16)	(41,27,460.17)	(43,44,694.92)	(45,73,363.07)	(48,14,066.39)	(50,67,438.30)
Net revenue after taxes		(46,45,080.00)	(48,89,557.89)	(51,46,903.05)	(54,17,792.68)	(57,02,939.66)	(60,03,094.38)	(63,19,046.72)	(66,51,628.13)	(70,01,713.82)	(73,70,225.07)
Foreign ticket sales		2,11,61,170.00	2,22,74,915.79	2,34,47,279.78	2,46,81,347.14	2,59,80,365.41	2,73,47,753.06	2,87,87,108.48	3,03,02,219.46	3,18,97,073.11	3,35,75,866.43
Resident ticket sales		1,72,20,000.00	1,81,26,315.79	1,90,80,332.41	2,00,84,560.43	2,11,41,642.56	2,22,54,360.59	2,34,25,642.73	2,46,58,571.29	2,59,56,390.83	2,73,22,516.66
Restaurant sales		4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00
Gift shop sales		8,61,000.00	9,06,315.79	9,54,016.62	10,04,228.02	10,57,082.13	11,12,718.03	11,71,282.14	12,32,928.56	12,97,819.54	13,66,125.83
Commissions paid	30%	(26,18,875.00)	(27,56,710.53)	(29,01,800.55)	(30,54,526.90)	(32,15,291.47)	(33,84,517.34)	(35,62,649.83)	(37,50,157.72)	(39,47,534.44)	(41,55,299.41)
Net revenue after commissions		(51,66,000.00)	(54,37,894.74)	(57,24,099.72)	(60,25,368.13)	(63,42,492.77)	(66,76,308.18)	(70,27,692.82)	(73,97,571.39)	(77,86,917.25)	(81,96,755.00)
Foreign ticket sales		1,59,95,125.00	1,68,12,697.37	1,76,73,299.86	1,85,79,197.22	1,95,32,773.39	2,05,36,537.78	2,15,93,131.88	2,27,05,336.18	2,38,76,077.56	2,51,08,436.91
Resident ticket sales		1,20,54,000.00	1,26,88,421.05	1,33,56,232.69	1,40,59,192.30	1,47,99,149.79	1,55,78,052.41	1,63,97,949.91	1,72,60,999.90	1,81,69,473.58	1,91,25,761.67
Restaurant sales		4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00	4,61,250.00
Gift shop sales		8,61,000.00	9,06,315.79	9,54,016.62	10,04,228.02	10,57,082.13	11,12,718.03	11,71,282.14	12,32,928.56	12,97,819.54	13,66,125.83
Commissions paid		(26,18,875.00)	(27,56,710.53)	(29,01,800.55)	(30,54,526.90)	(32,15,291.47)	(33,84,517.34)	(35,62,649.83)	(37,50,157.72)	(39,47,534.44)	(41,55,299.41)
Variable operating costs	35%	(55,98,293.00)	(58,92,940.00)	(62,03,094.74)	(65,29,573.41)	(68,73,235.17)	(72,34,984.38)	(76,15,773.04)	(80,16,603.20)	(84,38,529.68)	(88,82,662.82)
Gross margin		1,03,96,832.00	1,09,44,033.68	1,15,20,035.46	1,21,26,353.11	1,27,64,582.22	1,34,36,402.34	1,41,43,581.41	1,48,87,980.43	1,56,71,558.35	1,64,96,377.21
MKNP concession fees		(18,00,000.00)	(18,94,736.84)	(19,94,459.83)	(20,99,431.40)	(22,09,927.79)	(23,26,239.78)	(24,48,673.46)	(25,77,551.01)	(27,13,211.59)	(28,56,012.19)
Salaries		(5,40,000.00)	(5,68,421.05)	(5,98,337.95)	(6,29,829.42)	(6,62,978.34)	(6,97,871.93)	(7,34,602.04)	(7,73,265.30)	(8,13,963.48)	(8,56,803.66)
Fixed operating expenses		(25,00,000.00)	(26,31,578.95)	(27,70,083.10)	(29,15,876.95)	(30,69,344.16)	(32,30,888.59)	(34,00,935.35)	(35,79,931.95)	(37,68,349.42)	(39,66,683.60)
EBIT		1,02,01,957.00	1,07,38,902.11	1,13,04,107.48	1,18,99,060.50	1,25,25,326.85	1,31,84,554.58	1,38,78,478.50	1,46,08,924.74	1,53,77,815.51	1,61,87,174.22
Depreciation		(40,00,000.00)	(40,00,000.00)	(40,00,000.00)	(40,00,000.00)	(40,00,000.00)	(40,00,000.00)	(40,00,000.00)	(40,00,000.00)	(40,00,000.00)	(40,00,000.00)
Profit before tax		62,01,957.00	67,38,902.11	73,04,107.48	78,99,060.50	85,25,326.85	91,84,554.58	98,78,478.50	1,06,08,924.74	1,13,77,815.51	1,21,87,174.22
Taxation	30%	(12,28,404.00)	(12,93,056.84)	(13,61,112.47)	(14,32,749.96)	(15,08,157.86)	(15,87,534.59)	(16,71,089.04)	(17,59,041.09)	(18,51,622.20)	(19,49,076.00)
Profit after tax		49,73,553.00	52,35,318.95	55,10,862.05	58,00,907.42	61,06,218.34	64,27,598.25	67,65,892.90	71,21,992.52	74,96,834.23	78,91,404.46
<b>Balance Sheets</b>											
<b>Cableway and other fixed assets</b>											
		4,00,00,000.00	3,60,00,000.00	3,20,00,000.00	2,80,00,000.00	2,40,00,000.00	2,00,00,000.00	1,60,00,000.00	1,20,00,000.00	80,00,000.00	40,00,000.00
Current assets		1,18,89,642.85	1,16,36,416.41	1,22,46,864.06	1,28,89,440.54	1,35,65,836.84	1,42,77,832.94	1,50,27,302.51	1,58,16,217.86	1,66,46,655.07	1,75,20,799.49
Receivables		13,14,667.81	13,81,865.54	14,52,599.99	15,27,057.31	16,05,433.43	16,87,934.61	17,74,777.96	18,66,192.02	19,62,417.33	20,63,707.14
Inventories		3,73,443.95	(4,84,351.23)	(5,09,843.40)	(5,36,677.27)	(5,64,923.44)	(5,94,656.25)	(6,25,953.95)	(6,58,898.89)	(6,93,577.78)	(7,30,081.88)
Cash and bank		1,02,01,531.09	1,07,38,902.11	1,13,04,107.48	1,18,99,060.50	1,25,25,326.85	1,31,84,554.58	1,38,78,478.50	1,46,08,924.74	1,53,77,815.51	1,61,87,174.22
Current liabilities		(4,60,133.67)	(4,84,351.23)	(5,09,843.40)	(5,36,677.27)	(5,64,923.44)	(5,94,656.25)	(6,25,953.95)	(6,58,898.89)	(6,93,577.78)	(7,30,081.88)
Trade payables		(4,60,133.67)	(4,84,351.23)	(5,09,843.40)	(5,36,677.27)	(5,64,923.44)	(5,94,656.25)	(6,25,953.95)	(6,58,898.89)	(6,93,577.78)	(7,30,081.88)
Receiver of revenue		-	-	-	-	-	-	-	-	-	-
Employment of capital		5,14,29,509.17	4,71,52,065.18	4,37,37,020.66	4,03,52,763.28	3,70,00,913.40	3,36,83,176.69	3,04,01,348.57	2,71,57,318.97	2,39,53,077.28	2,07,90,717.62
Share capital		1	1	1	1	1	1	1	1	1	1



YEARS COMMENCEMENT	AFTER	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Shareholders loans		4,00,00,000.00	4,00,00,000.00	4,00,00,000.00	4,00,00,000.00	4,00,00,000.00	4,00,00,000.00	4,00,00,000.00	4,00,00,000.00	4,00,00,000.00	4,00,00,000.00
Retained income		49,73,553.00	52,35,318.95	55,10,862.05	58,00,907.42	61,06,218.34	64,27,598.25	67,65,892.90	71,21,992.52	74,96,834.23	78,91,404.46
Total shareholders interests		4,49,73,553.00	4,52,35,318.95	4,55,10,862.05	4,58,00,907.42	4,61,06,218.34	4,64,27,598.25	4,67,65,892.90	4,71,21,992.52	4,74,96,834.23	4,78,91,404.46
Borrowings		-	-	-	-	-	-	-	-	-	-
Total capital employed		4,49,73,553.00	4,52,35,318.95	4,55,10,862.05	4,58,00,907.42	4,61,06,218.34	4,64,27,598.25	4,67,65,892.90	4,71,21,992.52	4,74,96,834.23	4,78,91,404.46
Cash flow statements											
EBITDA		1,02,01,957.00	1,07,38,902.11	1,13,04,107.48	1,18,99,060.50	1,25,25,326.85	1,31,84,554.58	1,38,78,478.50	1,46,08,924.74	1,53,77,815.51	1,61,87,174.22
Change in working capital		12,27,978.09	4,13,163.07	4,32,913.18	4,53,702.77	4,75,586.55	4,98,622.11	5,22,870.07	5,48,394.23	5,75,261.77	6,03,543.39
Taxation paid		(12,28,404.00)	(12,93,056.84)	(13,61,112.47)	(14,32,749.96)	(15,08,157.86)	(15,87,534.59)	(16,71,089.04)	(17,59,041.09)	(18,51,622.20)	(19,49,076.00)
Capex		-	-	-	-	-	-	-	-	-	-
Free cash generated		1,02,01,531.09	1,07,38,902.11	1,13,04,107.48	1,18,99,060.50	1,25,25,326.85	1,31,84,554.58	1,38,78,478.50	1,46,08,924.74	1,53,77,815.51	1,61,87,174.22
IRR											
Initial capex	(4,00,00,000.00)										
Free cash generated		1,08,21,007.00	1,07,38,902.11	1,13,04,107.48	1,18,99,060.50	1,25,25,326.85	1,31,84,554.58	1,38,78,478.50	1,46,08,924.74	1,53,77,815.51	1,61,87,174.22
Total cash flows	(4,00,00,000.00)	1,08,21,007.00	1,07,38,902.11	1,13,04,107.48	1,18,99,060.50	1,25,25,326.85	1,31,84,554.58	1,38,78,478.50	1,46,08,924.74	1,53,77,815.51	1,61,87,174.22
IRR	#DIV/0!										
Assumptions.											
Number of gondolas	20										
Number of seats	120										
Annual capacity	360000										
Number of foreign pax per year	105000										
Number of resident pax per year	22500										
Average occupancy	29%										
Increase per year in costs	5%										
Average commission rate	30%										
Variable costs per day		(18,660.98)	(19,643.13)	(20,676.98)	(21,765.24)	(22,910.78)	(24,116.61)	(25,385.91)	(26,722.01)	(28,128.43)	(29,608.88)
Fixed costs per day		(6,849.32)	(7,209.81)	(7,589.27)	(7,988.70)	(8,409.16)	(8,851.75)	(9,317.63)	(9,808.03)	(10,324.24)	(10,867.63)
Variable cost per seat sold		(46.65)	(49.11)	(51.69)	(54.41)	(57.28)	(60.29)	(63.46)	(66.81)	(70.32)	(74.02)
Fixed cost per seat sold		(20.83)	(21.93)	(23.08)	(24.30)	(25.58)	(26.92)	(28.34)	(29.83)	(31.40)	(33.06)
Operating Expenditure											
Staff number	100										
Average staff salary	450										
Repairs and maintenance	3% of capital										
Tax rate on revenue	35%										
VAT rate on revenue	18%										
MKNP fees	30										
EBITDA margin											
Capex	4,00,00,000.00										



YEARS COMMENCEMENT	AFTER	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Debtors days		30	30	30	30	30	30	30	30	30	30
Creditors days		30	30	30	30	30	30	30	30	30	30
Inventories		30	30	30	30	30	30	30	30	30	30
Tax Calculation											
Profit before tax		62,01,957.00	67,38,902.11	73,04,107.48	78,99,060.50	85,25,326.85	91,84,554.58	98,78,478.50	1,06,08,924.74	1,13,77,815.51	1,21,87,174.22
Community levies	0.03%	1,860.59	2,021.67	2,191.23	2,369.72	2,557.60	2,755.37	2,963.54	3,182.68	3,413.34	3,656.15
Taxable Income		62,00,096.41	67,36,880.43	73,01,916.25	78,96,690.79	85,22,769.25	91,81,799.21	98,75,514.96	1,06,05,742.06	1,13,74,402.17	1,21,83,518.07

A large, light blue circular graphic containing a stylized, double-lined letter 'A'. The 'A' is centered and occupies most of the circle's area. The text 'COMPANY PROFILE' is superimposed over the middle of the 'A' in a bold, blue, sans-serif font.

**COMPANY PROFILE**



**AVAN LIMITED** is a Tanzanian registered company established with an objective to uncover the full potential of the growing opportunities in tourism. AVAN Ltd. has a vision to create a new vein of attraction in Tanzanians giant tourism industry. The idea is to integrate sustainable, environmentally friendly practices with the experience of Kilimanjaro, in a way that's never been experienced before. AVAN Ltd. is a proud subsidiary of IHRONE, a leading Auto contract manufacturing company based in Detroit, U.S.A. and Hot Car Accessories Inc. Worlds source for high end American sports car parts, based in Central Florida.

Hot Cars is the World's Source for Parts & Accessories for American Sports Cars ! Like the cars our accessories are made in America, that hand crafts high quality car parts and car accessories for some of America's most premiere sports cars. Such cars as the Dodge Viper, Dodge Challenger, Plymouth Prowler, Chrysler Crossfire. These are unique parts and accessories that you will not find anywhere else. The company designs and markets unique accessories and parts for these famous sports cars, our accessories and parts are of high quality materials and workmanship and are fully guaranteed.

IHRONE's services include turnkey manufacturing, mechanical assembly, and state of the art electronic and mechanical components. Our main focus is to partner with our clients in their quest for profitable growth in a dynamic economy. We do this through close communications and responsive customer service. Whether the client has a new product introduction, quick-turn requirement, or wants to completely outsource their product utilizing our turnkey service, IHRONE has the expertise and resources to respond to the needs of the clients. We understand the importance of maintaining cost control without sacrificing high quality production outcomes.

IHRONE's key strength lies in the ability to provide customers with the simplicity of dealing with one supplier for an end-to-end solution to their contract manufacturing needs, from assistance with product design and development through the entire lifecycle of a product. Customers are comfortable that by dealing with IHRONE they will receive high quality, best value products and services.

The majority of IHRONE's customers are Global Players. These companies see value in partnering with IHRONE and taking advantage of the cost, reliability and quality leadership that IHRONE provides them. IHRONE has always prided itself on its flexible manufacturing capability, made possible by a team of skilled and committed employees. To keep ahead, the Company is constantly increasing its technological and research and development capacity by introducing new technology into the production process to further improve product quality and expanding the level of product technology.



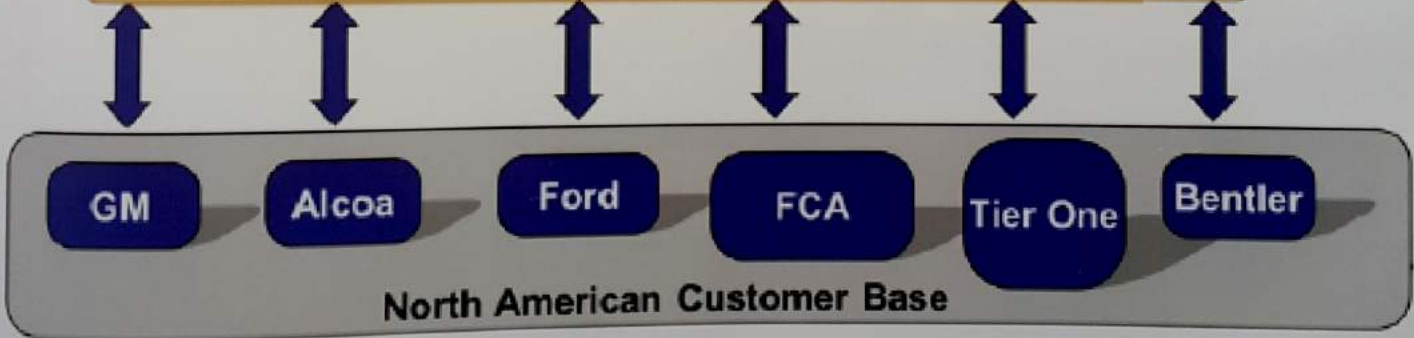


# A GLOBAL LCC SERVICE PROVIDER



**EXPERTISE, EXPERIENCE AND REACH**

## Emerging Markets Manufacturer





- Location : Pune , India
- Established : 1983
- Employee : 1100
- Land : 245,000 m<sup>2</sup>
- Facilities : 7
- Capacity :130,000 Tons / YR
- Customer : OE/OEM
- Sales Revenue :US\$ 180 Mil.
- Product :
  - ✓Steering Knuckles
  - ✓Brake Disc
  - ✓Brake Drum
  - ✓Corner Module
  - ✓Caliper Housings / Brackets
  - ✓Other Cast / Machined Products
- Certifications :
  - ✓ TS16949
  - ✓ ISO14001
  - ✓ OHSAS 18001



- Location : Rajkot , India
- Established : 1980
- Employee : 1600
- Land : 545,000 m<sup>2</sup>
- Facilities : 3
- Capacity :230,000 Tons / YR
- Customer : OE/OEM
- Sales Revenue :US\$ 210 Mil.
- Product :
  - ✓Hubs
  - ✓Net Gears
  - ✓Third Generation Bearings
  - ✓Crank Shaft and Assemblies
  - ✓Connecting Rods
  - ✓Other Forged / Machined Products
- Certifications :
  - ✓ TS16949
  - ✓ ISO14001
  - ✓ OHSAS 18001







- Location : Nanjing , China
- Established : 1994
- Employee : 600
- Land : 145,000 m<sup>2</sup>
- Facilities : 2
- Capacity :130,000 Tons / YR
- Customer : OE/OEM
- Sales Revenue :US\$ 110 Mil.
- Product :
  - ✓ Air Vents
  - ✓ Airbags
  - ✓ Hydrographic Trims
  - ✓ Cock pit Trims
  - ✓ Exterior and Interior Mirrors
  - ✓ Other Plastic / Finished Products
- Certifications :
  - ✓ TS16949
  - ✓ ISO14001
  - ✓ OHSAS 18001



- Location : Mumbai , India
- Established : 1994
- Employee : 600
- Land : 145,000 m<sup>2</sup>
- Facilities : 4
- Capacity :230,000 Tons / YR
- Customer : OE/OEM
- Sales Revenue :US\$ 110 Mil.
- Product :
  - ✓ Hoses
  - ✓ NVH Products
  - ✓ Gaskets
  - ✓ Hydro Mounts
  - ✓ Bellows
  - ✓ Other Rubber Products & Assm.
- Certifications :
  - ✓ TS16949
  - ✓ ISO14001
  - ✓ OHSAS 18001



## AVAN MISSION AND VISION STATEMENT

### VISION

"Striving for excellence in whatever we do by keeping our fundamentals and core values to become a leader in every sector"

### MISSION

- Being the supplier and partner of choice.
- Focusing on the culture of sustainability
- Ensuring growth and Delivering Value.
- Caring for community.

## OUR CORE VALUES

We have always been value-driven. These values continue to direct the growth and business of the company. The following core values underpinning the way we do business are:  
**Excellence:** We must constantly strive to achieve the highest possible standards in our day-to-day work and in the quality of the goods and services we provide.

**UNITY:** We must work cohesively with our colleagues across the group and with our customers and partners around the world, building strong relationships based on tolerance, understanding and mutual cooperation.

**RESPONSIBILITY:** We must continue to be responsible, sensitive to the countries, communities and environments in which we work, always ensuring that what comes from the people goes back to the people many times over. It will not be out of place here to mention that the Group has always remained keen on producing the products which are non-hazardous to health and do not contain any toxic matter.

**QUALITY:** Quality is not an achievement, but a way of life.

Our Company considers quality as one of its principal strategic objectives to guarantee its growth and leadership in the markets in which it operates. The Company maintains an open communication channel with its consumers and customers and carefully monitors the feedback to continuously improve its products and services and set quality standards to fulfill them. The company periodically reviews quality policy for its effectiveness and consistency with business objectives.

**Safety:** The Company has made a voluntary commitment to the safety of its units by implementing the International Safety Evaluation System (SIES)





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**A world**  
of *experience* -  
committed to your **mission**

TANZANIA



**Certificate of Incorporation**

Section 15  
No **124234**

**I HEREBY CERTIFY THAT**  
**AVAN LIMITED**

is this day incorporated under the Companies Act, 2002 and that the Company is Limited.

Given under my hand at Dar es salaam  
this **19TH** day of **OCTOBER**  
**TWO THOUSAND AND FIFTEEN.**

*[Signature]*  
Senior Asst. Registrar of Companies

TANZANIA  
Stamp Duty Stamp  
PAID ORIGINAL  
Receipt No. 011012  
Stamp Duty Office

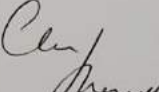


**THE COMPANIES ACT, 2002**  
**COMPANY LIMITED BY SHARES**  
**MEMORANDUM OF ASSOCIATION**  
**OF**  
**AVAN LIMITED**

TANZANIA  
Stamp Duty Stamp  
PAID ORIGINAL  
Receipt No. 011012  
Stamp Duty Office

1. The name of the company " AVAN LIMITED "
2. The Registered office of the Company will be situated in Tanzania.
3. The objects for which company is established are:-
  - (a) To engage, hire and or carry on the business of Tourism, Safaris, Site showing in Tanzania or Outside Tanzania by Road, railways, Metro, Rock Climbing, Cable Car, tramways, Air, Water and any other possible means of transport for Tanzanians and or Other than Tanzanians.
  - (b) To engage, hire and or carry on the business of Amusement Park, Water Sports, Gaming, Entertainment of Children and/or Adults, Open or Closed Theaters
  - (c) To engage in, hire and carry out the business of proprietors and managers of hotels, restaurants, cafes, road houses, motel, safari and holiday camps, caravans sites, guest houses, apartment housekeepers, refreshment and tea rooms, milk and snacks bars, tavern, beer house and lodging housekeepers and to provide food and catering services to individuals, private and public institutions and to industrial and business concerns.
  - (d) To engage, hire and or carry on the business of Hotels, readymade biting, snacks /or food, Food preparation and selling.
  - (e) To engage, hire and or carry on the business of manufacture or trading of Purified and or Mineral Water, Juices, drinks etc.....
  - (f) To build, construct, hire includes purchase, sale of commercial & residential Apartments, alter, improve, enlarge, repair, maintain, develop, demolish, remove or replace and to work, manage, carry out or control works of all descriptions, including but not limited to commercial & residential Apartments, offices, factories, mills, warehouses, shop, store, garages and other buildings, roads, machinery and plants, which may in the opinion of the Directors of the company, be likely to advance directly or indirectly the company's interests; to clear sites for the same; to contribute to, subsidies or otherwise assist in the building, construction alternation, repair, improvement, enlargement, maintenance, development, demolition, removal, replacement, working, management, carrying out or control of the above.



We the several persons, whose names and addresses are subscribed, are desirous of being formed into company, in pursuance of this Memorandum of Association, and we respectively agree to take the numbers of shares in the capital of the company set opposite our respective names.

Names, Addresses, and Description Of Subscribers	Number of shares taken by each Subscriber	Signature
Chris Shemwell 13721 Linden Dr. Spring Hill, FL 34609 USA	40	
Roxann Shemwell 13721 Linden Dr. Spring Hill, FL 34609 USA	40	
AKASH SHETTY 380, Meloy Road, Apt 47, West Haven, CT - 06516 United States of America	20	

Dated at Spring Hill this 25<sup>th</sup> day of September 2015

Witness to the above signatures

Name : Gowtham Manna  
 Signature :   
 Postal Address : 2019 83rd  
 Qualification : Advocate

