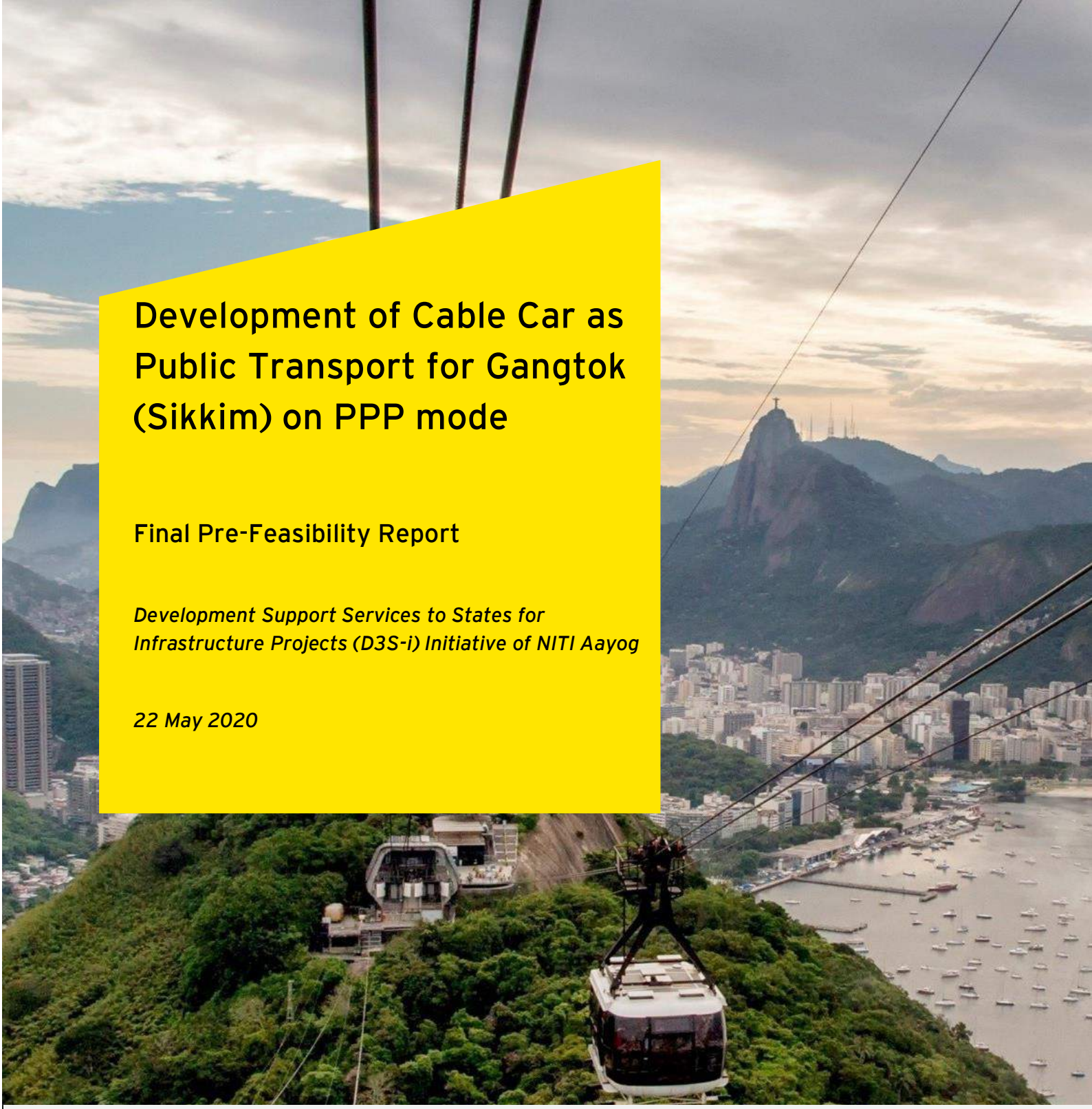


Development of Cable Car as Public Transport for Gangtok (Sikkim) on PPP mode

Final Pre-Feasibility Report

Development Support Services to States for Infrastructure Projects (D3S-i) Initiative of NITI Aayog

22 May 2020

State Support Initiative by

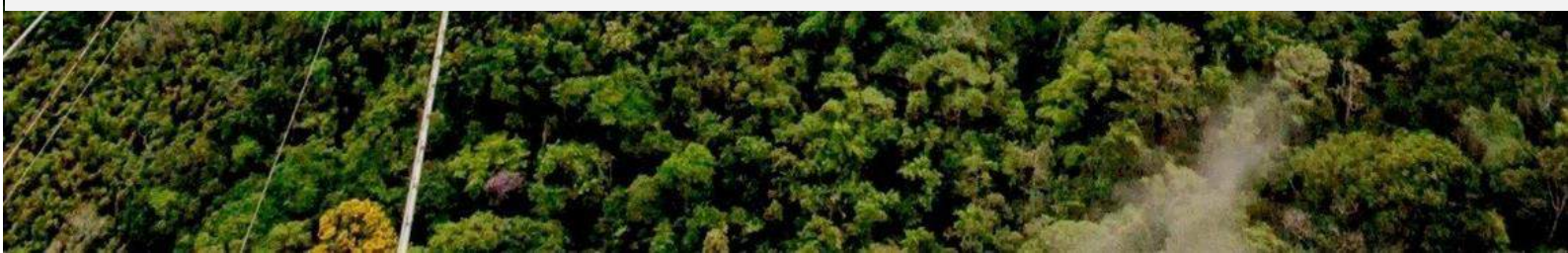
NITI Aayog

State Government Partner

Urban Development & Housing Dept.
Government of Sikkim

Financial Consultant & Transaction Advisor

EY
Building a better working world



Disclaimer

This Concept Plan and Financial Feasibility Report (the "Report") has been prepared by Ernst & Young LLP (hereinafter referred to as "EY" or "we" or "us") for NITI Aayog (hereinafter referred to as "NITI" or "You" or "Client") for the purpose of Development Support Services to States for Infrastructure Projects for which a Memorandum of Understanding has been executed between NITI Aayog and Government of Sikkim.

The findings submitted in this Report are based on information collated through secondary research, data provided by respective State Government and EY's internal databases. EY has taken due care to validate the authenticity and correctness of sources used to obtain the information; however, neither EY nor any of our respective partners, officers, employees, consultants or agents, provide any representations or warranties, expressed or implied, as to the authenticity, accuracy or completeness of the information, data or opinions that third parties or secondary sources provided to us. The information and images (if any) provided or analysed in the Report have been collated from various industry sources, including web resources, public-domain information sources, data provided by NITI Aayog and our internal databases. EY has ensured reasonable care to validate the data presented in the Report; however, EY have not conducted an audit, due diligence or an independent verification of such information. It is also to be noted that the images presented (if any) are pictorial representations of the overall concept and are in no way intended to represent any concrete imagery for the proposed development. Neither EY, nor affiliated partnerships or bodies corporate, nor the directors, shareholders, managers, partners, employees or agents of any of them, make any representation or warranty, express or implied, as to the accuracy, reasonableness or completeness of the information contained in this Report. All such parties and entities expressly disclaim any and all liability for, or based on or relating to any such information contained in, or errors in or omissions from, this Report or based on or relating to the recipient's use of this Report.

References to EY in the Report relate to EY advice, recommendations and analysis and do not indicate that EY take any responsibility for the information concerned or are assembling or associating ourselves with any financial information, including prospective financial information. This Report has been prepared for your internal use, on your specific instructions, solely for the purpose of exploring the feasibility and structuring of the project and must not be used or relied upon for any other purpose. This Report is strictly confidential, and no part thereof may be reproduced or used by any other party other than NITI Aayog, except as otherwise agreed between NITI Aayog and EY. If NITI Aayog is permitted to disclose the Report (or a portion thereof), you shall not alter, edit or modify it from the form EY has provided.

This Report has not considered issues relevant to any third parties. Use of this Report by any third party for whatever purpose should not, and does not, absolve such third party from using its own due diligence in verifying the Report's contents. If any third party chooses to rely upon any of the contents of this Report they do so entirely at their own risk, and we shall have no responsibility whatsoever in relation to any such use. EY accept no duty of care or liability of any kind whatsoever to any such third party, and no responsibility for damages, if any, suffered by any third party as a

result of decisions made, or not made, or actions taken, or not taken, based on this document, unless expressly agreed between NITI Aayog, EY and such third party in writing.

Notwithstanding anything contained herein to the contrary, EY shall not be liable for any loss of profit, data, goodwill or revenues, or for any indirect, incidental, consequential, special or punitive damages that NITI Aayog or any third party may incur as a result of your use of this Report.

This Report supersedes any previous oral presentations or summaries EY may have made in connection herewith. Neither EY nor any of our affiliates worldwide are responsible for revising or updating this Report because of events or transactions occurring subsequent to the date of this Report. Any updates or second opinions on this Report cannot be sought by the management from external agencies (including our affiliates) without our prior written consent.

The information contained in the Report is based on judgmental estimates and assumptions, about circumstances and events. Accordingly, EY cannot provide any assurance that the projected results will be attained in this ever-changing dynamic market environment. Further, neither this Report nor any part of it shall form the basis of, or be relied upon in connection with, any contract or commitment whatsoever. This Report is being supplied to NITI Aayog solely for your information and is confidential.

In taking any commercial decisions relating to our services or this Report, NITI Aayog shall have regard to the restrictions and limitations on our scope of services, liability and duty of care as set out in the Contract Agreement and this Report. Accordingly, NITI Aayog remains responsible for all management decisions relating to EY services and/or this Report, including the use or implementation of this Report.

This disclaimer forms an integral part of the Report.

Contents

List of Figures

List of Tables

List of Abbreviations

BOT	Build Operate Transfer
CCT	Cable Car Transport
DBFOT	Design Build Finance Operate Transfer
D3S-i	Development Support Services to States for Infrastructure
GDP	Gross Domestic Product
GSDP	Gross State Domestic Product
GoS	Government of Sikkim
GoI	Government of India
EI	Empowered Institution
EPC	Engineering, Procurement and Construction
EIA	Environment Impact Assessment
EMP	Environment Management Plan
EAP	Environment Action Plan
IRR	Internal Rate of Return
O&M	Operations and Maintenance
NPV	Net present Value
PFR	Pre-Feasibility Report
PPHPD	Passengers per hour per direction
PPP	Public Private Partnership
SNT	Sikkim Nationalized Transport
TPC	Total Project Cost
TEFR	Techno-Economic Feasibility Report
UDHD	Urban Development and Housing Department
UT	Union Territory
VGF	Viability Gap Funding

Executive Summary

Background

Recognising the importance of easing congestion in the state, Government of Sikkim (GoS) has initiated steps to improve the local transit system by developing a cable car system as an efficient mode of public transport in the capital city of Gangtok.

The Government of Sikkim is seeking an affordable solution for delivering improved public transport service to its citizens and has therefore requested NITI Aayog to help in assessing the feasibility of the project, and in structuring a PPP transaction to attract private sector capital and to tap private sector efficiencies under an appropriate PPP structure for the project.

Concept: Cable Car system as an efficient mode of Public Transport in the capital city of Gangtok

Sector: Urban Public Transport

Location: Gangtok, Sikkim

Length: 13 km

Stations: 14 (nos.)

Technology: Mono-cable Detachable Gondola

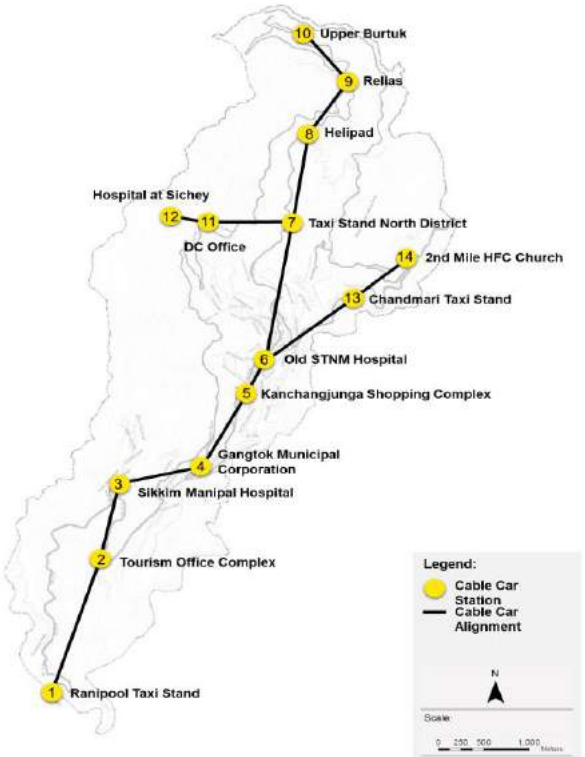
Indicative capex: INR 996 crore

Estimated Combined Ridership: ~47,592 pax (FY 2025 i.e. 1st operational year)

Implementation Authority: Urban Development & Housing Department (UDHD) Department, Government of Sikkim

City Context

Gangtok, capital of Sikkim is the largest urban centre in the State. As per Census of India 2011, the city of Gangtok had a population of nearly 1 lakh in 2011 and based on the average decadal growth rate of previous decades, it is estimated that city population is expected to increase to 2.4 lakh by 2021. Sikkim has emerged as a hotspot for tourism over the last 10 years. Scarcity of land in the city is a major constraint in development of infrastructure. Gangtok is a linear city that has developed along the arterial roads, especially National Highway 31A. Most of the road length in Gangtok, is of two-lane undivided carriageway with foot path on one side of the road and drain on the other. The steep gradient of the different road stretches coupled with spiral road configuration act as a constraint for smooth flow of vehicular as well as pedestrian traffic. Sikkim Nationalized Transport (SNT) provides public transport service to the people of Sikkim. The entire bus passenger transport service in the state is run by government with no private bus operators. Currently, SNT has a fleet of 128 buses and 83 truck/tankers. The operation of the



public transport system provided by SNT is currently on a decline with reduction in its fleet size over the past years. All of this has led to an overall pressure on the public transport system with most commuters relying on taxis or on private vehicles to commute. And establishes the need for a planned public transport system for the city of Gangtok.

A conceptual alignment has been identified in the TEFR prepared by the state. The implementation of proposed cable car network shall be taken up in two construction phases:
Phase 1: Consists of the 6 lowermost sections, from Ranipool Taxi Stand to Old STNM Hospital in the North South Line.
Phase II: Consists of the following 3 sections comprising of total of 8 stations

- North Link - 4 uppermost sections of Old STNM Hospital to Upper Burtuk and
- East Link - 2 sections connecting STNM Hospital to Chandmari Area.
- West Link - 2 Sections connecting Taxi Stand North District to Hospital at Sichey

Key characteristic of the ropeway proposed is summarised in table below. The project scope involves development of cable car transport as a means of public transport in Gangtok and carrying out the operation and maintenance of the developed facilities for the concession period. The idea is to develop cable cars as an integral part of the transport of the city and provide a convenient, safe and green mode of transport for the residents.

Table 1: Ropeway system key characteristics

Particulars	Details
Length of alignment	13 km
No. of stations	14 (13 stations to have passenger boarding/deboarding)
Capacity per cabin	10
Proposed Technology	Mono-cable Detachable Gondola
Design Capacity	4,125* (Peak hour peak section in the horizon year 2051)
Type of cabin	Detachable Gondola system
Max speed	6 m/s (~22 km/hour)
Estimated Ridership	~47,592 passengers (FY 2025 i.e. 1st operational year)

Financial Analysis
The objective of this analysis was to evaluate the financial performance of the project, its ability to source financing and meet "return" expectations of capital providers. Based on the same, to suggest a transaction structure with good returns on investment to make the project commercially viable for a concessionaire, we have analysed the viability under two scenarios to establish project's viability prospects. The base capex estimates classified into system mechanical and electrical components cost and station civil development costs which includes construction cost of stations has been taken from TEFR assumptions. On the base cost estimates, assumptions w.r.t escalation, contingencies, IDC and other soft costs have bene built in our financial analysis. The total capital cost for the project estimated under the two scenarios is presented in the table below.

Parameter	Scenario: Without Grant or Funded works (INR cr)	Scenario with Capital Grant of 40% & Funded Works (INR cr)
Station Construction	152	152
Land acquisition costs	13	13
System electro-mechanical Cost	584	584
Project Development / Consultancy	36	36
Freight Cost	10	10
Contingency @10% of system costs	58	58
Interest During Construction (IDC)	100	46
Escalation during construction period	104	96
Total capital cost	**1,057**	**996**

The project implementation period in our analysis has been phased over 3 years to be taken up in two phases with the first phase of 5.99 Kms and second phase of 7.44 Kms. The construction is expected to commence at the start of FY 2022 and end by the end of FY 2024. The project cost phasing under the two scenarios is presented in the table below.

Means of Finance	Unit	2022	2023	2024	Total
Scenario: Without Grant or Funded works					
Debt	INR Cr	180	189	265	**634**
Equity	INR Cr	120	126	177	**423**
Total	**INR Cr**	**300**	**315**	**442**	**1057**
Scenario: Capital Grant of 40% & Funded Works					
Debt	INR Cr	84	88	122	**293**
Equity	INR Cr	56	58	82	**195**
VGF Grant	INR Cr	93	97	136	**326**
Funded civil works	INR Cr	48	50	70	**169**
Land acquisition	INR Cr	13	-	-	**13**
Total Project Cost	**INR Cr**	**293**	**293**	**410**	**996**

For a private sector investor, a project must be both bankable and provide an acceptable return for the risk of the investment. As can be seen from the financial analysis, the project's revenue streams are not sufficient to bring viability into the project without viability grant support. Accordingly, a scenario has been structured to capture two levels of support:

i) 40% Viability Gap Funding (VGF) support (20% each from Centre and State govt.) totalling INR 326 crore

ii) Including the civil construction works of approximately INR 169 crore as "funded works" on EPC / DB mode in the PPP concession, the project's IRR improves substantially.

Key output parameters under the scenarios assessed are summarized in the table below.

Parameter	Unit	Scenario : No Grant, No funded works	Scenario: 40% VGF Grant and Funded works
TPC including funded works & land	INR cr	1057	996
Project IRR	%	8.9%	10%
Equity IRR	%	8.7%	15%
NPV (INR cr)	INR cr	-226	223

It is proposed that the project is taken up on PPP mode with provisions of up to 40% VGF funding and "funded works" as a Design Build Finance Operate Transfer (DBFOT) Concession for a concession period of 35 years.

Conclusion and Way Forward

In view of the project's financial indicators, government support in form of VGF and including the major civil construction works as 'funded works' is proposed to make the project investment viable from a private sector point of view. Further, GST levied on capital goods can be claimed as input credit by the Concessionaire from the Government. Based on the financial analysis, the project's revenue streams are not sufficient to bring viability into the project. Therefore, grant funding scenarios have been assessed.

For a private sector investor, a project must be both bankable and provide an acceptable return for the risk of the investment. As can be seen from the financial analysis, the project's revenue streams are not sufficient to bring viability into the project without viability grant support. Accordingly, a scenario has been structured to capture two levels of support:

i) 40% Viability Gap Funding (VGF) support (20% each from Centre and State govt.) totalling INR 326 crore
ii) Including the civil construction works of approximately INR 169 crore as "funded works" on EPC / DB mode in the PPP concession, the project's IRR improves substantially.

The station cost estimates are preliminary and need to be further validated by the state on the basis of availability of land and technical suitability. We have undertaken a site visit of each of the proposed station location. Detailed site appreciation and assessment is presented in the report. Key broad aspects that need to be assessed for station locations during the Supplementary Technical Study stage are:

- The land ownership details of the sites proposed to correctly ascertain the land acquisition requirement and financial outgo
- Social Impact Assessment (SIA) and Environmental Impact Assessment (EIA) are needed to address the acquisition / R&R process and assess likely negative impacts such as tree felling, soil erosion, muck disposal, river water pollution etc.
- The construction on a number of station sites lying on the sloped part might require cut and fill construction technology. Hence, the land suitability (detailed soil characteristics i.e. typology, stability etc.) needs to be assessed.
- Geotechnical investigation study should be conducted to assess the station site areas and the deep layers before final design and layout of the station area and access area.

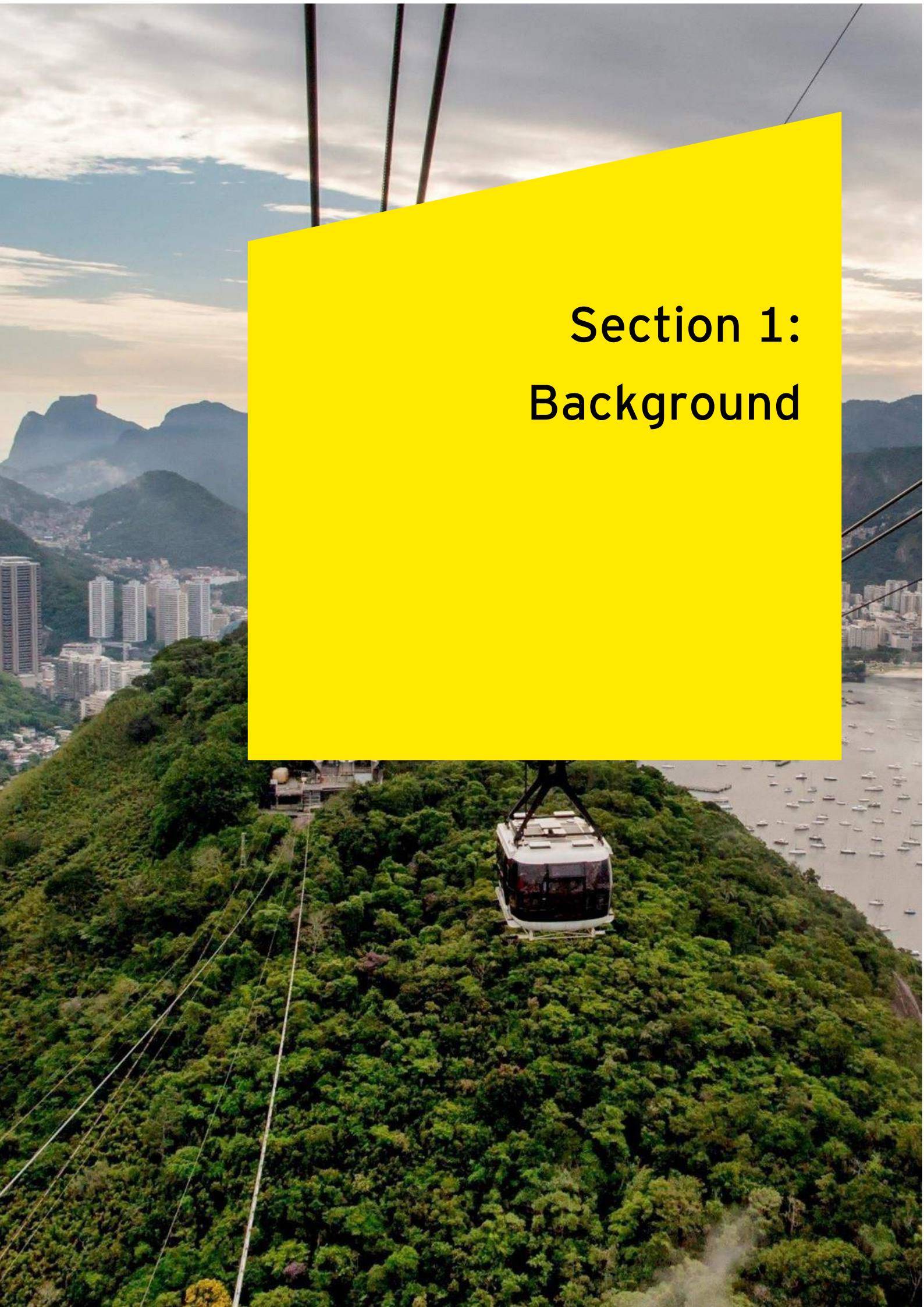
In order to ease the implementation, it is crucial that land acquisition is minimized as much as possible. Therefore, in the TEFR, the station sites have been chosen such that most of the sites are in possession of government. Besides the sites for the stations, additional plots of land need to be available during construction for stocking of material, pre-assembling of towers, loading and unloading pieces of the system, and for helicopter landing. These areas must be secured and accessible for heavy trucks. Based on preliminary discussions with the state, out of the total land requirement of 29,618 sq. m., about 76% is government land i.e. with State government or CPWD

or Forest land. Balance 24% is private land and would need to be acquired. Accordingly, land acquisition, R&R costs of INR 13 crore will be borne by the state government.

Public transport projects require heavy capital outlay. With reasonable fare level, ensuring servicing of the debt and return on capital invested often pose problems. Therefore, to make the project financially viable, the fares will have to be substantially increased, but this will result in the fares reaching socially un-acceptable levels. This will result in the ridership coming down significantly, as it is sensitive to increase in the fare levels. Thus, the very objective of constructing the cable car based public transport system to provide an affordable mode of mass travel for public will be defeated. It, therefore, becomes necessary to keep the initial capital cost of the project as low as possible so that the fare level can be kept at reasonable level. Accordingly, scenarios have been analysed proposing civil works for station development as funded works in the scope of the private concessionaire.

Uninterrupted and reliable power supply is one of the key elements for financial viability of the project. In addition to ensuring optimum energy consumption, it is also necessary that the electric power tariff be kept at a minimum in order to contain the O&M costs. It is proposed that Government of Sikkim will take necessary steps to fix power tariff for the CCT at "No Profit No Loss" basis.

As the next step, the project preparation activities need to commence. These include acceptance of Pre-feasibility Report, seeking EI and state level approval for VGF, finalizing financing and transaction structure, plugging in technical gaps through commissioning a Supplementary Technical Study, environment impact assessment, social impact assessment etc.



Section 1: Background

Section – 1: Background

1.1 INTRODUCTION

NITI Aayog has implemented a structured initiative for "Development Support Services to States for Infrastructure projects (D3S-i)" with a vision to achieve transformational, sustained delivery of infrastructure projects with state of art capacity disseminated at all levels of governance. There is a strong need for rebooting infrastructure project delivery models so a sustainable infrastructure creation cycle is established. A renewed focus of the Government is evident and the action is geared towards creating PPP success stories at the level of States/UTs.

The D3S-i initiative involves providing project level support from Concept plan till financial closure to state governments / UTs for a demonstrable project shelf consisting of selected infrastructure projects. NITI Aayog has appointed M/s Ernst & Young LLP (EYLLP) as its consultant to partner with NITI Aayog in formalizing the D3S-Infrastructure initiative, engaging with states to identify a project shortlist and providing transaction management for implementing selected infrastructure projects on ground on PPP mode.

The project involving Development of Cable Car as Public Transport in Gangtok has been identified from the State of Sikkim in September, 2019 . Development of the selected project on PPP mode will be through an MoU based partnership between NITI Aayog and the Government of Sikkim and would also entail a formal letter demonstrating state commitment to implement the project on PPP mode. The Urban Development and Housing Department of the Government of Sikkim is seeking an affordable solution for delivering improved public transport service to its citizens and has therefore requested NITI Aayog to help in assessing the feasibility of the project, and in structuring a PPP transaction to attract private sector capital and to tap private sector efficiencies under an appropriate PPP structure for the project.

A Pre-Feasibility Report is thus being submitted to NITI Aayog and the State Government. The State government had already commissioned a Techno-Economic Feasibility Report (TEFR), prepared by Urban Mass Transit Company Limited (UMTC), to examine the location conditions, validate the technology and viability and identify the associated risks for the proposed project. The objective of this study, however, is to take the assessment from the TEFR a step further and to chart out a clear transaction structure and implementation roadmap with stakeholders' support through enabling institutional structures and financing frameworks.

A Draft Pre-feasibility Report (PFR) was prepared by EYLLP and was submitted to NITI Aayog on 22 November, 2019. The PFR findings were discussed with NITI Aayog and their comments and observations discussed vide meeting dated 18 December, 2019 were incorporated in the Draft PFR. Subsequently, a revised Draft Pre-feasibility Report (PFR) was submitted to NITI Aayog and also to the Government of Sikkim on 9 January, 2020. Various observations of the state government officials and NITI Aayog based on discussions have been analysed and incorporated. This Final Pre-feasibility Report has been finalised based on the comments received and to capture revised scenarios as discussed.

1.2 PROJECT CONTEXT

As digitization and urbanization take the centre stage in development, the cities need to keep pace, evolve their role and prepare for a complex future. As Gangtok is growing, so is the need and expectation of the commuters in the city – and mobility networks and infrastructure are struggling to keep up.

Natural features especially topography and terrain are limiting the expansion of infrastructure development like bridges and roads, not only due to high costs but also due to limited space. This is affecting the balanced growth of the cities and putting pressure on the existing services and infrastructure. Recognising the importance of increasing congestion in the state, Government of Sikkim (GoS) has initiated steps to improve its local transit system by developing a cable car system as an efficient mode of public transport in the capital city of Gangtok. Further, with visible impact of climate change and transport sector emissions contributing largely to environmental pollution, the governments, research organisations, industries and societies in general are motivated to adopt solutions to reduce such adverse effect on our climate. Reducing tailpipe emissions is key to a long-term solution for the pollution problem.

Sikkim, one of the states in North-East Region (NER) of India, has assessed its carbon footprint and estimated a trend for emissions. As part of this initiative "Sikkim Climate Inventory and Monitoring System (SCIMS)" launched in 2017, all sectors in the state, like transport, tourism, industry, roads, agriculture, are being studied to estimate carbon emissions from each of them.

Carbon – Negative: According to the preliminary report of SCIMS, at present Sikkim is carbon-negative, but emissions are on the rise. In its efforts to improve mobility, tackle congestion, harmonize development and reduce emissions and accidents, Government of Sikkim envisages promotion of cable car transport in Gangtok.

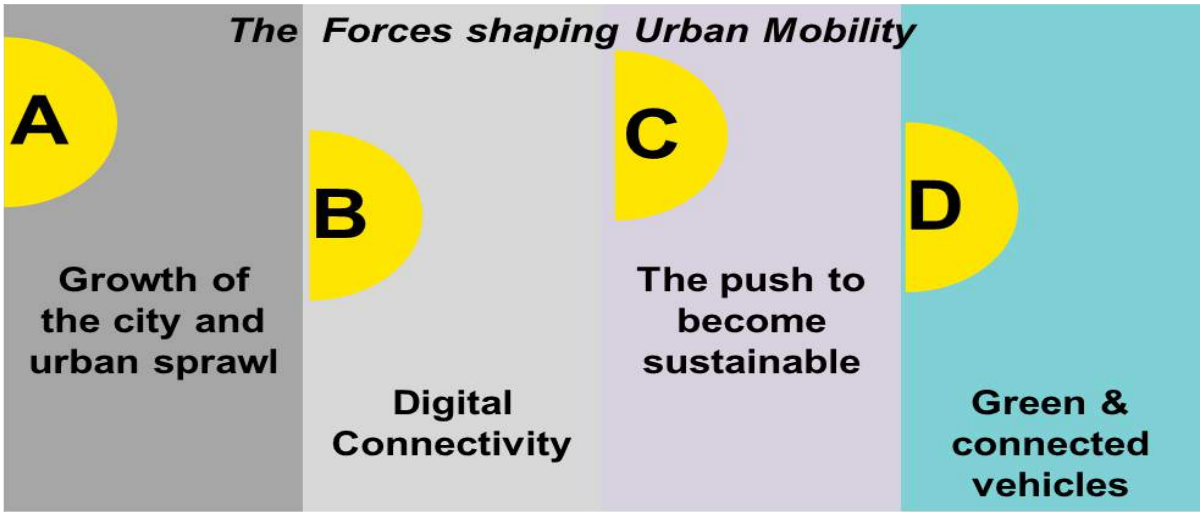


Figure 1: Strategic context for push towards Ropeways

1.3 PROJECT OBJECTIVE

The objective of this study, is to carry out a preliminary feasibility assessment of the proposed alignments, assess the financial viability and to accordingly chart out a transaction structure and implementation roadmap with stakeholders' support through enabling institutional structures and financing frameworks. Thus, with an overall aim to develop the cable car system in Gangtok, the Project has a set of specific objectives to achieve the development envisioned by the decision makers of the State. These are:

a. To develop a comprehensive (and integrated) cable car service plan for Gangtok city, with rationalized routes,
b. To create a bankable project structure so as to enable the state to market the project to attract best investors and experienced operators to develop and run the cable car in Gangtok city
c. To prepare an implementation framework and roadmap for timely execution and implementation of the project

1.4 PROJECT SCOPE

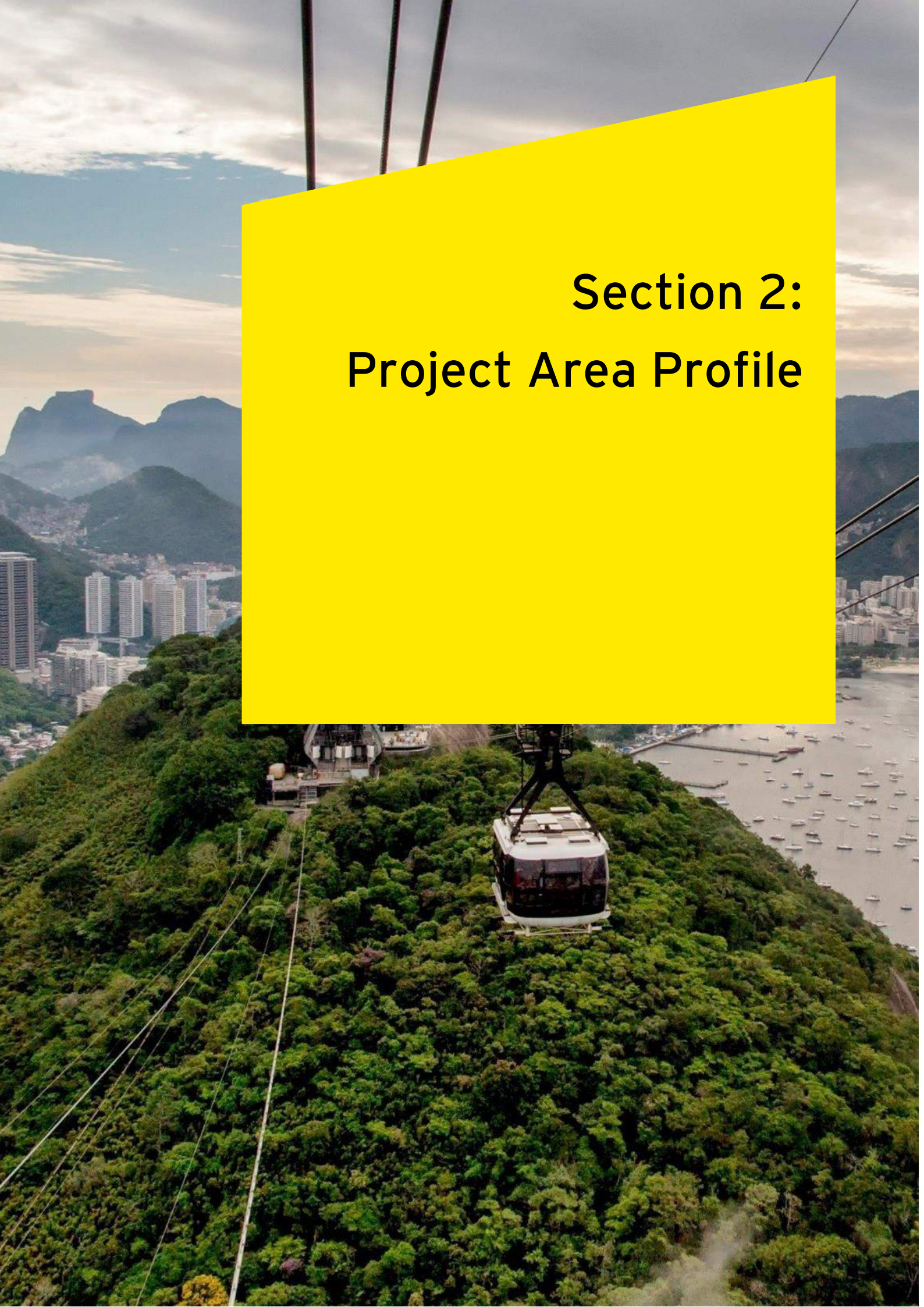
Considering the objectives set above, the scope of work broadly includes the following tasks:

Phase 1: Preparation of available secondary data and any previously undertaken Study/ies

- Review of existing mobility scenario in the city
- Secondary data identification, collection and analysis
- Review of travel demand assessment
- Review of proposed cable car alignment
- Preliminary site assessment incorporating the technical inputs from secondary research
- Financial viability assessment

Phase 2: Assistance in formulation of Transaction structure and implementation roadmap

- Formulation of a suitable PPP structure and financing pattern based on project's viability considerations
- Identification of technical gaps if any and structuring the framework for appointment of a technical consultant
- Structuring of financial and other project level support from the Government
- Assistance in preparation of bidding documents (RFQ/ RFP and Concession Agreement)
- Facilitate coordination between departments, ministries to expedite decision-making (such as creating memos for seeking VGF assistance)
- Assistance in running the bid process



Section 2:
Project Area Profile

Section 2: Project Area Profile

2.1 THE CITY IN FOCUS – GANGTOK, SIKKIM

Sikkim, spreading over an area of 7,096 square km, comprises of 4 Districts, 9 Subdivisions, 453 Revenue Blocks and 452 villages. The state had a population of 6.1 lakhs (Census of India 2011) with a population density of nearly 76 per sq. km. Out of the 4 districts, the East Sikkim district, including Gangtok, is the most populous one. Sikkim's nominal state gross domestic product (GDP) was estimated at US$1.57 billion in 2014 constituting the third-smallest GDP among India's states. The Gross State Domestic Product (GSDP) of Sikkim expanded at a high Compound Annual Growth Rate (CAGR) of ~12 per cent between 2011-12 and 2017-18. In 2017-18, the secondary sector contributed ~59 per cent to the state's GSDP at current prices. It was followed by the tertiary sector at ~30 per cent and primary sector at ~10 per cent. Sikkim had a total installed power generation capacity of 962 megawatt as of April 2019. Tourism, agriculture, hydro-electric power and pharmaceuticals are the key industries in the state.

Gangtok, capital of Sikkim and district headquarter of East Sikkim is the largest urban centre in the State. It is connected by NH 10 to the rest of the country via West Bengal.

2.1.1 Population Growth in City

As per Census of India 2011, the city of Gangtok had a population of nearly 1 lakh in 2011 and based on the average decadal growth rate of previous decades, it is estimated that city population will increase to 2.4 lakh by 2021.

2.1.2 Tourist Inflow

Sikkim has emerged as a hotspot for tourism over the last 10 years. The inflow of domestic tourists has increased from 5.5 lakh in 2011 to 13.7 lakh in 2017 at an average annual growth rate of around 20% since 2011. Similarly, the inflow of foreign tourists has also doubled since 2011. In

2017, the inflow of foreign tourists was recorded to be 49,111 as compared to 2011 where it was 23,945. The travel demand from tourists is only bound to increase as more and more people are attracted to the serene and scenic beauty of the city.

Table 2: Annual Tourist arrivals in Gangtok

Year	Domestic	Foreign	Total Tourists
2015-16	66,583	830	67,413
2016-17	67,223	987	68,210
2017-18	44,872	680	45,552

2.1.3 Urbanization Scenario: Gangtok

Gangtok, the capital of the state, is also the largest city in Sikkim. With a population of 100,286 as per Census 2011, it has the highest urban population in the state, comprising of 65% of the total urban population. The city has experienced significant spatial expansion in recent years. The area of Gangtok city is 25 sq. kms, while the Greater Gangtok area, comprises ~77 sq. kms. Greater Gangtok comprises of the Notified Town Area and surrounding rural areas, which though administered through the Panchayati Raj system, have gradually become urban colonies of Gangtok.

Government is the largest employer in Gangtok, both directly and as contractors. Other than government, residents are dependent on tourism for employment, with hospitality being the largest industry in the city. Thus, we can see that Gangtok, being the state's administrative and economic capital, offers the maximum growth opportunities. Also, the connectivity with the rest of the country through the National Highway attracts more population to the city. Economic activities and population are highly concentrated in Gangtok. Consequently, the city has witnessed high immigration from the rural areas. Urban development in Sikkim has taken place around the main roads given the importance of connectivity and accessibility. Thus, since Gangtok is connected fairly well with the rest of the country through NH10 and helicopter services, most urban development has taken place there. The economic prospects of the city have also been enhanced after the trade route - Nathula to the Tibetan Autonomous Region of China, opened after 44 years. Consequent to the influx of people, construction activity has tremendously increased in the city, which is primarily regulated by UDHD.

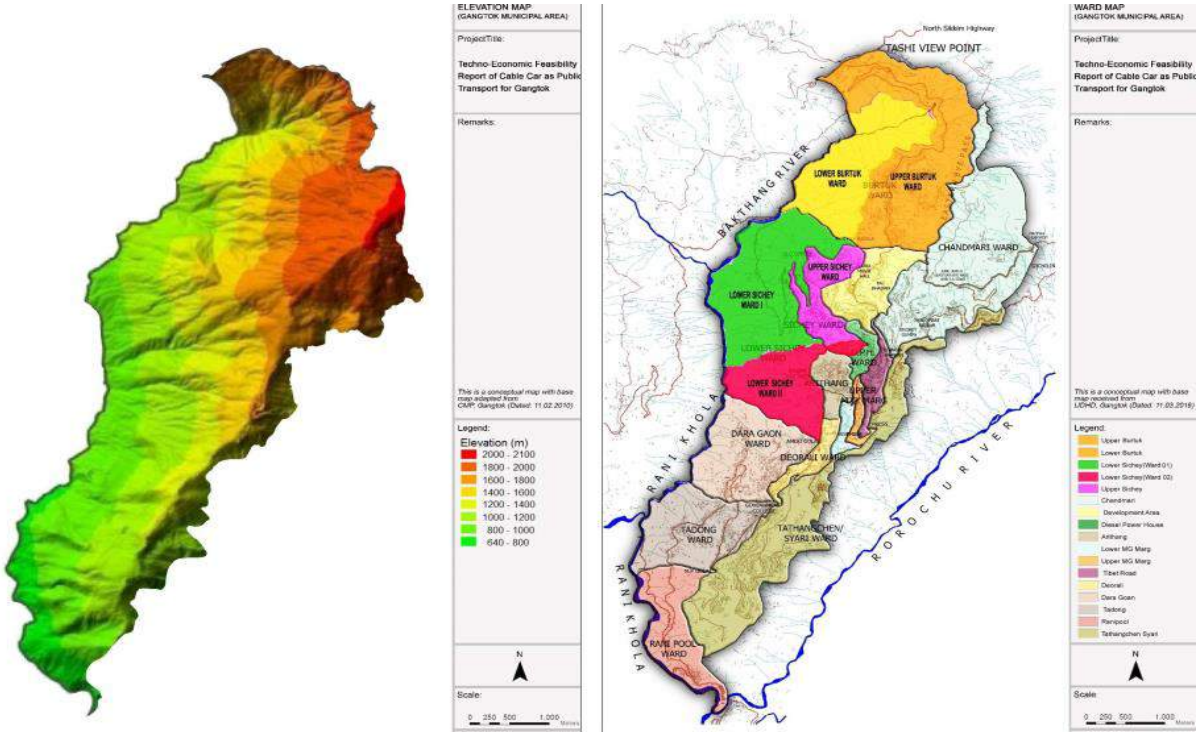


Figure 2 ***Elevation and Ward Map of Gangtok***

Scarcity of land in the city is a major constraint in development of infrastructure. There is a dearth of social and cultural facilities such as leisure and entertainment facilities, malls, parks and community halls in the city. The provision of such facilities is essential not only for the city's residents but also for enhancing the experience provided to its huge tourist base. Thus, in the face of increasing tourism and trade, we can see that the pressure on land and urban services is bound to increase in the city.

Gangtok is administered directly by the various departments of Government of Sikkim, particularly the Urban Development and Housing Department (UDHD) and Public Health Engineering Department (PHED). Cable Car Transport infrastructure thus falls under the purview of UDHD. An administrator appointed by the state government heads the UDHD. The UD&HD has the administrative and legal jurisdiction along with the responsibility to develop the city infrastructure and provision of services to its citizens.

Owing to the increase in domestic and foreign tourists, Gangtok has potential for development of commercial space such as hotels and shopping complexes. As per secondary research, there are over 400 hotels in Gangtok, with tariffs ranging from <INR 1,000 to > INR 10,000. As regards retail space, Gangtok primarily offers retail and commercial space through MG Road and a shopping complex i.e. Lal Bazaar. These are largely unorganized and the city does not possess an integrated commercial / retail complex at present.

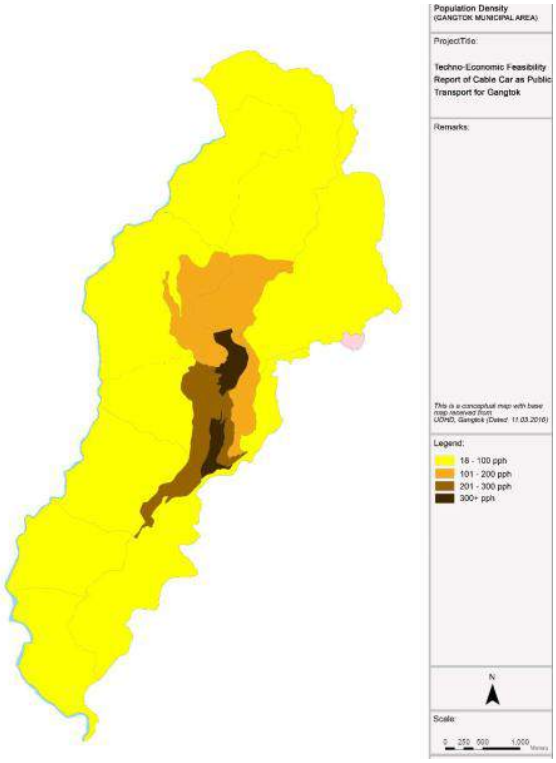


Figure 3 : Population Density in Gangtok

The urban structure is expanding mainly along the major transport corridors. Total area of Gangtok City is approximately 19.28 sq. Km. but as per the City Development Plan (Draft CDP, 2015) area of Greater Gangtok is 76.95 Sq. Km. which includes urban and rural fringe around the Gangtok. M.G. Marg, Tibet Road and Kazi Road are the core business district of Gangtok. These are major hubs for the tourists and employment. It is evident from the exhibit depicting the land use distribution that 43% of the area is under residential use followed by 19% under transportation usage (such as major and minor road corridors, stairways, taxi stands, parking areas etc).

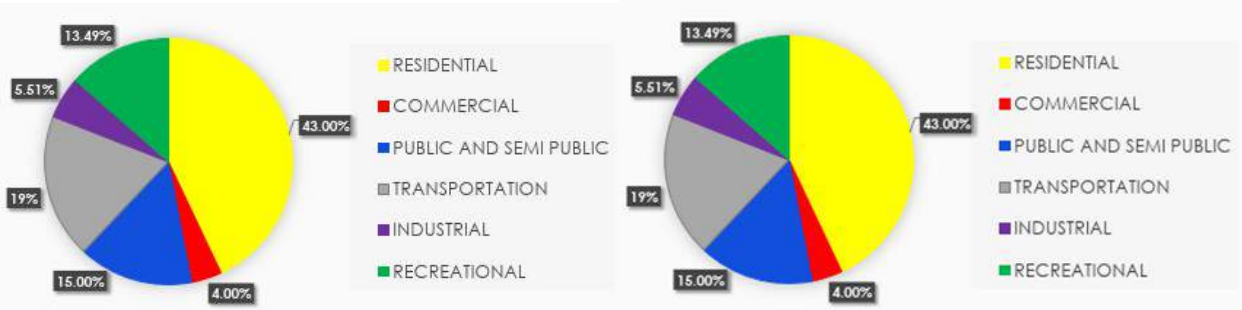


*Figure 4 : **Land use distribution of built-up areas in Gangtok***

Gangtok is a linear city that has developed along the arterial roads, especially National Highway 31A. The length of the city is about 25 km. The NH-31A, North Sikkim Highway, Indira bypass and JN Road act as the major regional roads converging at or passing through the city. Apart from these, the other major city roads are Tibet Road, M.G. Marg, Kazi Road, Paljor Stadium Road, Indira by-pass and Namnang Road, that connects to the National Highway. Most of the road length in Gangtok, is of two lane undivided carriageway with foot path on one side of the road and drain on the other. The steep gradient of the different road stretches coupled with spiral road configuration act as a constraint for smooth flow of vehicular as well as pedestrian traffic. About 75% of the

primary road network has a carriageway ranging from 6-8m. Another 25% of the road length has carriageway ranging between 8-10m. There is no road apart from MG Marg, which has divided carriageway in Gangtok. The existing roads of Gangtok are essentially narrow to accommodate the high volume of traffic, and the road geometry inappropriate. Gangtok has two bus terminals serving both interstate as well as intra state buses at P.S. Road and Police Head Quarters. These consist of 7 bus bays. Another 7 are expected to come up in the second phase of construction. These terminals are presently being used by the local taxi and private vehicle owners also. There are no designated terminal facilities for goods vehicles and goods are transported to the local sites in smaller vehicles.

2.2 EXISTING PUBLIC TRANSPORTATION SYSTEM

Sikkim Nationalized Transport (SNT) provides public transport service to the people of Sikkim. The entire bus passenger transport service in the state is presently run by the government with no private bus operators. Currently, SNT has a fleet of 128 buses and 83 truck/tankers. SNT operates on routes from Gangtok to Siliguri, Mangan, Jortang and Rangli. The operation of the public transport system provided by SNT is currently on a decline with reduction in its fleet size over the past years. This has increased the overall pressure on the public transport system with most commuters relying on taxis or on private vehicles to commute.

Taxis are the most widely available public transport within Gangtok. Most of the residents stay within a few kms of the town center and many have their own vehicles such as two wheelers and cars. The share of personal vehicles and taxis combined is 98% of Gangtok's total vehicles. City buses have a share of less than 1%. Those travelling longer distances generally make use of share-jeeps which is a kind of public taxi. All of this establishes the need for a planned public transport system for the city of Gangtok.

2.2.1 Vehicular Growth in City

As of May 2019, a total of 68,761 vehicles were registered in the State out of which nearly 70% (47,895 vehicles) were registered in the East District of the State where Gangtok is located.

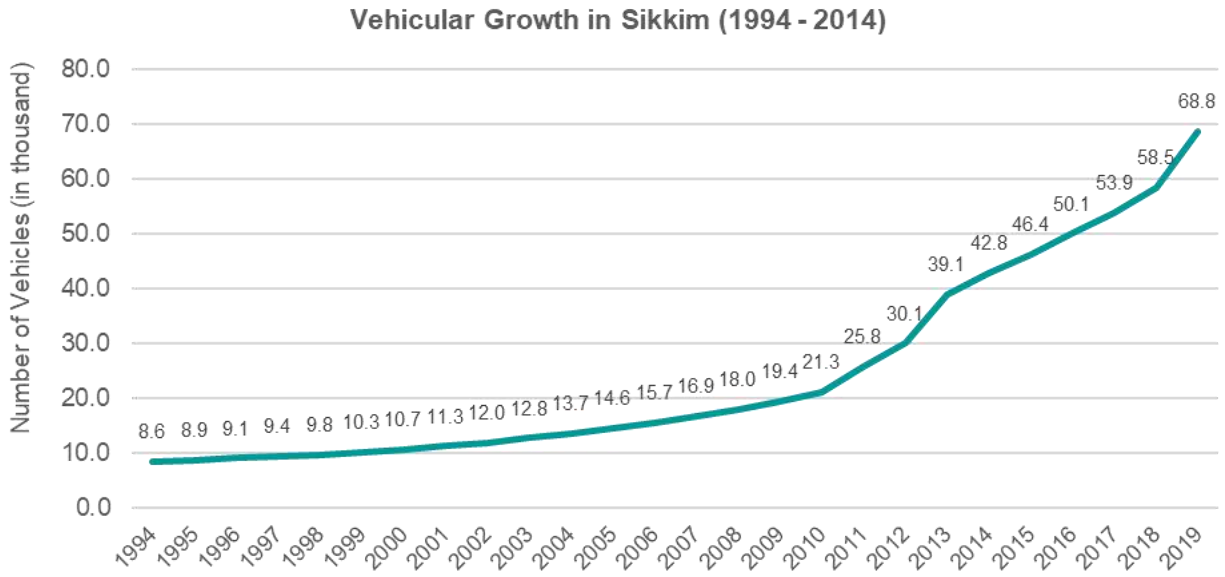


Figure 5: Vehicular growth in Sikkim (1994-2014)

The share of personal vehicles and taxis combined is 76% of total vehicles. Buses have a share of less than 1%. Taxis are the most widely available public transport within Gangtok. Those travelling longer distances generally make use of share-jeeps which is a kind of public taxi.

Table 3 : ***Category Wise Number of Registered Vehicles in Districts of Sikkim (2019)***

District	2W	Car	Taxi	Bus	Tractor & Trailer	Goods Vehicle	Other	Total
East	6820	24646	12022	441	150	3667	149	47895
West	580	3559	1897	30	27	786	10	6889
North	292	1319	962	10	39	665	11	3298
South	1182	6148	2032	68	45	1192	12	10679
Total	8874	35672	16913	549	261	6310	182	68761

As per the Comprehensive Mobility Plan of Gangtok, the estimated travel demand of the city in 2015 was 92,014 trips per day with a per capita trip rate (PCTR) of 0.96 and it is projected to increase up to 4,18,605 trips per day by the year 2041, i.e. more than 3.5 times of the current travel demand. Travel demand is also substantiated by the large influx of tourists in the city. Public transport is grossly inadequate as per the CMP, with buses catering to less than 1% of vehicular trips and majority share (98%) being of private vehicles and taxis.

2.3 TRANSPORTATION SCENARIO IN GANGTOK

The existing transportation scenario in Sikkim majorly includes taxis on a private and shared basis. Sikkim Nationalized Transport (SNT) provides bus public transport services to the people of Sikkim. SNT operates on 18 routes from Gangtok to Siliguri, Mangan, Jorethang, Pelling, Pakyong, Rangpo etc. A total of 549 buses are being run, including 128 buses owned and run by SNT and 421 buses owned and run by a private entity. Majority of public transport needs are sufficed by shared taxi services which act as a fast and cheap mode of transport. Taxi operations

are organized by city authorities by designating specific pick up/drop off points along major city roads. A flat average fare of Rs 10 per passenger is charged in the shared taxis. **The share of personal vehicles and taxis combined is ~98% of Gangtok's total vehicles. City buses have a share of less than 1%. The share of goods traffic is about 3.7%.**

As a part of TEFR undertaken by UMTC, various surveys were undertaken to assess the transportation scenario in the city. The key findings from these surveys are as under:

- High share of shared taxis confirms the existence of substantial public transit demand and implies the need for an organized public transport system;
- Majority of the trips are daily work trips half of which are currently performed by share taxis, implying consistent public transit demands;
- Average trip cost of taxi users is Rs 22.5 for an average trip length of 2.9 kms which implies good paying capacity for an organized, comfortable and reliable public transit system
- Uniform employment growth across all wards in Gangtok implies uniformly distributed public transit demand along the entire high demand transit corridor
- Willingness to pay and shift in favour of Cable Car system is high even at same or slightly higher trip cost, inferring high acceptability of Cable Car system providing reliable, comfortable and fast services
- Lower average travel speeds imply existing roads are nearing saturation and a non-road based public transit mode will be ideal for the city of Gangtok;
- Gangtok receives substantial tourists during peak seasons who in the absence of an organized public transport system rely on shared and reserved taxies for commuting which adds to their expenditure substantially, an organized non-road based public transport system will be a boon for the tourists and in turn these tourists will be an additional season ridership for the transit system

These data points form an integral part of our financial analysis as discussed in the further sections. Sikkim also has five existing ropeways to boost the tourism and improve the existing transportation in the state. **The core idea of Government of Sikkim is not to obtain a ropeway system as a singular piece of transportation infrastructure, but have it be a cornerstone of a fully redesigned urban mobility plan for the state, ready for the 21st century.**

How we deal with transportation today will impact the way Gangtok operates in the future—including its environmental footprints and how it can impact citizens' health, mobility, and quality of life…

Following are the key factors impacting the planning and design of a ropeway network.

- **Amenity Value:** The aerial ropeway including any further extension shall be so located that adequate facilities for inter-connecting public transport are available at the boarding / de-boarding stations / terminals.
- **Route:** An aerial ropeway including any future extension should be routed so that its effect on the environment is minimal. In the design of the routing of the aerial ropeway or its extension, due regard should be given to the effect on/from existing neighbouring built-up areas or natural habitat, such as vegetation, roads, electric power lines, streams, buildings, bridges and slope stability. An environmental impact assessment should be carried out to address this subject in accordance with any other legislative requirement in force.
- **Emergency Access:** Adequate access to terminal stations by emergency vehicles as may be required. Rescue plans are drawn up before installation of ropeways.

2.4 EXISTING ROPEWAYS IN SIKKIM

Ropeways are not a new idea in Sikkim. A 1 km long cable car with three stops connects lower Gangtok suburbs with Sikkim Legislative Assembly in central Gangtok and the upper suburbs. Due to the high fare costs, these are not as popular with local commuters as they are with tourists owing to the aerial view of the whole city that they provide.

The existing operational ropeway system in Gangtok is a double-cable zig back ropeway which has been operating since December 2003. There are three stations in a 1.0 km ride. The lowest station is at Deorali near Institute of Tibetology. The next station is Namnang and the top most station is in Tashiling next to the Secretariat. Each cable car can carry up to 24 passengers however, there are no seats in the cable car. The ticket price is INR 100 and includes a two-way ride with picturesque views. One way ride takes about 10 minutes. The ropeway service is generally used by tourists but is also used by certain residents working within the CBD area, as it avoids road congestion and has shorter traveling time to work.

Ropeways have also been developed at other parts of the state : Tsomgo lake, Nature Interpretation Centre at Yangang and Namchi etc. The pilot projects like Ropeway facility for Skywalk at Bhaleydhunga is being constructed using the French technology of POMA Galaski. The other projects like Passenger Ropeway from Gyalzing to Sangacholing, Phur-cha-Chu Hot Spring, Peace Centre and Helipad at Temi are also being developed. Namchi ropeway, inaugurated in February 2019, has been developed by Damodar Ropeways & Infra Ltd. PWD Bungalow, Samdruptse and Rock Garden are the 3 stations in the ropeway. It has 20 cabins and covers a distance of 640 m in 3 seconds. The total capex is INR 43.5 crore, with the central share of expenditure being INR 14 crore.

2.5 INFRASTRUCTURE SCENARIO IN GANGTOK

Rail

- The state does not have rail connectivity.
- Siliguri (~117 km) and Jalpaiguri (located in West Bengal) are the closest railway stations.

Air

- Sikkim's first airport (Pakyong airport, ~35 kms from Gangtok, at 4,590 ft. above sea) was inaugurated in 2018. However, it is currently not served by any airlines.
- Presently serviced by Bagdogra airport, ~124 kms away

Road

- NH10, an all-weather metaled highway, connects Gangtok to Siliguri and the rest of India.
- The city has several arterial roads as well.
- Gangtok is a linear city and topographically, it has great difference in highest and lowest altitude
- Most roads are two-lane, undivided, with footpath on one side and drain on the other

Water

- Water Security & Public Health Engineering Department (WS&PHED) provides water supply
- Ratey Chu river is the main source of water supply in the city of Gangtok
- Per capita supply is 129 lpcd
- ~19,800 households have water tap connection

Power

- Energy & Power Department, GoS performs generation, transmission & distribution of electricity
- Sources: 510 MW Teesta (NHPC), Singtam, 12 MW Lower Lagyap, Ranipool, 2 MW Jali Power House, Sang Khola 2.5 MW Rongnichu, Nimtar,, 6 MW URHP, Nimtar
- State is a power surplus state
- Per capita consumption: 482.6 kWh

Public Transport

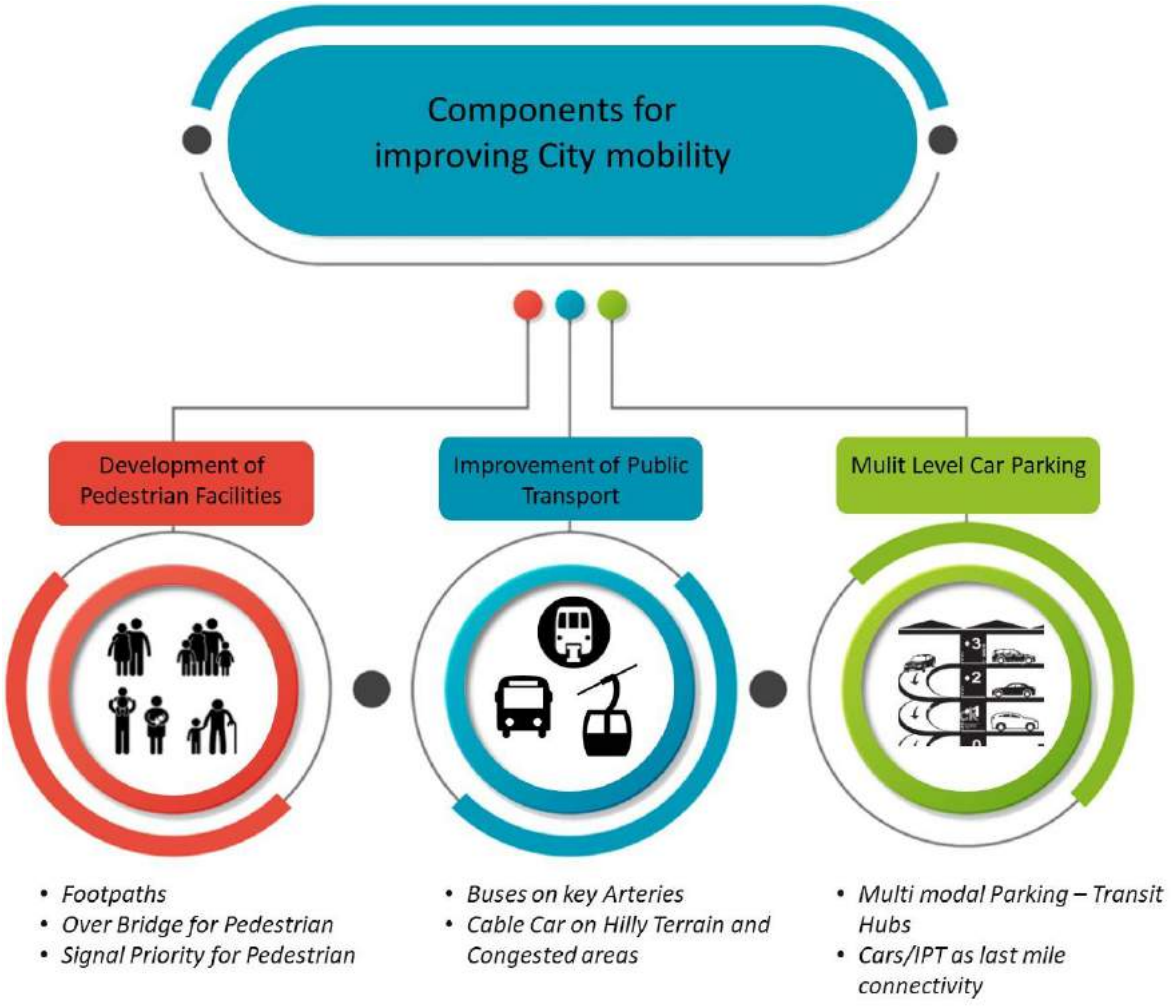
Public transport, in the form of city buses, comprises less than 1% of total vehicles, while personalized vehicles and taxis contribute more than 98%.

2.6 KEY ISSUES AFFECTING CITY'S MOBILITY

As a part of TEFR, various surveys were undertaken to assess the transportation scenario in the city. The key findings from these surveys are as under:

- Gangtok is linear city and topographically also it has great difference in highest and lowest altitude. Topography acts as a barrier to road alignment. Most of the roads in Gangtok are two lanes, undivided and footpath on one side and drain on the other side. Roads in Gangtok are narrow in width. Gradient of roads are also slightly high.
- Some areas in Gangtok are not accessible through vehicles. There are no designated terminal facilities for goods vehicles and goods are transported to the local sites in smaller
- vehicles. 90% of the traffic is intra-city and only 10% traffic is interstate traffic.
- Unorganized Public Transport System and limited space for expansion of current network

- Lack of adequate parking spaces leading to on-road parking and congestion
- Increasing vehicular population, especially 2-wheelers and small cars
- Poor road intersection at critical junctions
- Pre-dominance of poorly organized local taxi and inadequate provision of terminals for taxis, buses and freight vehicles
- Movement of freight vehicles into city centres leading to congestions due to narrow roads
- The pedestrian traffic volume survey shows high pedestrian volumes mainly on MG Road, Indira Bypass and Deorali Bazar
- Congestion during peak working hours due to concentration of offices, business & commercial centres and schools and colleges



2.7 AERIAL ROPEWAY AS AN OPTION

The core idea driving the proposed ropeway alignment is to develop a cost effective, efficient transportation system well integrated with the city's intermediate para transit system and public transport systems. An aerial ropeway as a mode of public transport is a cheaper option than a monorail system or a cable liner, though it has a lower capacity (maximum 4,000 pphpd). However, it also has a few advantages over other modes. It takes up minimal road space for creation of infrastructure (columns, terminals etc.), can cross valleys and can cover steep gradients of upto 60 degrees. The choice of aerial ropeway technology is further characterised by wind speeds and elevation.

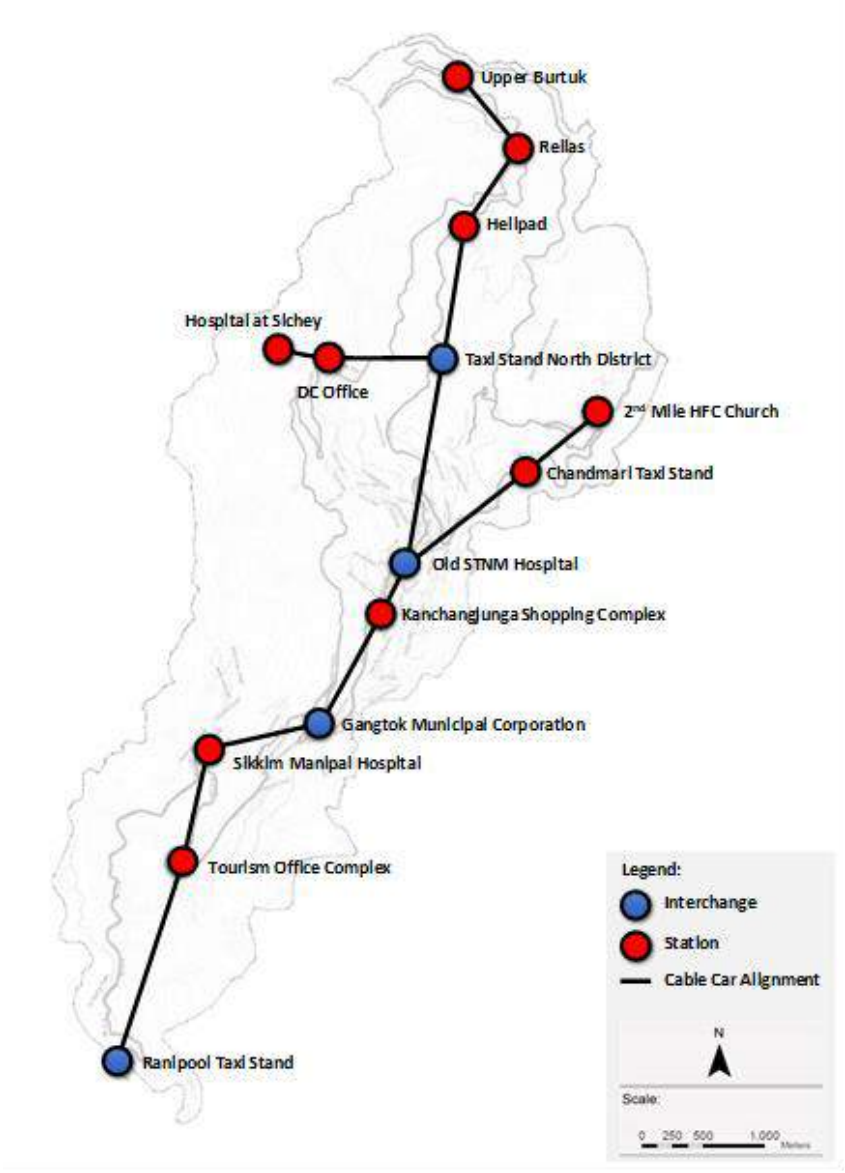
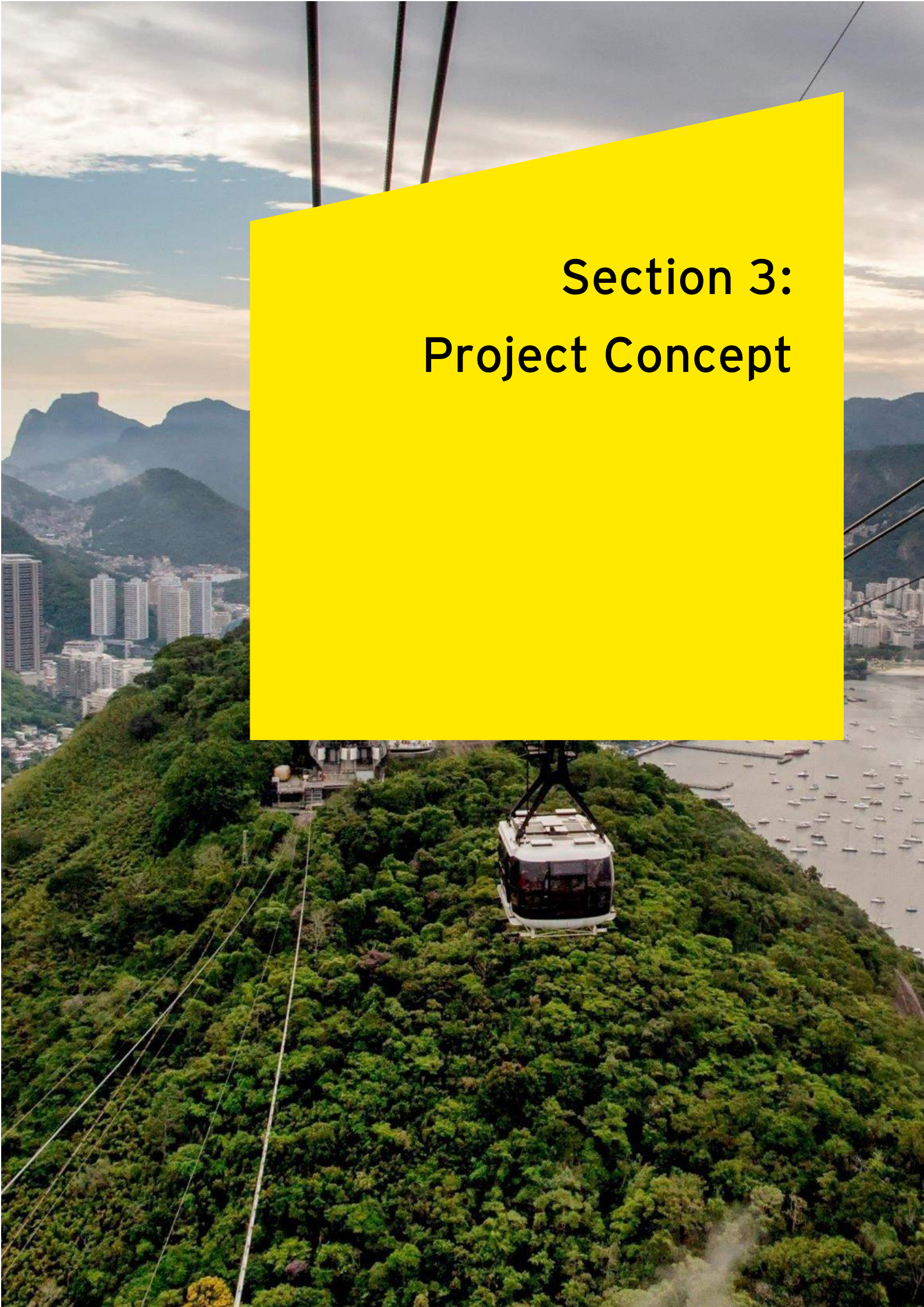


Figure 6 : Gangtok Ropeway Conceptual Alignment

Source: Google Maps, markings are only for visual representation, not to scale



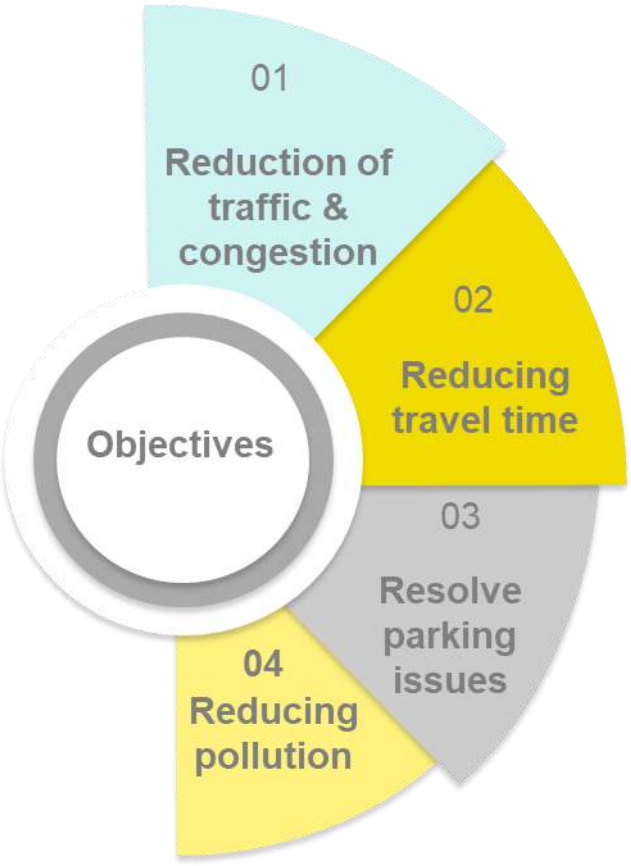
Section 3:
Project Concept

Section 3: Project Concept

Development of an Aerial ropeway-based transit system which is Integrated, Sustainable, Efficient, Reliable and Cost-Effective Public Transport for the city of Gangtok

The Government of Sikkim envisages augmentation of public transport in the capital city of Gangtok and provision of an efficient, adequate, economic, green and properly co-ordinated transport system in the city for promotion of rapid and inclusive economic growth. Using cable car transport as public transport and not just tourist attraction is a nascent idea in the country even today. Cable car transport is ideal for public transport in the mountainous terrain of Gangtok. If developed as an integrated mode, with the existing modes such as shared taxis and buses, the benefits will reach even the urban sprawl and not be reserved for a minority. Cable car transport is ideal for difficult terrain, which is too steep for railways and also does not require development of roads. Shifting of population from the shared taxis to cable cars will reduce congestion on the roads. They substantially reduce the emissions and are highly safe. Further, they are an iconic addition to a city's skyline and are a great attraction for tourists.

The goal for the proposed ropeway system is to enhance the existing social fabric and touristic opportunities through the incorporation of integrated programs into and around stations. Additionally, it should act as a catalyst encouraging a more sustained urban development along the routes, helping decongest the vulnerable central axis of Gangtok.



Gangtok has a linear road network which means that fundamentally the requirement is of a mass transit system along the trunk line (NH-10) and feeder systems to cover the inner areas. For location of boarding / de-boarding points and planning, high population density areas and employment centres have been considered in the TEFR. Considering the increasing travel demand in future years, the TEFR has proposed that a Cable Car system be provided as mass transit mode along the trunk network and shared taxies which are currently plying along trunk network shall be reorganized to serve as a feeder system.

Best suited for an eco-sensitive zone such as Gangtok, cable car transport will decrease requirement of travelling by cars / shared taxis and be an added attraction for the tourists

Ropeway system is ideal for public transport in the mountainous terrain of Gangtok. If developed as an integrated mode, in coordination with the existing modes such as shared taxis and buses, the benefits will reach even the urban sprawl and not be reserved for a minority. Ropeway transport is ideal for difficult terrain, which is too steep for railways and where availability of land for widening of roads is a challenge. Shifting of population from the shared taxis to cable cars will reduce congestion on the roads. They substantially reduce the emissions and are highly safe.

Aerial Ropeway systems are used to transport goods as well as passengers where conventional machines cannot be used due to inaccessible terrain or where high investments for the construction of roads and railway can be reduced. Ropeways are also constructed for summer and winter related tourism activities where people are carried to higher reaches. Ropeway systems are capable of overcoming large distances and major obstacles - Including topographically demanding terrain, there can be no doubt that in modern world the ropeway systems have become major tourist attractions at different tourist destinations all across the Globe. The modern ropeway systems are eco-friendly, safest and reliable means of urban transport with following advantages.

The project scope involves development of cable car transport as a means of public transport in Gangtok and carrying out the operation and maintenance of the developed facilities for the concession period. The idea is to develop cable cars as an integral part of the transport of the city and provide a convenient, safe and green mode of transport for the residents. The key project particulars are depicted below:

3.1 PROPOSED ALIGNMENT

A conceptual alignment has been identified in the TEFR prepared by the state. Table below lists identified cable car station locations along the conceptual alignment.

Table 4: Proposed ropeway alignment and sections

Sl. No.	Route No	Route Sections	Route Length (kms)	No. of Stops
1	North South Corridor	Ranipool -Tourism Office Complex	1.765	9
		Tourism Office Complex-Sikkim Manipal Hospital	0.920	
		Sikkim Manipal Hospital -Gangtok Municipal Corporation	0.628	

		Gangtok Municipal Corporation-Denzong Cinema/Supermarket	1.420	
		Denzong Cinema/Supermarket-Old SNMT Hospital	0.856	
		Old SNMT Hospital-Taxi Stand North District	0.956	
		Taxi Stand North District-Helipad	1.602	
		Helipad-Burtuk	1.800	
		Total	**9.948**	
2	West Corridor	Hospital at Sichey-District Center	0.380	3
		District Center-Taxi Stand North District	1.000	
		Total	**1.380**	
3	East Corridor	Old SNMT Hospital-Chandmari Taxi Stand	1.200	3
		Chandmari Taxi Stand-2nd Mile HPC Chruch	0.500	
		Total	**1.700**	
Total			**13.028**	**13**

The proposed CCT system route connecting Gangtok from Ranipool Taxi Stand in the south to Upper Burtuk in the North and New Hospital at sichey in the West and Chandmari in the East, along a 13 km route with 13 sections and 14 stations, 13 of which are open for passenger service. The stations site proposal responds to the main landmarks and points of activity to connect within the city of Gangtok. Neuralgic points like Tourism Office Complex, Sikkim Manipal Hospital, New Hospital at Sichey and the Denzon Cinema/Supermarket Complex are considered as strategic because they are significant trip generators. Serving them has positive impact in the city mass transport system. The implementation of proposed cable car network shall be taken up in two construction phases:

Phase 1: Consists of the 6 lowermost sections, from Ranipool Taxi Stand to Old STNM Hospital in the North South Line.

Phase II: Consists of the following 3 sections;

1. North Link - 4 uppermost sections of Old STNM Hospital to Upper Burtuk and

2. East Link - 2 sections connecting STNM Hospital to Chandmari Area.

3. West Link - 2 Sections connecting Taxi Stand North District to Hospital at Sichey

Table 5 : Key Ropeway characteristics

Particulars	Details
Length of alignment	13 km
No. of stations	14
Capacity per cabin	10
Proposed Technology	Mono-cable Detachable Gondola
Design Capacity	4,125* (Peak hour peak section in the horizon year 2051)
Type of cabin	Detachable Gondola system
Max speed	6 m/s (~22 km/hour)

Estimated Ridership	~47,592 passengers (FY 2025 i.e. 1st operational year)

On the Northern end of the city, proposed Taxi Stand North District station of Cable Car Transit System will be the first station, post phase-I implementation, while entering the city from northern side. This station already has a multi-level taxi stand and shall be further augmented as a multi-modal hub for terminating regional shared taxi and bus services from the north. This will again decongest central Gangtok due to restriction of regional shared services. Post phase-II implementation, Burtuk station of Cable Car Transit system shall be developed as a multi-modal transit hub k – 2 Sections connecting Taxi Stand North District to Hospital at Sichey.

Table 6 : Proposed alignment station types

#	Cable car station Name	Type
1	Ranipool Taxi Stand	Interchange
2	Tourism Office Complex	Station
3	Sikkim Manipal Hospital	Station
4	Gangtok Municipal Corporation	Interchange
5	Denzong Cinema / Kanchenjunga Shopping Complex	Station
6	Old SNMT Hospital	Interchange
7	Taxi Stand North District	Interchange
8	Station Near Helipad	Station
9	Upper Burtuk	Station
10	District Administrative Centre	Station
11	Hospital at Sichey	Station
12	Chandmari Taxi Stand	Station
13	2nd Mile HFC Church	Station

Based on the estimated corridor & section wise demand for the public transport in the city, the number of cabins has been estimated. Estimation of cabin size is quite essential for any public transit facility. Surplus no. of the cabins would often lead to underutilization and eventually increase the capital and operational costs. On the other hand, insufficient cabin drives the users to adopt a different mode leading to the reduction in the ridership values. So it is important that an optimal cabin size is determined and such a system needs to be developed which ensures enough cabin size to meet the ridership demand at the same time being self-sustainable. To estimate the

cabin size for the Cable Car System for Gangtok, various parameters have been considered. The assumptions for the cabin estimations are based on 16 Hours of Operations, Load Factor of 85% and an Average Speed of 6 m/s (~22 kmph).

Table 7 : Proposed ropeway design characteristics

#	Line / Section	Design PHPDT	Journey Time (Min)	Gondolas required
	North South line			
1	Ranipool -Tourism office	500	5	12
2	Tourism office-Sikkim Manipal Hospital	1000	3	11
3	Sikkim Manipal Hospital-Gangtok Municipal Corporation (GMC)	1000	2	9
4	Gangtok Municipal Corporation (GMC) –Denzong Cinema/Supermarket	1000	4	13
5	Denzong Cinema/Supermarket-Old STNM Hospital		2	8
6	Old STNM Hospital-Taxi Stand North District	1000	3	9
7	Taxi Stand North District -Helipad	1000	4	18
8	Helipad - Burtuk	1000	5	14
	West Line			
9	Hospital at Sichey-District Center	100	1	1
10	District Center-Taxi Stand North District	100	3	1
	East Line			
11	Old STNM Hospital-Chandmari Taxi Stand	100	3	1
12	Chandmari Taxi Stand-2nd Mile HPC Chruch	100	1	1

The total network length envisaged is approximately 13 km with North-South Line from Ranipool Taxi Stand to Burtuk Ward. The west alignment connects Taxi stand north district to District administrative centre and Hospital at Sichey. The east alignment connects the Chandmari ward to the Old STNM Hospital station. The stations are placed within dense built-up areas thus ensuring that maximum potential usage lies within walkable distance. Station at Taxi Stand North District, Sikkim National Transport, Gangtok Municipal Corporation and Ranipool Taxi stand can be developed as multimodal interchange hub (cable car to taxi/bus). The alignment as proposed under the TEFR has been based on following key planning concepts:

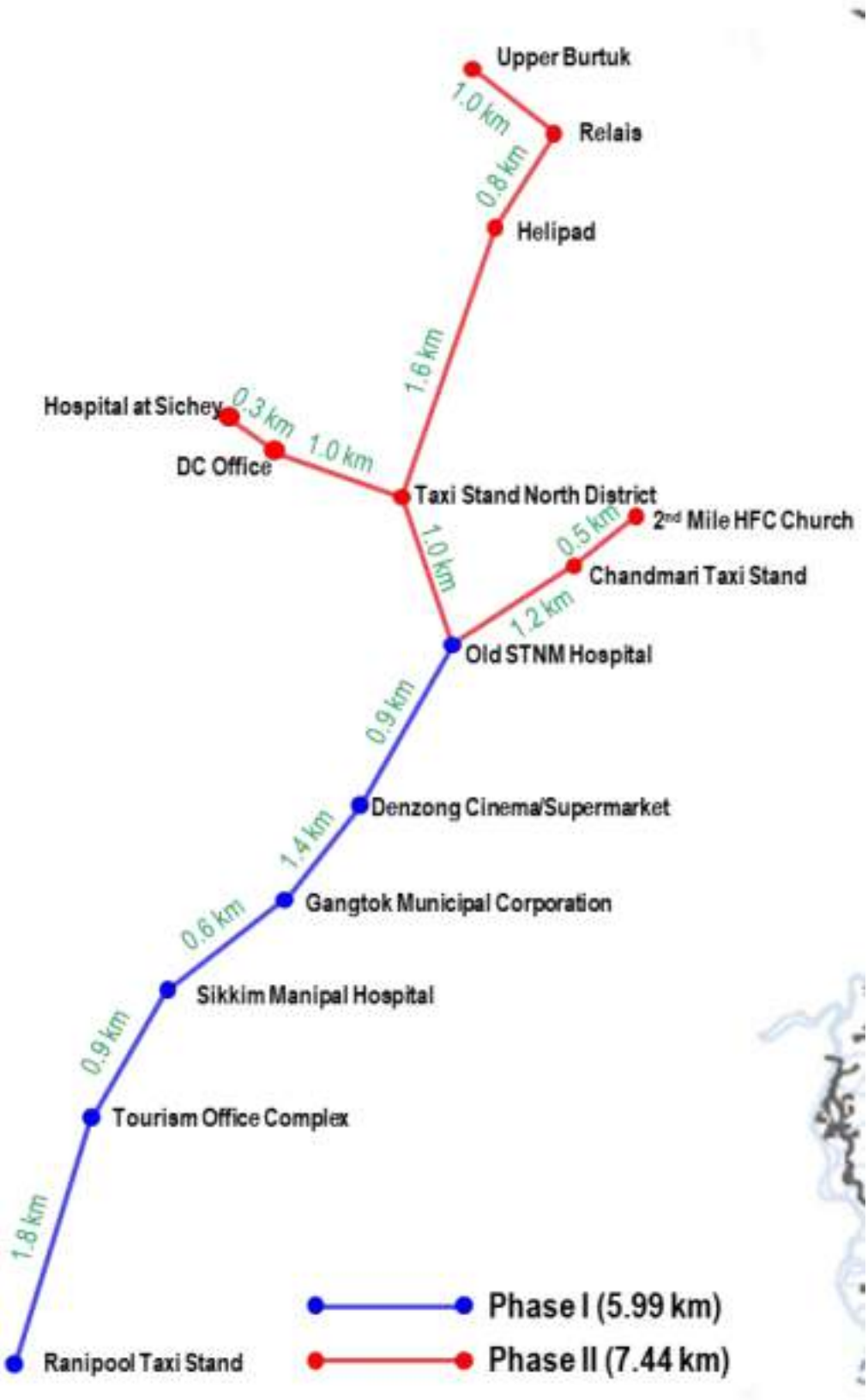


Figure 7: Conceptual Alignment of the North-South and East West Line

Maximum Network Coverage: Considering the linear structure of Gangtok, the proposed alignment is envisaged with a view to make the network length available to cover the maximum potential commuters. More than 75% of the area is covered under walkable-transit accessible zone.

Multimodal Integration: Cable Car Stations are planned to maximized walkability and also to integrate with the existing modes of transport such as public bus network, non-motorised transport, shared and private taxis. All existing major taxi and Bus Stands are in close proximity to the identified stations. Four of the stations are therefore going to be developed as an interchange to other modes of transport.

Transit Accessible Station planning: The distance between stations (spacing) is done keeping in view the 'walkability concept'. The trunk network is planned such that it covers maximum built up area under walkable distance (about 400 meters). Because majority of trips start and end with a walk, integration efforts to improve all modes simultaneously leads to safe and convenient access to transit and discourage people for using private vehicles.

The project scope involves development of cable car transport as a means of public transport in Gangtok and carrying out the operation and maintenance of the developed facilities for the concession period. The idea is to develop cable cars as an integral part of the transport of the city and provide a convenient, safe and green mode of transport for the residents.

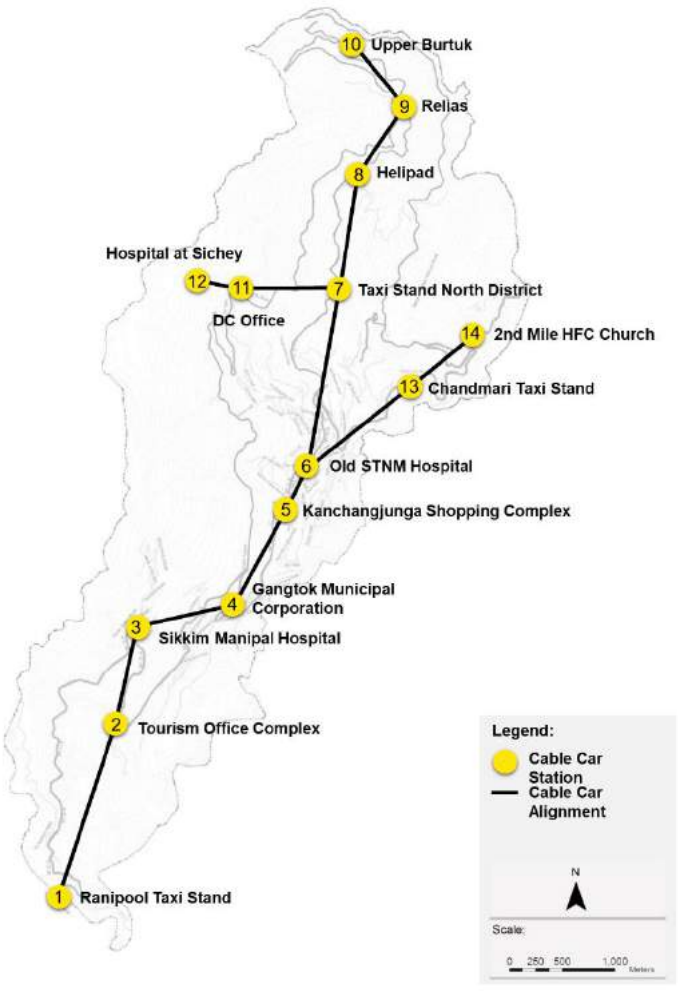
Section 4:

PROJECT SITE APPRECIATION

Section 4: Project Site Appreciation

The project envisages development of 13 sections and 14 stations are spread across Gangtok city covering approximately 13 kms of the city. Gangtok has a linear road network which means that fundamentally the requirement is of a mass transit system along the trunk line (NH-10) and feeder systems to traverse the inner areas. Considering the increasing travel demand in future years, it is proposed that a Cable Car system be provided as mass transit mode along the trunk network and shared taxies which are currently plying along trunk network, shall be reorganized to serve as a feeder system. As per the existing Techno-economic Feasibility Report (TEFR) undertaken by the state, 13 sections and 14 cable car stations have been identified to be included under the proposed project.

Detailed discussions with various stakeholders on the availability of land and basic utilities for development of such facilities at the proposed stations to boost the commercial viability for the project is a must. This shall be done during the technical surveys stage and as part of Social Impact Assessment report.



S.No	Station Location
North South Alignment	
1	Ranipool Taxi Stand
2	Tourism Office Complex
3	Sikkim Manipal Hospital
4	Gangtok Municipal Corporation
5	Kanchangjunga Shopping Complex
6	Old STNM Hospital
7	Taxi Stand North District
8	Station Near Helipad
9	Relias
10	Upper Burtuk
West Alignment	
11	District Administrative Centre
12	Hospital at Sichey
East Alignment	
13	Chandmari Taxi Stand
14	2nd Mile HFC Church

As per the TEFR, it is advisable to use higher ground areas wherever possible as it will enable decreasing station development costs. Each station would need to be integrated with additional modes of transport to meet the ultimate objective of development of a ropeway in the city.

Figure 8: Ropeway alignment & stations

As assessed in the TEFR, tentatively, ~3.8 ha (38,023 sq. m.) of permanent land is required for the 14 stations. Station-wise land requirement for the 14 stations with passenger movement is detailed below as per the TEFR. It may be noted that Relias is deemed to be a support station for the alignment with no passenger boarding / deboarding facilities. Including all stations, the land requirement is estimated to be 38,023 sq. m. The station cost estimates need technical viability assessment at the Supplementary Technical Studies stage.

Table 8: Station wise area break down (in sq m)

S.No	Station Location	Station Area (sq. m.)	Demolition required (sq. m.)
North South Alignment			
1	Ranipool Taxi Stand	3,370	-
2	Tourism Office Complex	3,600	350
3	Sikkim Manipal Hospital	2,280	-
4	Gangtok Municipal Corporation	3,150	-
5	Kanchangjunga Shopping Complex	4,560	750
6	Old STNM Hospital	2,100	1,600
7	Taxi Stand North District	3,040	735
8	Station Near Helipad	3,040	320
9	Relias	*[1]	-
10	Upper Burtuk	3,040	-
West Alignment			
11	District Administrative Centre	1,520	-
12	Hospital at Sichey	3,040	-
East Alignment			
13	Chandmari Taxi Stand	1,520	-
14	2nd Mile HFC Church	3,040	-
	TOTAL	**37,300**	**3,755**

4.1 LAND AVAILABILITY

Based on discussions with the state Government, out of the total land requirement of about 29,618 sq m, about 76% of land required is Government land (i.e. State / CPWD / Forest) and remaining 24% is private land to be acquired. Land acquisition, R&R costs have been estimated at INR 13 crore.

Table 9: Break up of land acquisition requirement

Parameter	Value
Total land required (sq m)	~29,618 sq m

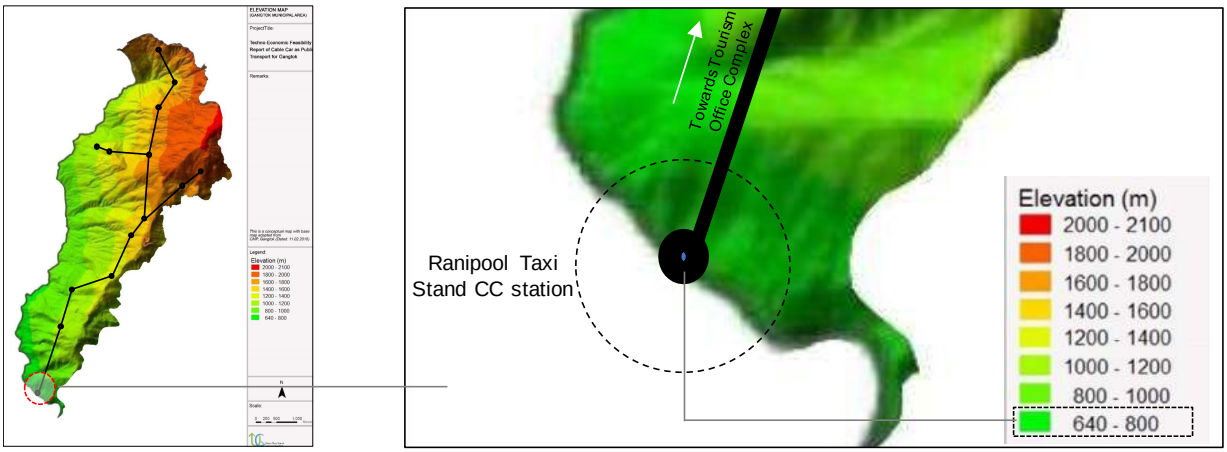
[1] *Relias is proposed to be a support station for the alignment with no passenger boarding / deboarding facilities. Area break up for Relias station is not available, to be confirmed by Technical consultant*

Land to be acquired from private (sq m)	~6,591 sq m
Cost of acquisition of private land/forest land transfer	INR 13 crore
Existing status of land break up	~76% with Govt. (CPWD + Forest + State Govt.) ~24% private

4.2 STATION WISE SITE ASSESSMENT

4.2.1 Proposed Station #1: Ranipool Taxi Stand

The station lies on the North-South line and is located at the southern part of the Gangtok municipal area.



Physiography: Ranipool Taxi Stand cable car station is planned at 27.293501, 88.587838 (approximate location) at an elevation of 640 m - 800 m above MSL. The proposed station is planned on contoured site which currently has new cutting road.

Since, the station site is on the left hand side of Rani Khola river, the assessment, whether the site falls under Gangtok municipal area must be done. Also, the land ownership details of the site are unknown. The same shall be assessed and accordingly a SIA report shall address the acquisition / R&R process. The construction on station area lying on the sloped part might require cut and fill

construction technology. Hence, the land suitability (detailed soil characteristics i.e. typology, stability etc.) needs to be assessed. Also, geotechnical investigation study should be conducted to assess the station site area and the deep layers before final design and layout of the station area and access area.

Access: The station site can be accessed using National Highway-10 road which has two lanes. Also, the proposed site area has a new cutting road, that is used to access the area. The road is not metalled.

Built-up Characteristics: The area in the close vicinity of station is green (forest). There is a dense built up on the other side of the river. Also, there are pharmaceutical factory of Sun Pharma and apartments. There are no built-up encumbrance on the proposed station site.

The social hazards pertaining to access (blocking of new cutting road and bridge at NH10-bottleneck) due to construction works are mostly of temporary nature and mitigation measure shall be suggested in SIA report before construction.

The station area has Rani Khola river in its close vicinity, there is no clear demarcation of the river bed/ No construction zone.

Since the River is in close proximity to the station site, appropriate measures should be included in the work plan and budgeted for. EIA report shall address the likely negative impacts such as soil erosion, muck disposal, river water pollution etc.

Ecological Environment: The station area has numerous trees and forest cover. Also, the river bed is in close proximity to the station site.

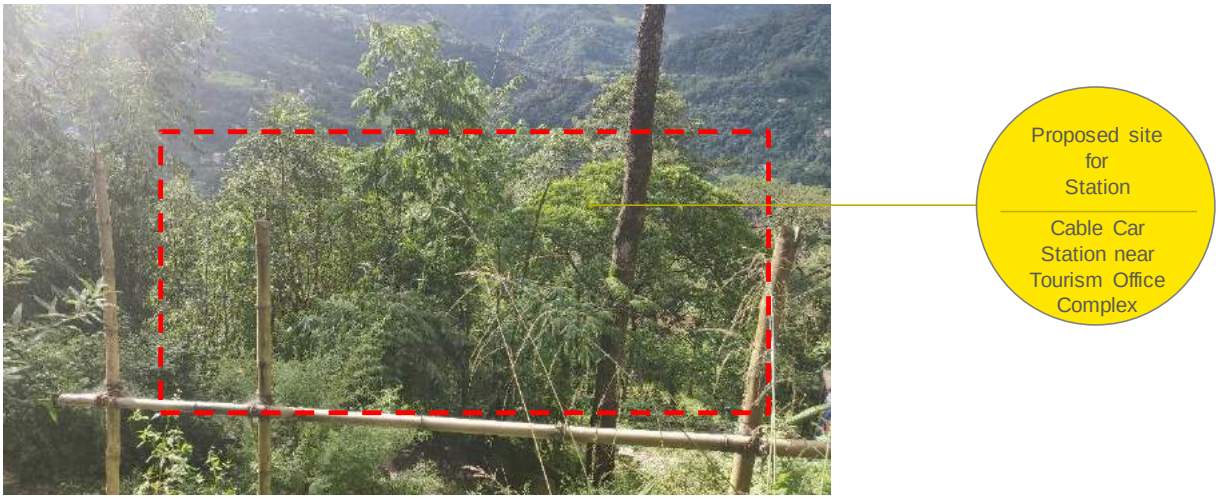
- An ecological study of the ecosystem is required before construction.
- Inventory of trees should be carried out along the cable car alignment & station area.

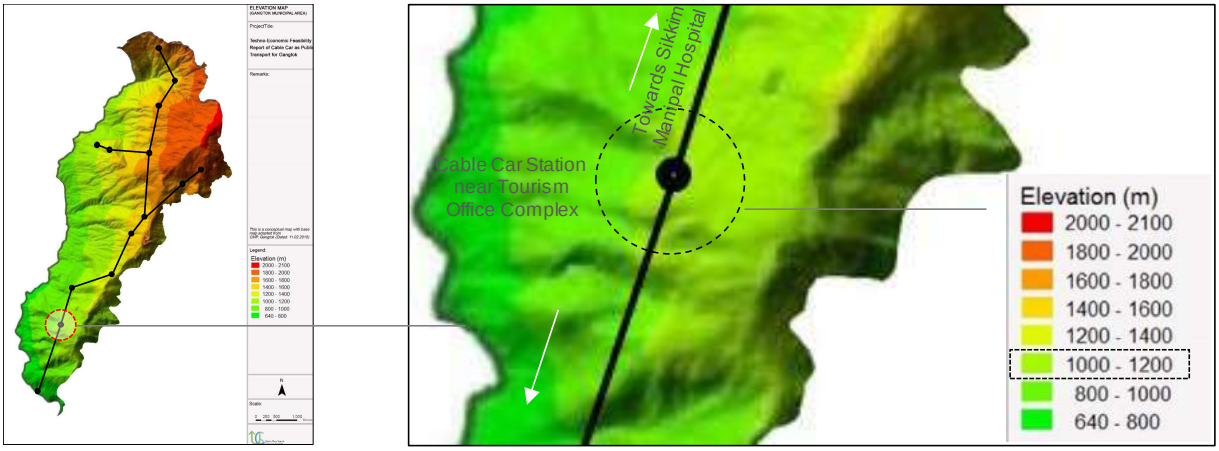
4.2.2 Proposed Station #2: Tourism Office Complex

This Cable Car Station near Tourism Office Complex is second station that lies on the North-South line and is located near Sikkim Tourist Organization headquarters.

Physiography: Cable Car Station near Tourism Office Complex is in Tadong area and it is planned at 27.306766, 88.593277 (approximate location) with an elevation of 1000 m -1200 m above MSL. The proposed station is planned on the sloped land.

Since the station is planned on the sloped part, the construction will require cut and fill methodology. Hence, the land suitability (detailed soil characteristics i.e. typology, stability etc.) needs to be assessed. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station and access area.





Access: The station can be accessed using NH-10 road which has two lanes. A road from this intersection also provide access to the army area.

Built-up Characteristics: Most of the structures in the station proximity area are 3-4 stories high. All structures have RCC construction and most of them have come up in recent years. The station area is planned in close vicinity to army area which might have sensitive receptor i.e. training area/no photography or visual access zone, school, etc.

There is no vacant land available for handling material and manpower during construction, and any hindrance to the NH10 might cause a bottleneck, thus mitigation measure shall be suggested in SIA before construction.

Ecological Environment: The station area has numerous trees and forest cover.

An ecological study of the ecosystem is required before construction to understand the impact due to cable car construction and operations' activities on the existing flora and fauna of the planned station area.
Inventory of trees shall be carried out along the Cable car alignment & station area.

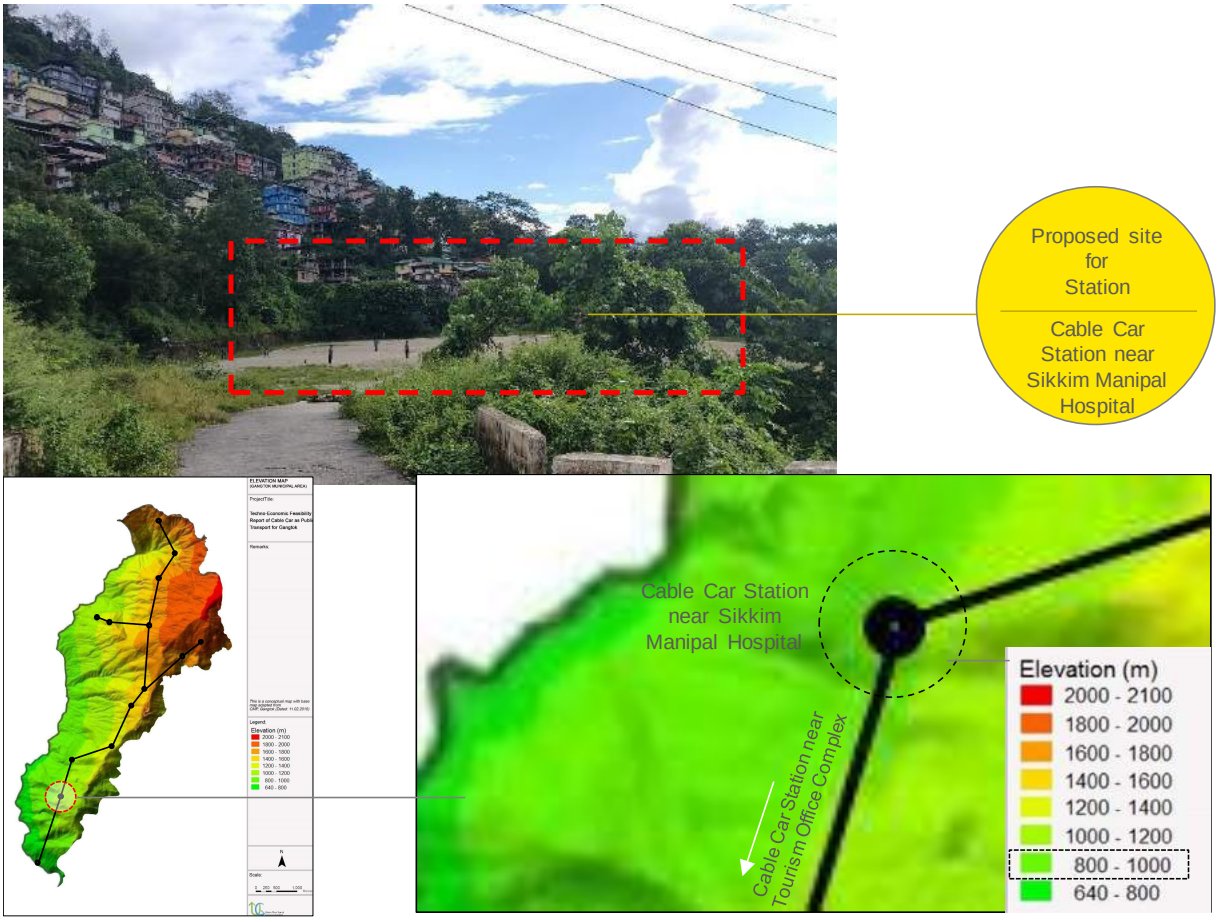
4.2.3 Proposed Station #3: Sikkim Manipal Hospital

This Cable Car Station near Sikkim Manipal Hospital is the third station that is planned along the North-South line and is located near Central Referral Hospital and Sikkim Government college.

Physiography: Cable Car Station near Sikkim Manipal Hospital is in Upper Tadong area and it is planned at playground of Sikkim Government College i.e. at 27.314423, 88.598552 (approximate location) with an elevation of 800 m - 1000 m above MSL. The proposed station is planned on the flat land.

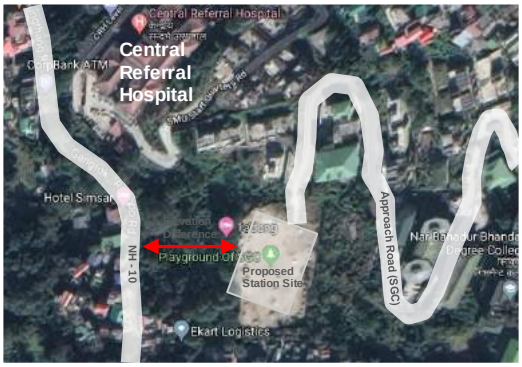
Since the station is planned on the Semi Public land i.e. Playground of Sikkim government college, SIA report shall detail out the process of land acquisition and compensation to landowners.

Also, the land suitability (detailed soil characteristics i.e. typology, stability etc.) needs to be assessed. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station and access area.



Access: The station site can be accessed using narrow road which is in the Sikkim government college compound. The station is ~100 m (aerial distance) away from the NH-10 road. However, the elevation difference is quite large and hence, the station site can't be accessed directly from the National Highway.

Built-up Characteristics: Most of the structures in the station proximity area are 3-4 stories high. All structures have RCC construction. The station area is planned in close vicinity to Sikkim Government College compound and Central Referral Hospital which are sensitive receptors.



Since the area is highly sensitive, the construction work might lead to social hazards and mitigation measures shall be suggested in SIA before construction. Social hazards during operations can be mitigated if provision for access to site from NH10 is done. This shall also be recommended in Supplementary Technical Study and SIA report.

Ecological Environment: The station site area is surrounded by numerous trees.

An ecological study of the station area's ecosystem is required before construction to understand the impact due to cable car construction and operations' activities on the existing flora and fauna of the planned station area surrounding and access path from NH-10.

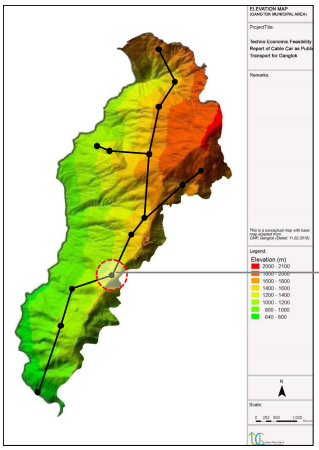
Inventory of trees shall be carried out along the Cable car alignment, station area and access path from NH10.

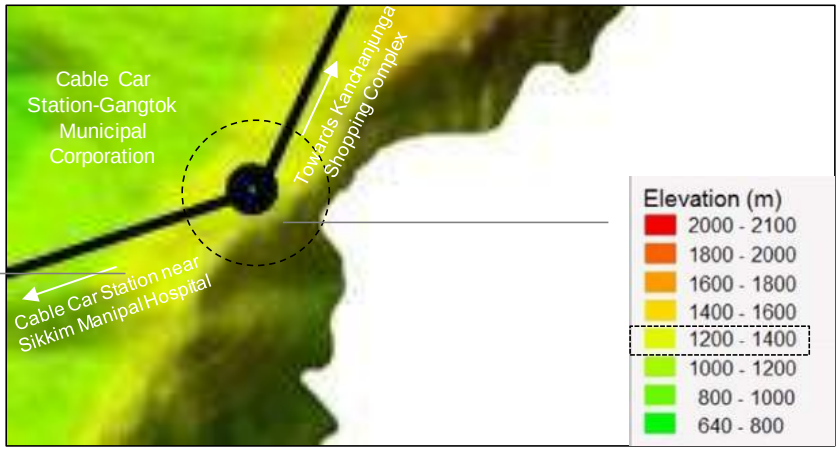
4.2.4 Proposed Station #4: Gangtok Municipal Corporation

This Cable Car Station - Gangtok Municipal Corporation is the fourth station that is planned along the North-South line and is planned near Gangtok Municipal Corporation / Deorali taxi stand in Deorali Baazaar.

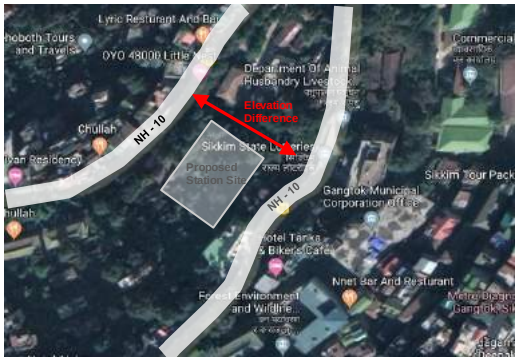
Physiography: Cable Car Station-Gangtok Municipal Corporation is in Deorali Baazaar and it is planned near vet hospital i.e. 27.319466, 88.606081 (Approximate location) with an elevation of 1200 m - 1400 m above MSL. The proposed station is planned on steep contoured land.

Since the landownership is unknown, SIA report shall detail out the land ownership details and accordingly the process of land acquisition and compensation to landowners. Also, since the site is steep, the land suitability analysis (detailed soil characteristics i.e. typology, stability etc.) needs to be done. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station and access area.





Access: The station site can be accessed by the NH-10 road.



Built-up Characteristics: Most of the structures in the station proximity area are 7-8 stories high. All structures have RCC construction.

The area has high footfall and vehicular traffic. The construction work might lead to social hazards, and hence, mitigation measure shall be suggested in SIA before construction. This shall also be recommended in DPR and SIA report.

Ecological Environment: The station area has numerous trees and green cover. An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna of the planned station area surrounding and access path from NH-10.

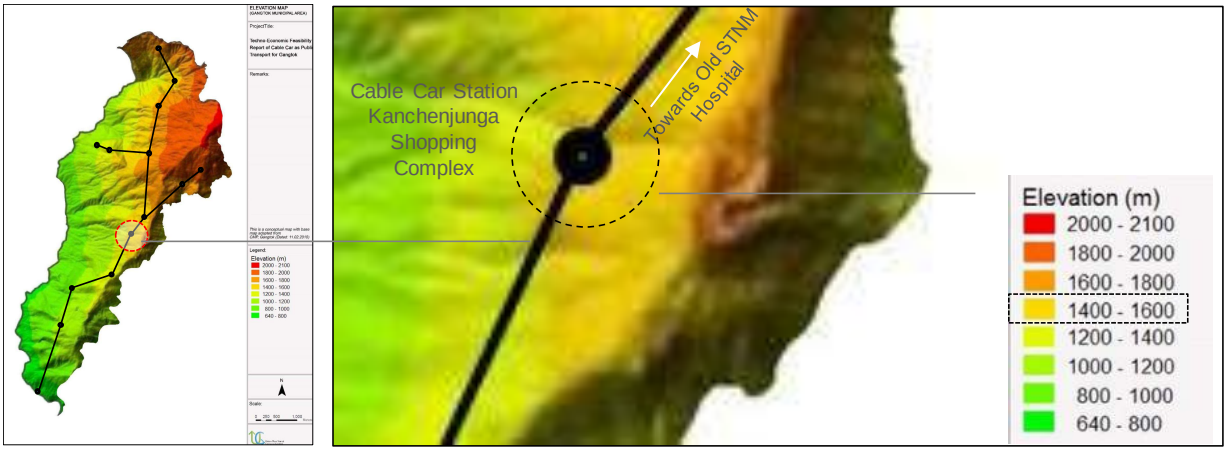
Inventory of trees shall be carried out along the Cable car alignment, station area and access path from NH10.

4.2.5 Proposed Station #5: Kanchenjunga Shopping Complex

This Cable Car Station - near Kanchenjunga Shopping Complex is fifth station that is planned along the North-South line and is planned near Kanchanjunga Shopping Complex (Old Lal Bazar). The station also serves nearby MG Marg, a former market and pedestrianized street very popular with both locals and tourists.

Physiography: Cable Car Station - near Kanchenjunga Shopping Complex is densely populated neighbourhood near Kanchanjunga Shopping Complex and nearby i.e. 27.325248, 88.610663 (Approximate location) with an elevation of 1400 m - 1600m above MSL. The proposed station is planned on the steep contoured land with dense trees.

Since the landownership is unknown, SIA report shall detail out the land ownership details and accordingly the Process of Land Acquisition and Compensation to landowners. Also, since the site is steep, the land suitability analysis (detailed Soil characteristics i.e. typology, Stability etc.) needs to be done. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station and access area. Since the station area is surrounded by tall and dense built-up, the EIA report shall address 'Vibration Control Measures' and 'Noise Control Measures'



Access: The station site has no direct connectivity to National highway or New Market road.

Built-up Characteristics: Most of the structures in the station proximity area are 4-5 stories high. All structures have RCC construction. There are few dilapidated structures also.

The area has high footfall and vehicular traffic, The construction work might lead to social hazards, and hence, mitigation measure shall be suggested in SIA before construction. This shall also be recommended in Supplementary Technical Study and SIA report.

Ecological Environment: The station area has numerous trees and green cover.

An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna of the planned station area surrounding and access path from NH-10.

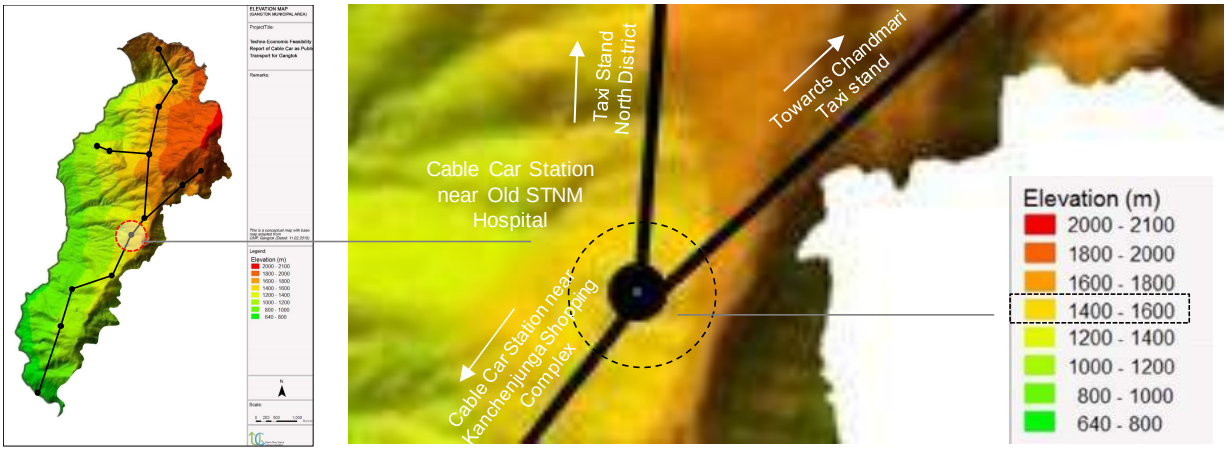
Inventory of trees shall be carried out along the Cable car alignment, station area and access path from NH10.

4.2.6 Proposed Station #6: Old STNM Hospital

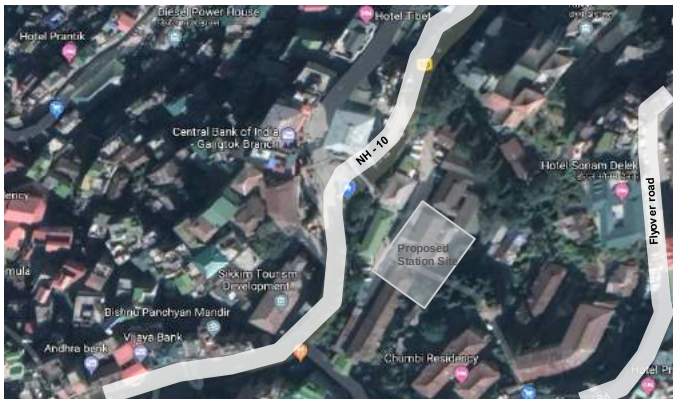
This Cable Car Station - near Old STNM Hospital is sixth station that is planned along the North-South line and is planned on the site of existing Old STNM hospital. The station also serves as an interchange station to east line connecting this station to Chandmari taxi stand and 2nd Mile area.

Physiography: Cable Car Station near Old STNM Hospital is planned in densely populated neighbourhood of Arithang and nearby i.e. 27.331179, 88.614152 (approximate location) with an elevation of 1400 m - 1600m above MSL. The proposed station is planned on the contoured land with existing built-up and slight green cover.

Also, since the site is steep, the land suitability analysis (detailed soil characteristics i.e. typology, stability etc.) needs to be done. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station and access area. Since the station area is surrounded by tall and dense built-up, the EIA report shall address 'Vibration Control Measures' and 'Noise Control Measures'



Access: The station site has no direct connectivity to National highway or New Market road.



Built-up Characteristics: Most of the structures in the station proximity area are 4-5 stories high. All structures have RCC construction. The site has Old STNM hospital structure in place.

Site is situated in densely populated area with more than 300 pph. The area has high footfall and vehicular traffic, The construction work might lead to social hazards, and hence, mitigation measure shall be suggested in SIA before construction. This shall also be recommended in Supplementary Technical Study and SIA report.

Ecological Environment: The site area has numerous trees and green cover.

An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna of the planned station area surrounding.

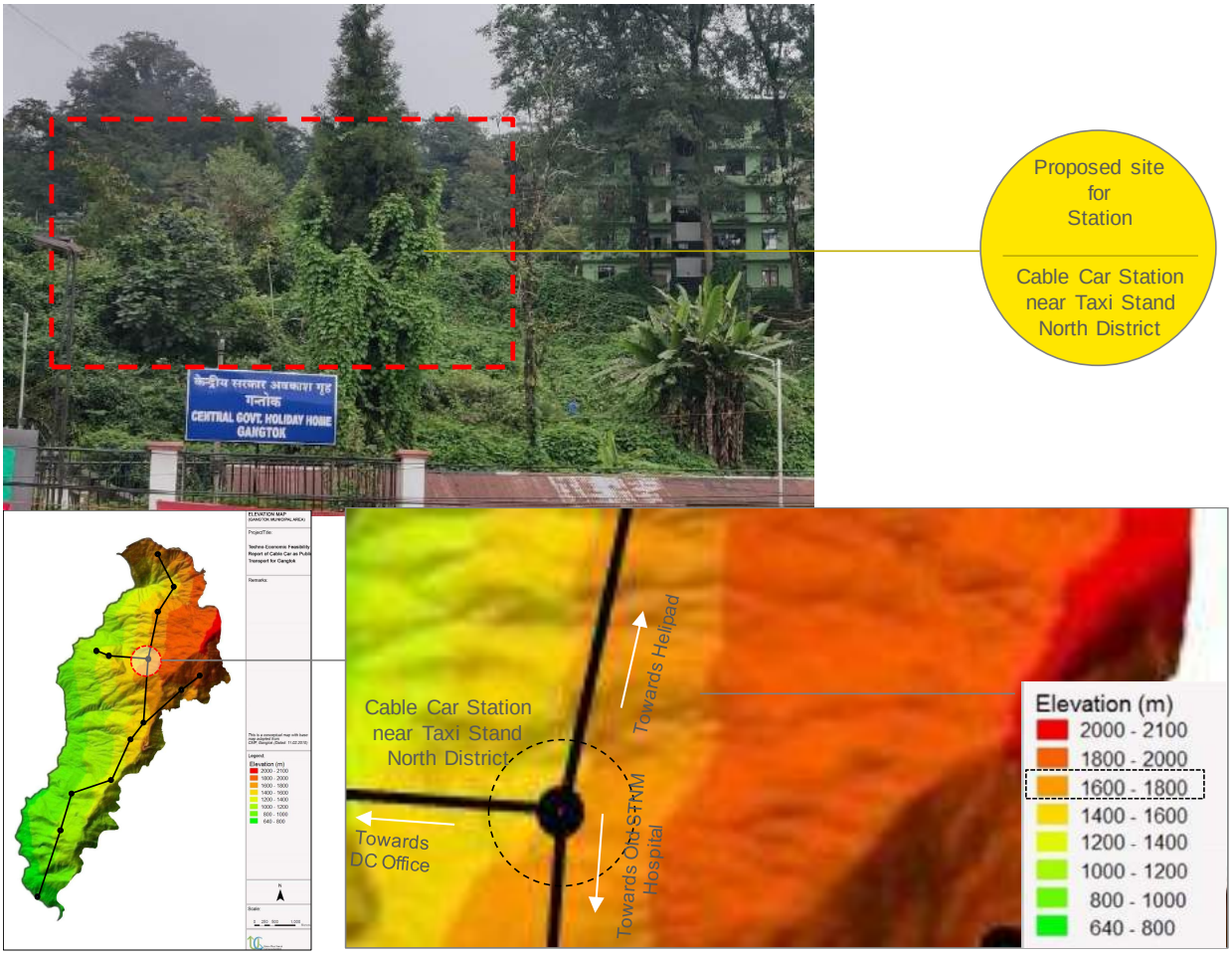
Inventory of trees shall be carried out along the Cable car alignment and station area.

4.2.7 Proposed Station #7: Taxi Stand North District

This Cable Car Station near Taxi Stand North District lies on the North South line and is located at Baluakhani road, Sungava. This station serves the development along the NH 10 and Sungava Area.

Physiography: Cable Car Station near Taxi Stand North District is planned in green contoured site i.e. 27.342470, 88.613664 (approximate location) with an elevation of 1600 m – 1800 m above MSL.

The construction on station area lying on the sloped part might require cut and fill construction technology. Hence, the land suitability (detailed soil characteristics i.e. typology, stability etc.) needs to be assessed. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station area and access area.



Access: The station site can be accessed using NH 10 road.

Built-up Characteristics: Most of the structures in the station proximity area are 3-4 stories high. All structures have RCC construction.

The area has **high** footfall and vehicular traffic, The construction work might lead to social hazards, and hence, mitigation measure shall be suggested in SIA before construction. This shall also be recommended in Supplementary Technical Study and SIA report.

Ecological Environment: The site area has numerous trees and green cover.

An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna of the area.

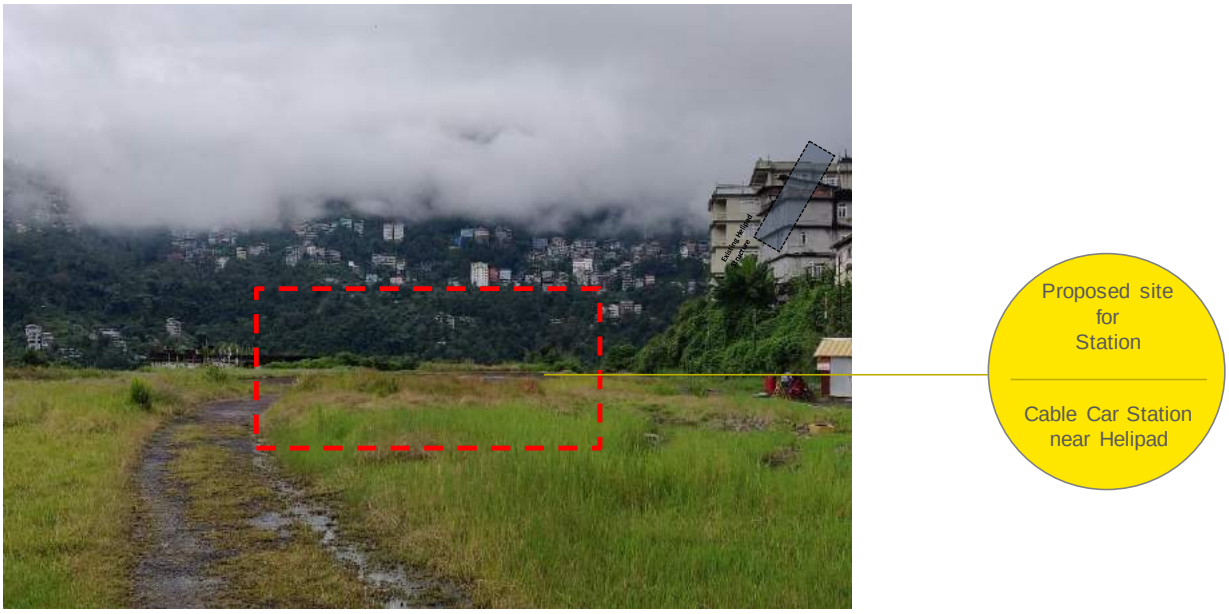
Inventory of trees shall be carried out along the Cable car alignment & station area.

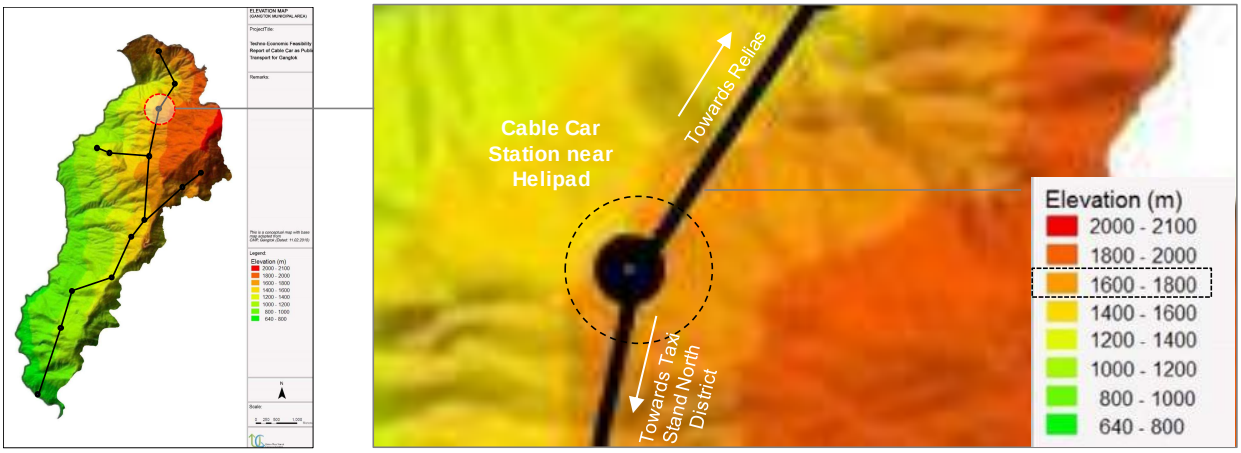
4.2.8 Proposed Station #8: Helipad

This Cable Car Station near Helipad lies on the North-South line and is located at lower Burtuk road. This station serves the development along the NH 10 and Sungava Area. The station is planned as a multimodal interchange with regional taxi stand.

Physiography: Cable Car Station near Helipad is planned in exiting helipad site at Lower Burtuk road near 27.355636, 88.614088 (approximate location) with an elevation of 1600 m – 1800 m above MSL.

The station area is planned on the flat land, However, the land suitability (detailed Soil characteristics i.e. typology, Stability etc.) needs to be assessed. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station area and access area.





Access: The station site can be accessed using lower Burtuk Road.

Built-up Characteristics: Most of the structures in the station proximity area are 2-3 stories high. All structures have RCC construction. The station site has existing helipad.

The area has **moderate** footfall and vehicular traffic, The construction work might lead to social hazards and hinderance to existing **helicopter operations**, and hence, mitigation measure shall be

suggested in SIA before construction. This shall also be recommended in Supplementary Technical Study and SIA report.

Ecological Environment: The site area has green cover.

An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna of the area.

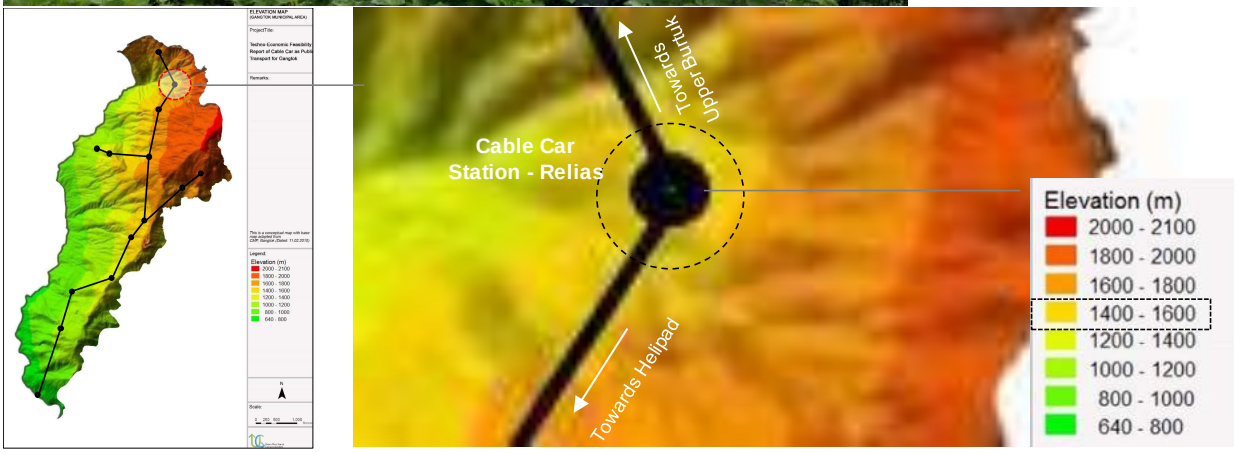
Inventory of trees shall be carried out along the Cable car alignment & station area.

4.2.9 Proposed Station #9: Relias

This Cable Car Station near Bakhthang Falls lies on the North-South line and is located at National Highway 10. This station serves as a turn station and is not meant for passenger Boarding/Alighting.

Physiography: Cable Car Station near Bakthang Falls is planned on the contoured site on the NH10 near 27.357134, 88.620225 (approximate location) with an elevation of 1400 m – 1600 m above MSL.

The construction on station area lying on the steep contoured part might require cut and fill construction technology. Hence, the land suitability (detailed Soil characteristics i.e. typology, Stability etc.) needs to be assessed. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station area and access area.



Access: The station site can be accessed using National Highway 10.

Built-up Characteristics: There is no built-up in close proximity of the station. However, some temporary structures are present on the site.

The area has **moderate** vehicular traffic. The construction work might lead to social hazards and hinder the national highway, and hence, mitigation measure shall be suggested in SIA before construction. This shall also be recommended in Supplementary Technical Study and SIA report.

Ecological Environment: The site area has dense green cover.

An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna of the area.

Inventory of trees shall be carried out along the Cable car alignment & station area.

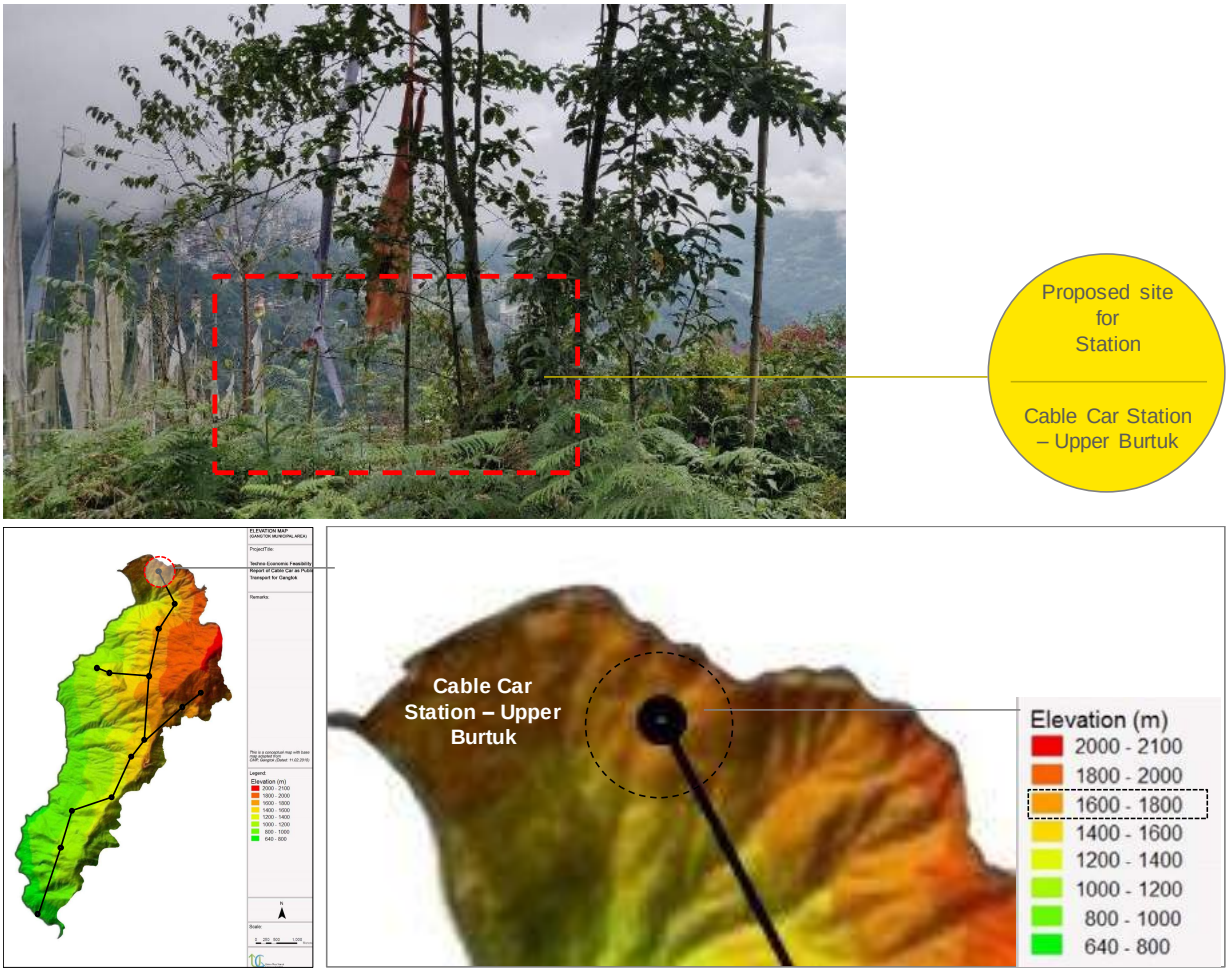
4.2.10 Proposed Station #10:– Upper Burtuk

This Cable Car Station – Upper Burtuk is planned near Government Sr Sec School Bojoghari located at National Highway 10. This station serves the northernmost area of Gangtok i.e. Upper Burtuk ward, as well as other remote settlement areas.

Physiography: this station is planned on the contoured site behind the school near 27.367101, 88.618147 (approximate location) at an elevation of 1400 m – 1600 m above MSL.

The construction on station area lying on the steep contoured part might require cut and fill construction technology. Hence, the Land suitability (detailed Soil characteristics i.e. typology, Stability etc.) needs to be assessed first. Also, geotechnical investigation study shall be conducted

to assess the station site area and the deep layers before final design and layout of the station area and access area.



Access: The station site can be accessed using National Highway which has two lanes.

Built-up Characteristics: Most of the structures in the station proximity area are 4-5 stories high. All structures have RCC construction and most of them have come up in last decade. The station area has sensitive receptor i.e. government school.

The area has **High** vehicular traffic. The construction work might lead to social hazards and hinder the national highway. The social hazards related to construction works are mostly of temporary nature and mitigation measure shall be suggested in SIA before construction. Also, mitigation measures for social hazards during operations shall also be suggested in SIA.

Ecological Environment: The site area has dense green cover.

An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna of the area.

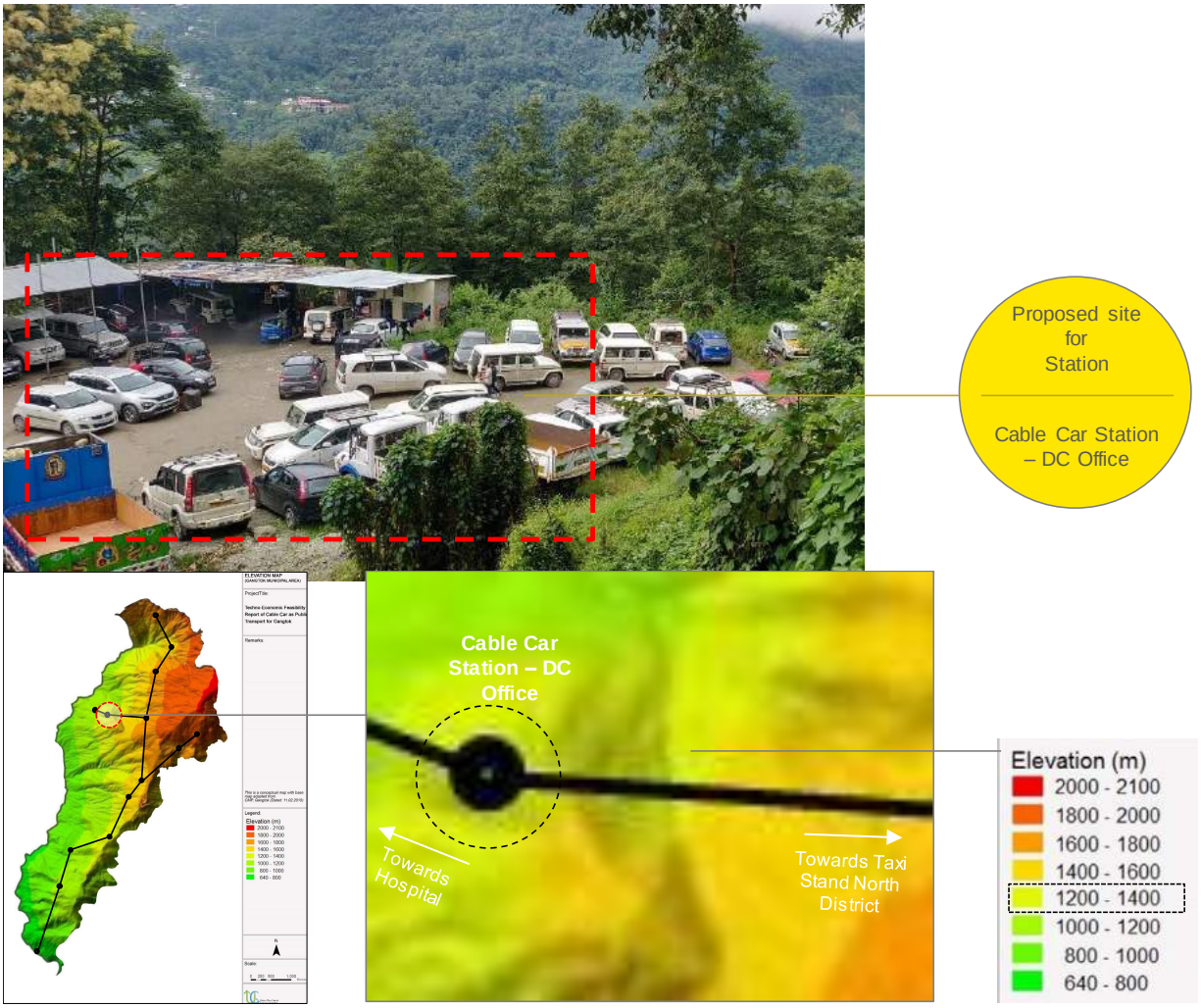
Inventory of trees shall be carried out along the Cable car alignment & station area.

4.2.11 Proposed Station #11: DC Office

This Cable Car Station – DC Office is planned near Office of Deputy Commissioner on lower Burtuk road. This station serves the western part of Gangtok municipal area.

Physiography: this station is planned on the flat car parking site behind the school near 27.346399, 88.605864 (Approximate location) at an elevation of 1200 m – 1400 m above MSL.

The station area is planned on flat land, but the adjoining land is steep. Hence, the land suitability (detailed soil characteristics i.e. typology, stability etc.) needs to be assessed. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station area and access area.



Access: The station site can be accessed using lower Burtuk road which has two lanes.

Built-up Characteristics: The site area has sheds and few single storied structures.

Since the station site is privately owned, SIA report shall address the acquisition / R&R process. This area has **High** vehicular traffic. The construction work might lead to social hazards and hinder the approach road. The social hazards related to construction works are mostly of temporary nature and mitigation measure shall be suggested in SIA before construction. Also, mitigation measures for social hazards during operations shall also be suggested in SIA. Since the station area is surrounded by tall and dense built-up, the EIA report shall address 'Vibration Control Measures' and 'Noise Control Measures'

Ecological Environment: The area around the site has dense green cover.

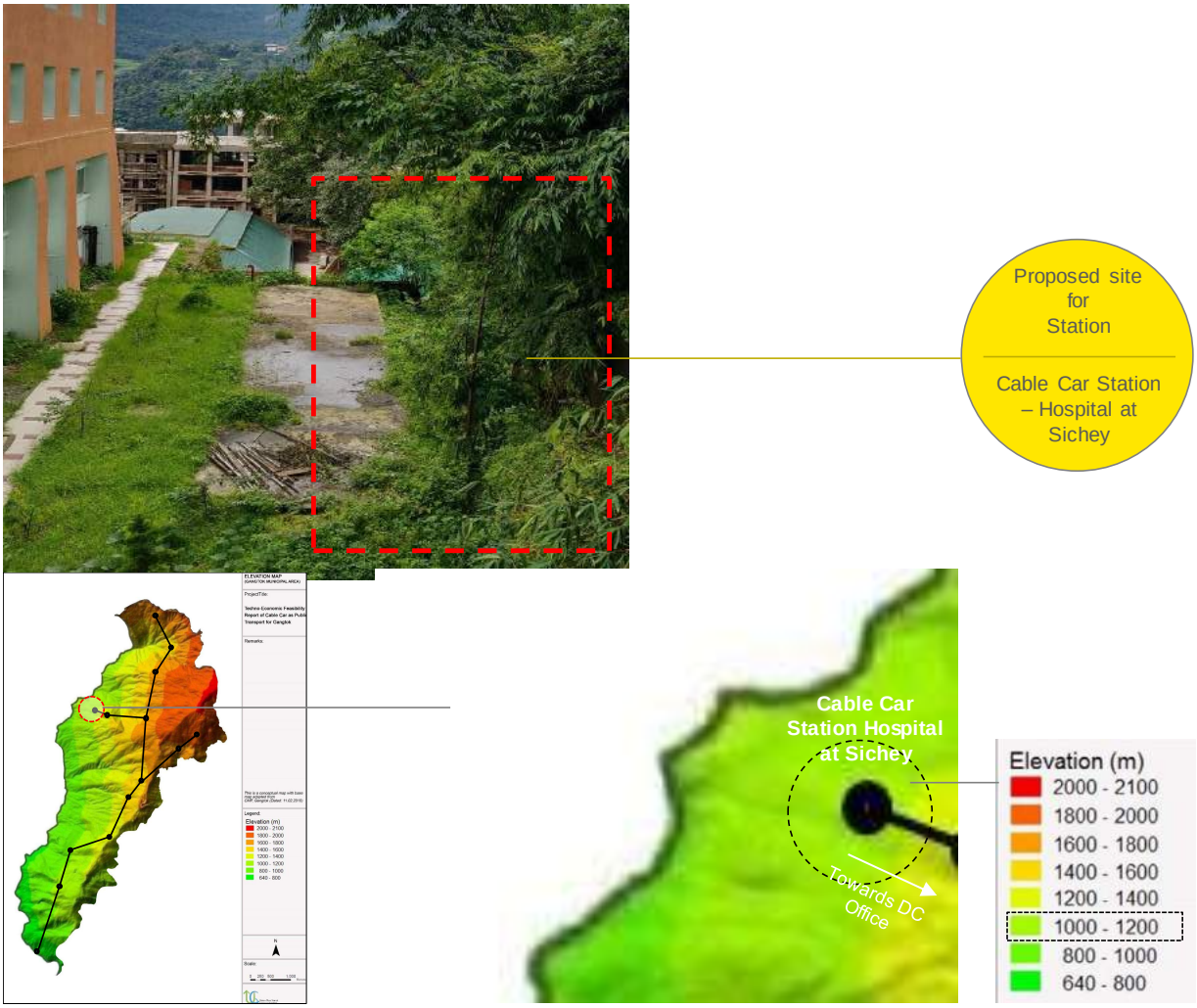
An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna of the area. Inventory of trees shall be carried out along the Cable car alignment & station area.

4.2.12 Proposed Station #12: Hospital at Sichey

This Cable Car Station – Hospital at Sichey is planned near Hospital at Sichey on Ranka Road.

Physiography: This station is planned on the partly contoured site adjacent to the hospital near 27.347743, 88.603644 (approximate location) at an elevation of 1000 m – 1200 m above MSL.

The station area is planned on partly contoured site. Hence, the land suitability (detailed Soil characteristics i.e. typology, stability etc.) needs to be assessed. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station area and access area.

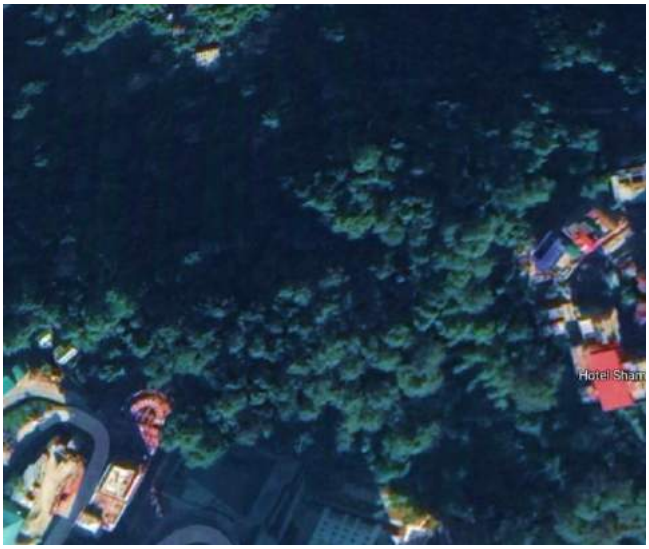


Access: The station site can be accessed using lower Burtuk road which has two lanes.

Built-up Characteristics: The site area has sheds and few single storied structures. The station area has sensitive receptor i.e. government hospital.

Since the ownership is not known, SIA report shall address the acquisition/RnR process. This area has **high footfall**. The construction work might lead to social hazards and hinder the access road. The social hazards related to construction works are mostly of temporary nature and mitigation measure shall be suggested in SIA before construction. Also, mitigation measures for social hazards during operations shall also be suggested in SIA. Since the station area is surrounded by tall hospital structure, the EIA report shall address 'Vibration Control Measures' and 'Noise Control Measures'

Ecological Environment: The station area and surroundings have dense green cover.



An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna of the area.

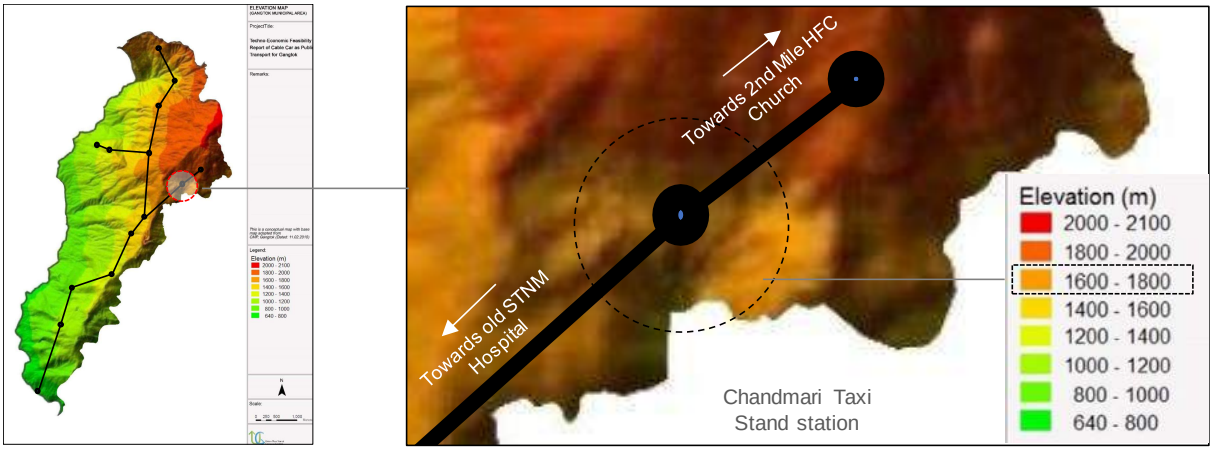
Inventory of trees shall be carried out along the Cable car alignment & station area.

4.2.13 Proposed Station #13: Chandmari Taxi Stand

The station lies on the east line and is located at the northern eastern part of the Gangtok municipal settlement area i.e. Core Chandmari Ward, the station serves the core development area. The e-Bike docks provided allow for easy self-service access also to more remote locations. The station is planned to be integrated with the Chandmari taxi stand.

Physiography: Chandmari Taxi Stand cable car station lies near 27.338666, 88.623184 (approximate location) with an elevation of 1600 m -1800 m above MSL. The proposed station is planned partly on the flat land which currently has Chandmari Taxi Stand (for development of integrated cable-car taxi stand station) and partly on the sloped land adjoining the taxi stand.

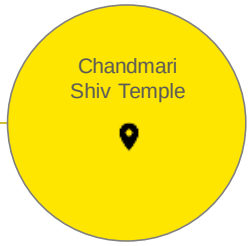
The construction on station area lying on the sloped part might require cut and fill construction technology. Hence, the land suitability (detailed soil characteristics i.e. typology, stability etc.) needs to be assessed first. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station area and access area.



Access: The station can be accessed using Jawaharlal Nehru road which has two lanes. The road section that goes towards the upper Burtuk ward is deteriorated.

Built-up Characteristics: Most of the structures in the station proximity area are 4-5 stories high. All structures have RCC construction and most of them have come up in last decade. The station area has sensitive receptor i.e. government school, place of worship (Temple) etc.

The social hazards related to construction works are mostly of temporary nature and mitigation measure shall be suggested in SIA before construction. Also, mitigation measures for social hazards during operations shall also be suggested in SIA.



Monuments: The station area has Chandmari Shiv Temple in its close vicinity, which serves as the attraction destinations for local people as well as tourists.

The historical monuments need to be studied for anticipated impact due to proposed section of alignment. If the temple site is protected, then as per '**Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010',** area to a distance of 100 m in all directions is prohibited for construction. Also, even if alignment is passing within the 200m of regulated area around these monuments, prior approval will be required for construction activities in a regulated area of these monuments.

Ecological Environment: The station area has numerous trees and forest cover.

Also, Sikkim Himalayan Zoological Park is in the close proximity (Approximately 350 m) of the Station area.

An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna of the area. Inventory of trees shall be carried out along the Cable car alignment & station area.

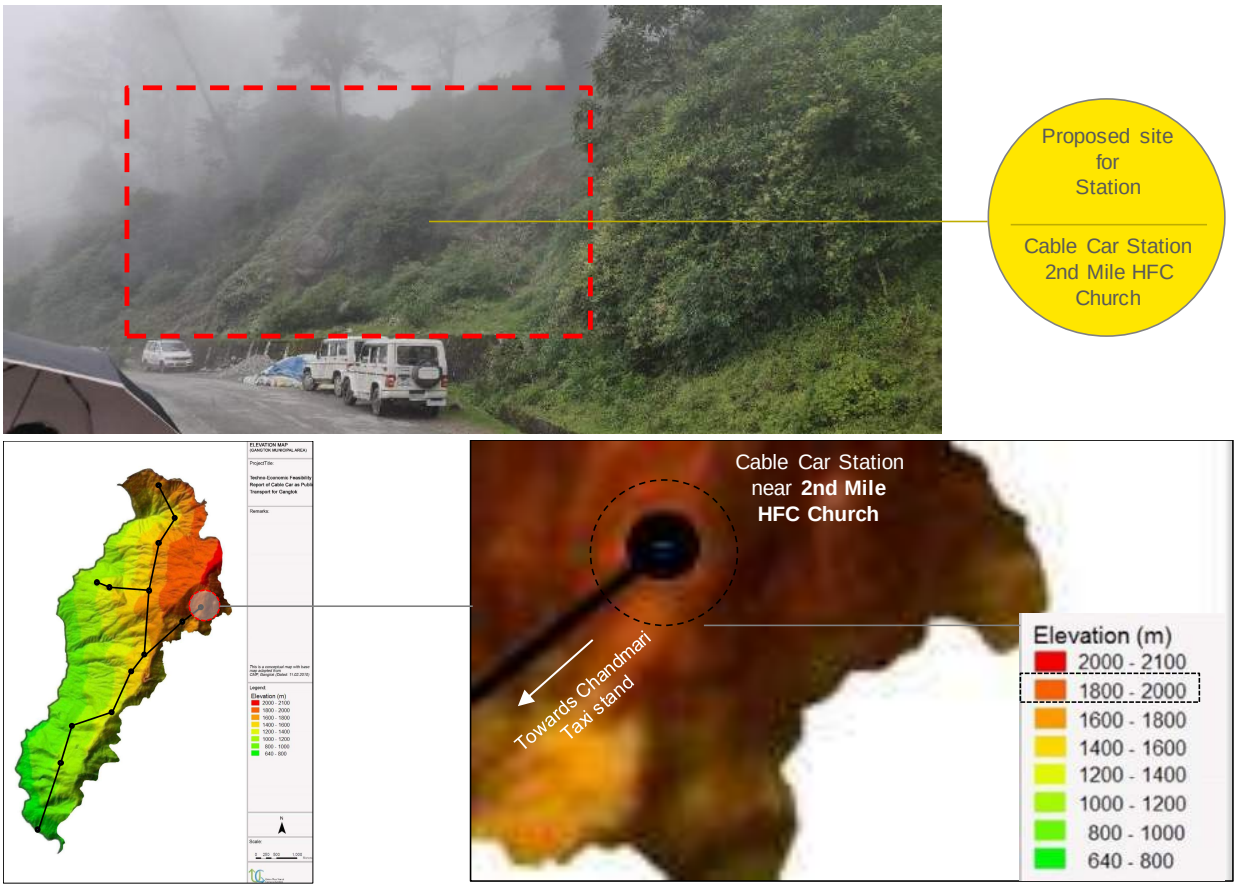
EIA report shall assess whether the '**Sikkim Himalayan Zoological Park'** is Protected area (National park or Wildlife sanctuary) or not. If yes, norms regarding construction in the buffer area (from the either side of both the alignment) shall be identified and accordingly the alignment will change.

4.2.14 Proposed Station #14: 2nd Mile HFC Church

This Cable Car Station-2nd Mile HFC Church lies on the east line and located at the upper Chandmari area, this station serves the development along the Jawaharlal Nehru road.

Physiography: Cable Car Station near 2nd Mile HFC Church is planned in dense green contoured site i.e. 27.341657, 88.626724 (Approximate location) with an elevation of 1800 m – 2000 m above MSL.

The construction on station area lying on the sloped part might require cut and fill construction technology. Hence, the land suitability (detailed soil characteristics i.e. typology, stability etc.) needs to be assessed. Also, geotechnical investigation study shall be conducted to assess the station site area and the deep layers before final design and layout of the station area and access area.



Access: The station site can be accessed using J N road.

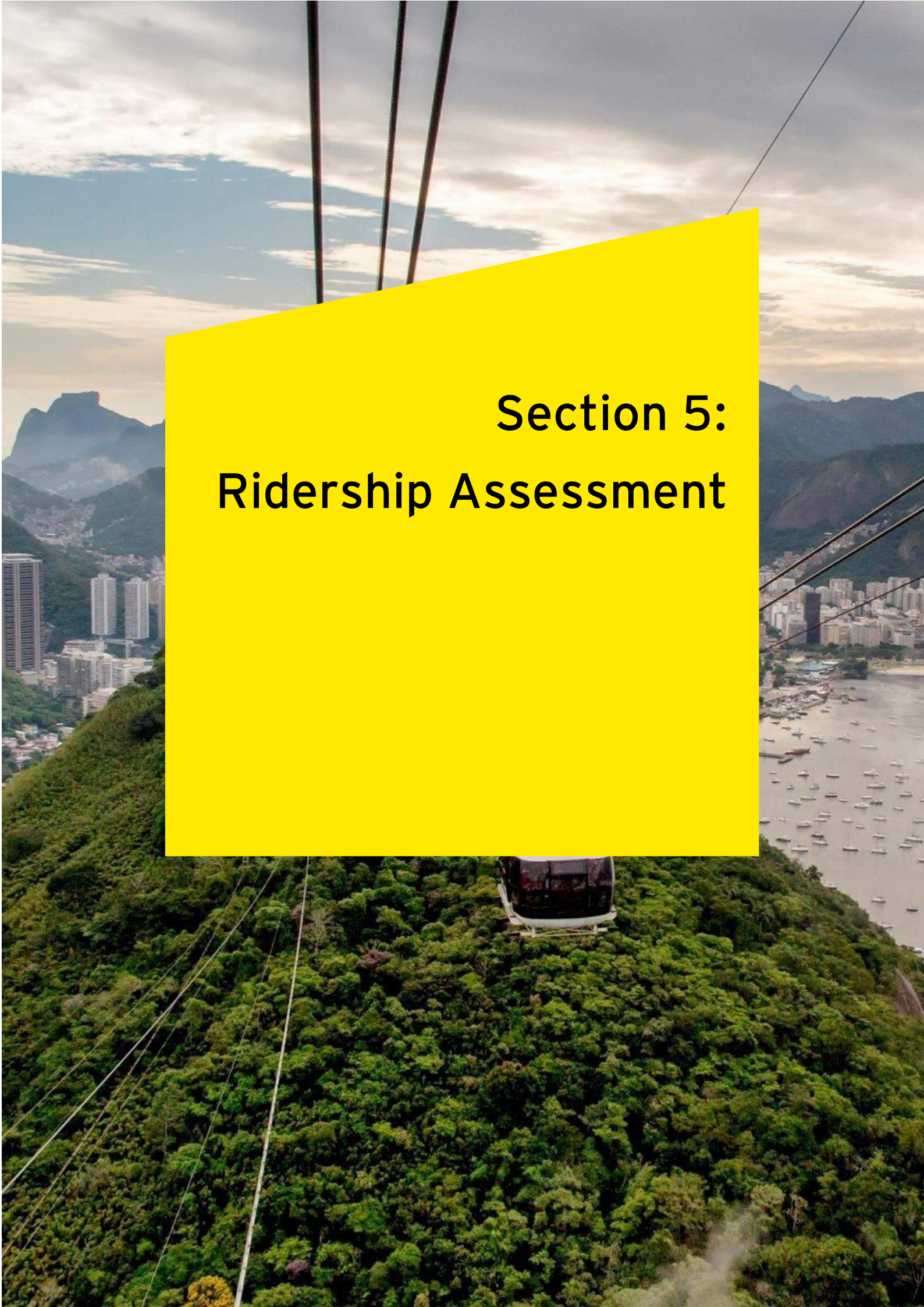
Built-up Characteristics: Most of the structures in the station proximity area are 3-4 stories high. All structures have RCC construction.

The area has moderate footfall and vehicular traffic. The construction work might lead to social hazards, and hence, mitigation measure shall be suggested in SIA before construction. These aspects shall also be covered in the Supplementary Technical Study and SIA report.

Ecological Environment: The site area has numerous trees and green cover. Also, Sikkim Himalayan Zoological Park is in the close proximity (~300 m) of the Station area.

An ecological study of the station area's ecosystem is required before construction to understand the impact due to Cable car construction and operations' activities on the existing flora and fauna

Page Separator



Section 5:
Ridership Assessment

Section 5: Ridership Assessment

The Techno-Economic Feasibility Report (TEFR) updated in February 2019 has carried out the requisite ridership assessment for the proposed project. As part of TEFR, a set of primary traffic and other surveys such as House Hold Interview Survey, Origin – Destination surveys, Traffic Volume Counts, Speed and Delay Surveys, Vehicle Occupancy Survey, Tourist survey etc. were conducted in the study area (GMC boundary) during September -October 2016 to assess the demographics, employment, traffic and transport scenario. The report calculates the system's ridership using VISUM modelling, binomial regression and probability of shifting to cable car mode of transport from the projected population as per the CMP of Gangtok, 2009. It thus, provides a holistic view of the regional traffic flow and forms a base for EY's financial analysis.

Primary interactions were conducted with:

- The UDHD, Govt. of Sikkim: EY team's visit to Sikkim provided an opportunity to assess the stakeholder interest
- Site visits: Site visits enabled the team to appreciate the alignment, traffic envisaged and the need for EIA, SIA and geo-technical studies

The Daily trips by cable car system calculated for Gangtok as per the TEFR and presented in table below is based on the assumption that the overall transportation infrastructure (feeder network, real estate etc.) of the city is developed in line with the proposals made as part of the cable car.

Table 10: Section wise projected ridership as per TEFR

Sl. No.	Route No	Route Sections	Daily Ridership			
			2021	2031	2041	2051
1	North South Corridor	Ranipool -Tourism Office Complex	34,337	54,855	80,048	1,22,031
		Tourism Office Complex-Sikkim Manipal Hospital				
		Sikkim Manipal Hospital - Gangtok Municipal Corporation				
		Gangtok Municipal Corporation-Denzong Cinema/Supermarket				
		Denzong Cinema/Supermarket-Old SNMT Hospital				
		Old SNMT Hospital-Taxi Stand North District				
		Taxi Stand North District-Helipad				
		Helipad-Burtuk				
		Total				

2	West Corridor	Hospital at Sichey-District Center	2,044	5,485	9,463	11,841
		District Center-Taxi Stand North District				
		Total				
3	East Corridor	Old SNMT Hospital-Chandmari Taxi Stand	3,919	6,533	9,427	10,876
		Chandmari Taxi Stand-2nd Mile HPC Chruch				
		Total				
Total			**40,300**	**66,873**	**98,938**	**1,44,749**

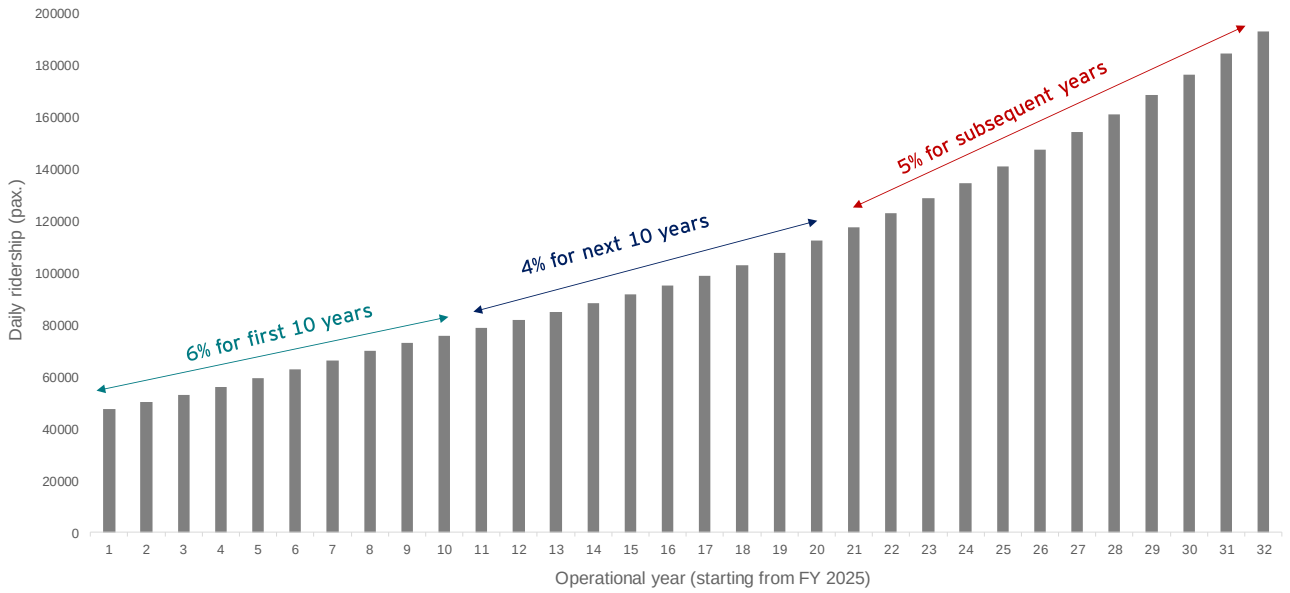
Based on the table above, it could be observed that as per the TEFR, the planned network of cable car is expected to cater to 40,300 passengers in the operational year (2021 i.e. FY 2022) and would increase to 1,44,749 passengers in the year 2051. Cable car System in Gangtok would account for 15% of the passenger trips in 2021 and would increase to 20% by 2051. Since in our analysis, we have assumed FY2025 as the first operational year, FY2021 ridership levels have accordingly been increased at 6% year on year to arrive at 47,592 as the ridership or the first operational year of 2025. The annual ridership growth assumptions and year on year ridership levels are presented in table and figure below.

Table 11: Ridership growth assumptions

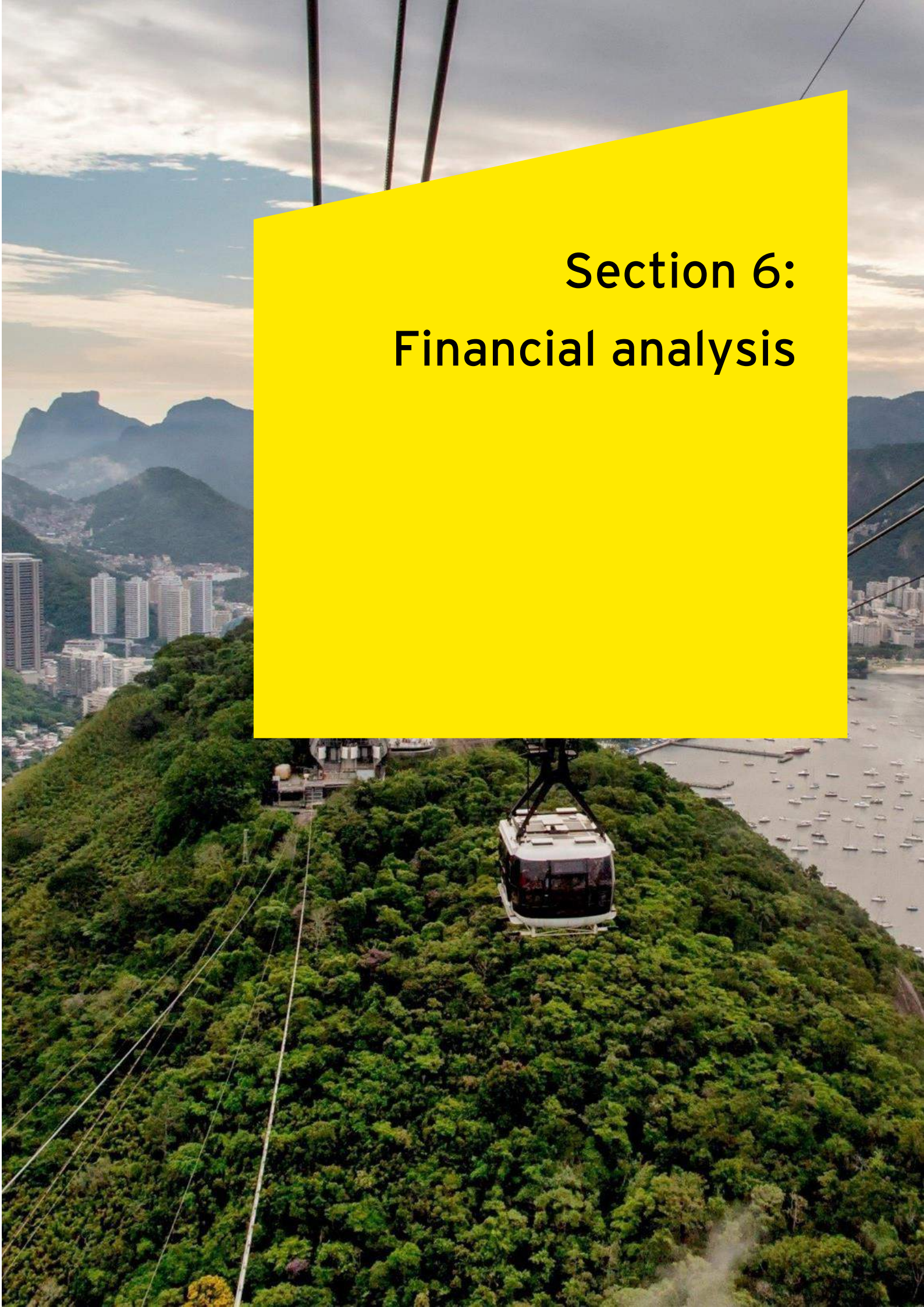
Parameter	%
Ridership growth (p.a.) for first 10 years	6%
Ridership growth (p.a.) for next 10 years	4%
Ridership growth (p.a.) for subsequent years	5%

*Table 12: **Projected Ridership***

Parameter	FY25	FY30	FY35	FY40	FY45	FY50
Operational Year	1	6	11	16	21	26
Passengers / Day	47,592	62,792	78,687	95,275	1,17,708	1,47,389



Analysis of existing modal share of total passenger trips in Gangtok indicates that shared taxi is the most popular mode of transport (45%) followed by walk (44%), Car (8%), Two-Wheeler (4%) and Buses (0.2%). Thus, it has been opined in the TEFR that the shared taxi users are the potential demand segment for CCT system.



Section 6: Financial analysis

Section 6: Financial Analysis

6.1 APPROACH TO FINANCIAL ANALYSIS

As part of the TEFR assessment, various alternatives from a technical standpoint have been evaluated and cable car based public transport system has been found to be most suitable technical option. Further, the strategic need for the project as a mode of public transport has also been established.

Since the project has been established as a government priority, the financial analysis is required to apprise the project for its potential to be taken up on PPP mode and to devise a suitable transaction structure. Financial analysis is required to justify the initial investments for implementation of the project and to investigate whether the project can recover its investments and recurring costs and become profitable in a pre-defined course of time. The profitability indicators such as Internal Rate of Return (IRR), Net Present Value (NPV) and Debt Serviceability Coverage Ratio (DSCR) have been evaluated against threshold values to ascertain financial attractiveness from a private sector point of view.

PPP attractiveness from the standpoint of market appetite has also been looked at. This involved a scan of private players in the market. During this assessment, we have attempted to gauge if there is expected to be a favourable response from the private sector towards the project of this scale and nature through preliminary consultations carried out with key industry players and a scan of similar past projects in the country. Further, in order to make the project bankable, debt financing with a relatively long tenure and low cost and availability of viability gap funding support will be a critical enabler. The financial analysis has accordingly been supplemented with assumptions pertaining to funding mix, introduction of viability gap, user charges and various financing assumptions.

Another important aspect to be looked at is fiscal affordability. If the project is developed as a PPP, it will need to be assessed if the Government agency / authority will be able to afford the necessary viability gap payments. The central question analysed is if the project can be self-financed under a user-charges based PPP model or is there a need for public contributions. It has also been assessed if synergistic commercial development opportunities to the private sector can reduce the need for increase in user charges or government funding.

In this chapter financial viability of the project is analyzed and determined. This analysis is conducted to justify the initial investments for implementation of the project. The financial analysis includes profitability indicators like Internal Rate of Return (IRR), Net Present Value (NPV) and a sensitivity analysis for key project variables.

The chapter has been structured in a manner to depict comparative analysis with the TEFR and highlight the differences of assumptions and opinions. The financial analysis has been carried out from the standpoint of the enterprise who will be implementing the project by obtaining an initial financing into an SPV created for the project. This section highlights the key assumptions underlying the financial analysis.

6.2 KEY ASSUMPTIONS

6.2.1 Timeline Assumptions

As assessed in the TEFR, the project is to be implemented in 2 Phases comprising of first phase of 5.99 Kms and second phase of 7.44 Kms. Since the TEFR assumed the implementation by way of a government run enterprise, it factored in timelines of 1 Year of Detailed Project Report preparation, 2 Years of Project Implementation i.e Station Development, Equipment deployment, and assembly etc. Accordingly, in TEFR, phase 1 of the project was expected to start operations from 2021 (i.e. FY2022) and Phase 2 of the project was expected to start operations from 2025 (i.e. FY2026).

In our view however, this assumption needs to be revisited as we are presently already close to FY 2021 year-end. Given the terrain, geographic profile and connectivity challenges, we have assumed 3 years of construction period for the entire cable car transport system, including the civil works, station development, commercial space development on the station premises and the ropeway installation as opposed to 2 years each for phase I and II in the TEFR. It is possible that the phase I (upto Old STNM hospital) could attain operations within two years and the project could be made partially operational. Overall construction period of 3 years for the entire alignment is therefore a reasonable assumption in our view. As most of Gangtok lies in landslide prone area, Government of Sikkim would need to identify available land for constructing stations with adequate distance from environmentally sensitive zones and military areas.

Further, the base year for estimating costs & ridership etc. was considered as FY2020. For our financial analysis, we have accordingly adjusted the base year numbers to capture the inflation / growth impact). The total concession period has thus, been considered as 35 years. Further from the base year (current FY 2020), we also need to factor in 1 year for Supplementary Technical studies, any other technical surveys and securing necessary approvals. Typical operating days in a year for the cable car transport is considered to be 360 days with the balance days for maintenance and overhaul. Phasing of construction has been assumed as 30% each for first and second year and 40% for third year.

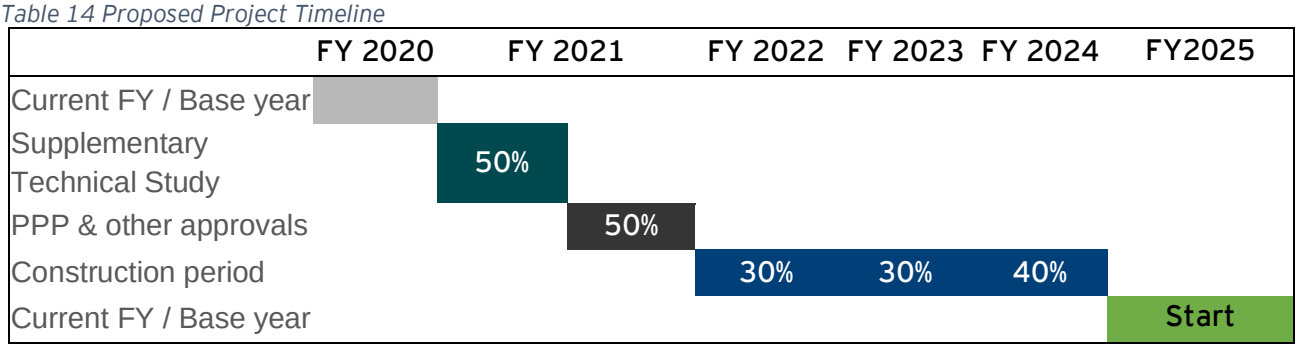
Accordingly, the construction in our analysis has been assumed to be phased over 3 years commencing from April 2021 (i.e. FY 2022). Phasing of construction has been assumed as 30% each for first and second year and 40% for third year.

Table 13 Timeline Assumptions

Parameter	Unit	Value
Concession Period	Years	35 (3+32)
Construction Period	Years	3
Operation Period	Years	32
Construction Start	Date	1-Apr-21
Construction Completion	Date	31-Mar-24

Concession Period End	Date	31-Mar-56

Table 14 Proposed Project Timeline



The construction period overrun risks can be mitigated by obtaining upfront approvals and clearances. Also, if the RoW and site clearances for stations can be provided at the time of appointed date, construction period delays can be reasonably mitigated. During the Supplementary Technical Consultancy stage, a detailed mapping of approvals required and site encumbrances (if any) needs to be carried out to de-risk the project concession.

6.2.2 Project Capital Cost

As per the TEFR, the project expenditure framework is conceptualized in the following three parts.

1) Land acquisition costs: While most of the stations have been identified such that the location is either government land or required minimal private land acquisition. Based on discussions with Govt. of Sikkim, it is believed that about 76% of land required is Government land either in possession of different State departments, CPWD and / or Forest department. Hence, about 24 % of the total land is private land and would need to be acquired. It is expected that Land acquisition, transfer costs, R&R costs of INR 13 crore would be involved. This has been accounted for in arriving at project cost and IRR calculations.
2) CCT Infrastructure Development Costs: This includes capital expenditure towards, mechanical and electrical components such as cables, carriers, grips, drive motors, bull wheels, towers with sheave assemblies, control panels, control room etc. and civil construction cost such as stations development cost.
3) CCT Infrastructure Maintenance Costs: This includes costs with regards to maintenance of CCT Infrastructure over the operations period.
4) CCT System operating expenditure: This includes electricity cost, ITS & automatic fare collection systems (ATS) operations & infrastructure maintenance cost, SPV staff, security staff and other staff salaries etc.

Project financials have been worked out on the assumption that Government of Sikkim would be able to transfer encumbrance free land for development of ropeway pillars and stations. The capital cost has been classified into system mechanical and electrical components cost and station civil development costs which includes construction cost of stations.

The capital cost has been classified into system mechanical and electrical components cost, which primarily includes modular components from the CCT system provider and the station civil development costs which includes construction cost of stations. The station civil costs also include cost of commercial area development within CCT station premises.

The technical cost estimates have been worked out in the TEFR considering the passenger carrying capacities, system length, number and type of stations, number of vehicles and power requirements. The estimated capital expenditure items include the gondola system equipment, stations, site infrastructure, construction and commissioning; capital costs do not include permitting or any right-of-way acquisition costs. The base capital expenditure estimates have been taken based on TEFR prepared by the state government.

The project implementation period in our analysis has been phased over 3 years. The construction is expected to commence at the start of FY 2022 and end by the end of FY 2024. The project cost is escalated at 5% considering the average growth of Wholesale Price Index published by GOI during last five years to account for increase in construction costs over the assumed construction period. Further, since the TEFR does not include interest during construction (IDC), we have included the same in our analysis to compute the costs comprehensively.

*Table 15 : **CCT Infrastructure Development Cost Phase wise (INR Crore)***

Sl. No.	Parameter	Phase I	Phase II	Total
1	Land acquisition and transfer costs	6	7	13
2	Project Cost for Station Construction	87	65	152
3	System Mechanical & Electrical Component Cost	251	333	584
4	Soft Cost - Project Development / Supervision / PMC	16	20	36
5	Freight Cost	4	6	10
6	Contingency Cost	23	35	58
7	**Total Base capex**	**383**	**456**	**839**

The contingencies have been assumed at 10% of system Mechanical & Electrical components. Further, the TEFR considers 18% GST on taxable components and spares as part of the Total Project Cost. However, as GST can be claimed as input tax credit, we have not considered it in the TPC.

Hence, on account of revised assumptions for contingencies, factoring in land acquisition costs, factoring in escalation during the 3 year construction period over base capex, Interest During Construction and GST, the overall project cost assumed in our financial analysis is INR 1,057 crore as against INR 1,054 crore estimated in the TEFR. A detailed table capturing item wise break-up of the capital cost is presented below:

*Table 16 : **CCT Infrastructure Development Cost (INR Crore)***

Sl. No.	Parameter	Total
1	Land acquisition and transfer costs	13
2	Project Cost for Station Construction	152
3	System Mechanical & Electrical Component Cost	584
4	Soft Costs - Technical Consultancy, Supervision etc.	36

5	Freight Cost	10
6	Contingency Cost	58
7	**Total Base capex**	**839**
8	Interest During Construction (IDC)	100
9	Escalation during construction	104
10	**Total Project Cost (TPC)**	**1057**

Escalation on base cost estimates of TEFR has been accounted for @ 5% (over 2020 prices) till 2022. As is evident, Civil works for station construction and columns etc. account for ~14% of total project cost. Electro-magnetic systems account for 55% of total project cost.

Table 17 : Capex comparison with the TEFR

Sl. No.	Parameter	As per TEFR	Assumed in PFR
1	Project Cost for Station Construction	152	152
2	Land acquisition costs	-	13
3	System Mechanical & Electrical Component Cost	584	584
4	Soft Costs - Technical Consultancy, Supervision etc.	36	36
5	Freight Cost	10	10
7	Contingency Cost	85	58
8	GST on taxable components and spares	156	-
9	**Total Base capex**	**1023**	**839**
10	Interest During Construction (IDC) for 3 years	-	100
11	Escalation during construction period	-	104
12	**Total capital cost**	**1023**	**1057**

As explained earlier, the phasing of capex has been done over 3 years in our analysis as against 2 years in the TEFR. Also, the start date of construction being FY2022, the base year numbers in the TEFR (FY 2020) have been adjusted by an escalation factor of 5% on an year on year basis.

GST @18% on project cost for taxable components and spares but has not been included and is assumed to be state/centre's contribution to the project.

The table below sets out the phasing of the capital cost and means of financing as assumed:

Table 18 : Capex Phasing

	Unit	FY2022	FY2023	FY2024	Total
Escalation Factor (base year for TEFR assumptions is 2020 i.e. FY 2021)	-	1.05	1.10	1.16	-
Capex phasing	%	30%	30%	40%	100%
Total Project Cost	INR Cr	**300**	**315**	**441**	**1057**

5) Station Construction Costs and Applicable Regulations

Building construction in the State of Sikkim is regulated by The Sikkim Building Construction Regulations, 1991 amended from time to time. 18m of building height is permitted with ground coverage varying from 40% to 80% depending on the plot of the land and its use. The Building regulations, however, have provision for relaxation of the same for public use on approval of the Government. Accordingly, multi-storey stations with commercial usage can be constructed. Tentatively, it has been estimated in the TEFR that ~38,100 sq. m. will be required for development of the 14 stations. The assumptions are detailed in the below table:

*Table 19: **Assumptions for Project Cost for Station Construction***

Parameter	Unit	Amount
Total Station Area	Sq. M.	38,100
Cost for Station Construction	INR cr	152

Table 20: Station wise area break up

Station	Total Area Sq M	Area for Commercial Development (Sq M)
Ranipool	3,370	0
Tourism Office Complex	3,600	1,800
Sikkim Manipal Hospital	2,280	760
Gangtok Municipal Corporation	3,150	2,100
Denzong Cinema/Supermarket	4,560	3,040
Old SNMT Hospital	2,100	1,050
Taxi Stand North District	3,040	1,520
Helipad	3,150	2,100
Burtuk	3,040	1,520
Hospital at Sichey	2,280	760
District Center	2,625	1,575
Chandmari Taxi Stand	2,625	1,575
2nd Mile HPC Chruch	2,280	760
Total Area	**38,100**	**18,560**

6.2.3 Financing Assumptions

A considerable cost associated with the project is the cost of capital or the costs of obtaining the financial resources to implement the project. To correctly estimate these costs, we have in our financial analysis assumed a financing mix for funding the initial capital investment. It is envisaged that funds required for the project would be secured through a mix of debt and equity.

In order to keep the user tariffs at affordable levels, while at the same time allowing recovery of cost of capital and reasonable return on investments (both debt as well as equity) and overall financial performance of the system, it is evident in urban mass transit projects that, the projects require substantial viability gap funding support in form on grant from the government. In our financial analysis, accordingly, we have analyzed two scenarios. Firstly, without any grant support and the project capex met out of debt and equity. Second scenario assumes viability gap funding

(equity support in form of grant) and also additional financial support to undertake part of the project capital costs in order to make the IRRs investment worthy from an investor's point of view.

Depending on the existence and the type of financial support offered by the government, part of the capital needed by the project company could be met by Viability Gap Funding (VGF) or other forms of upfront payments made by governments. However, in general PPPs almost always involve a certain mix of private financing by way of project debt and investors' equity. Thus, to achieve a reasonable estimate of cash flow, assumptions about the financial mix are critical.

A typical capital structure is a mix of equity and debt in the form of bank loans. The project debt is typically contracted directly by the project implementing SPV, with or without recourse to the project's sponsors. Key parameters pertaining to the financial structure are summarized in the table below.

Table 21 : Financing assumptions for the Project (In INR Crore)

Parameter	Unit	Scenario: No Grant, No funded works	Scenario: 40% VGF Grant, Civil works for station included in scope as "Funded Works"
Grant funding	%	0%	40%
Equity funding	%	40%	24%
Debt funding	%	60%	36%
Debt : Equity Ratio for non-grant portion of capex	Ratio	60:40	60:40

The interest rate on the project debt, typically consists of a base rate and a spread margin determined from market benchmarks or recent projects, have been assumed to be 12% for the purpose of financial analysis. The door to door tenure of debt is assumed to be 19 years which consists of 3 years of construction period (during which debt drawl is also happening), 1 year of repayment moratorium post COD and repayment tenure of 15 years thereafter). The parameters assumed above are normally a function of requirements imposed by the lenders, particularly the Debt Service Cover Ratio and other parameters such as borrowing covenants. In our financial analysis, we have considered typical debt terms of commercial debt providers for infrastructure projects. The key assumptions related to debt financing are depicted in the below table:

Table 22 : Debt Assumptions

Parameter	Unit	Amount
Debt Terms:		
Interest on the debt component	% p.a.	12%
Door to Door Loan tenure	Years	19
Loan Repayment Period	Years	15
Repayment Moratorium post COD	Years	1
Cost of Equity	%	15%

WACC	%	11%

Debt repayment terms are a critical market condition that needs to be factored in appropriately in the financial analysis. While longer tenure debt has higher overall interest outgo through the life of the loan, the year on year repayment is smaller and also has a favourable impact on equity returns for the shareholders. Typically in our experience, debt equity ratio of 60:40 to 65:35 is a reasonable assumption for a project of this scale and nature in the current financial market conditions. In the base case, year on year means of finance is summarized in the table below. Due to a higher amount of debt, the total project cost has increased on account of higher IDC component in the base case.

Table 23 : Financing Pattern in the Scenario without Grant

Means of Finance	Unit	2022	2023	2024	Total
Debt	INR Cr	180	189	265	**634**
Equity	INR Cr	120	126	177	**423**
Total	**INR Cr**	300	315	442	**1057**

Table 24 : Financing Pattern in the Scenario with Grant & funded works

Means of Finance	Unit	2022	2023	2024	Total
Debt	INR Cr	84	88	122	**293**
Equity	INR Cr	56	58	82	**195**
Grant	INR Cr	93	97	136	**326**
Sub-total	**INR Cr**	**232**	**243**	**340**	**814**
Civil works	INR Cr	48	50	70	**169**
Land acquisition	INR Cr	13	-	-	**13**
Total Project Cost	**INR Cr**	**293**	**293**	**410**	**996**

As can be seen from the table above, the land acquisition outgo has been assumed in year 1 of construction period in order to be accounted into the financial analysis. Realistically, the Government would have to make the necessary payments prior to the award of concession along with the project bid process. The base capex towards station civil works of INR 152 crore is assumed to be phased over 3 years and also has been escalated at 5% each year to factor in effect of inflation. In the second scenario as per table above, the Private concessionaire would arrange debt and equity for remaining portion.

6.2.4 Taxation

Corporate tax for the developer has been assumed based on current applicable tax rates summarised as below. Under the tax regime of Section 115BAA a domestic company may choose to relinquish certain deductions, exemptions, additional depreciation and unabsorbed losses. Under such scenario, the applicable tax rate is 22% which shall be further increased by a surcharge of 10% and health and education cess of 4%, making the effective tax rate 25.168%.

Goods and Services Tax (GST): GST will be applicable at 18% on the civil works and capital equipment. GST on capital equipment has been included as part of the Total Project Cost in the

TEFR. However, this GST paid can be claimed as input tax credit. Thus, we have not included the GST paid in the capital expenditure for the project. Detailed assessment of applicability of GST provisions and its impact on project cost may be undertaken at the detailed Transaction structuring stage.

6.2.5 Operational and Maintenance Costs

The operating expenditures (Opex) and reinvestments (periodic major maintenance and replacements) are commonly distributed throughout the entire duration of the contract. Cable car services involve significant maintenance, wherein regular working of the vehicles demand high operating costs. Other than the maintenance of electrical and mechanical components, human resource component, electricity, civil maintenance cost of CCT system forms a major part of the operating cost.

Accordingly, in the financial analysis, maintenance costs of the CCT infrastructure has been assumed over the operations period of 32 years. The base year considered in the TEFR for estimation of opex is 2020 i.e. FY2021. The Opex estimates have been adjusted for escalation in our financial analysis. A year on year inflation rate of 5% per annum have been assumed. They key maintenance cost heads are as under:

a. Electricity Cost - Electricity is an essential requisite for running a CCT system. Broad estimates based on power rating of drive components of proposed CCT system have been used in the TEFR to estimate the annual electricity consumption at 13,50,000 KW per annum. Electricity Consumption for the Phase 1 alignment is estimated at 6,48,000 KwH, and phase 2 alignment is estimated at 7,02,000 KwH. Total Electricity Consumption thus works out to be 13,50,000 KwH per annum. The prevailing electricity rates in Gangtok is INR 6.57 per unit for high tension bulk supply connection. Thus, the cost of electricity per unit has been assumed at Rs 6.57 per unit, which has been assumed to escalate at 2.50% per annum. Considering these the total cost of electricity for CCT services in first operational year in our financial analysis i.e. FY 2025 is estimated to be around INR 1.0 Crores which is in line with the TEFR estimate.

b. Cost of Manpower - TEFR has carried out a detailed estimation of the head count and designations for the total manpower and the requirement is estimated at 173 broken up into various levels. Factoring in salary assumptions on normative basis and escalation over base year of estimation, the manpower expense in FY2025 (first operational year in financial analysis) comes to INR 12 crore.

c. Cost of the Maintenance - Maintenance Cost includes the three heads, namely, i) Maintenance of the Electro-Mechanical Components, ii) Maintenance of the Civil Infrastructure and iii) Maintenance of the ITS Components. Maintenance of the Electro-Mechanical Components including the ITS - based on TEFR inputs worked out based on discussions with the various vendors. Typically the cost of maintenance of electromechanical components accounts for Rs 27 Crore Per Annum for an alignment of 13 Kms. i.e 2.5% of the estimated project cost. The cost is assumed to escalate @ 5% per annum. For Civil Infrastructure, routine maintenance cost of the passenger and commercial areas in the Stations has been assumed at INR 2,400 per sq m per annum. The total area for maintenance is 38,100 sq m including all the station areas. The cost works out at Rs 9 Crore per annum for base year i.e. FY 2022. Thus, total Cost of Maintenance is taken at INR 36 crore in FY2022 (i.e. Rs 27 cr and INR 9 cr) which is assumed to escalate at 5% per annum in our financial analysis.

d. Administrative, Marketing and Brokerage expenses for Non-farebox income - In addition to above three heads, since non-fare revenue sources (such as commercial retail rentals) would form an important source of revenue for the project, we have assumed 5% of rental revenues as expense towards administrative expenses, and an additional 3% of rental revenues towards marketing and brokerage expenses to realise the rental income. This is based on industry standards and could vary depending on local demand supply conditions.

e. Marketing expenses – Marketing expenses form a relatively small but an important component of operating expenses. For public transportation systems, it is important for the Government to create a strong brand and invest in marketing and customer engagement so as to create the required modal shift in favour of CCT system. We have therefore assumed 1% of total revenues as marketing expenses.

Based on above, the key assumptions/inputs for operation and maintenance costs have been summarised in table here.

Table 25: CCT O&M expenditure assumptions

Sl. No.	Parameter	Unit	Amount
1	Maintenance costs of Electro-magnetic, civil and ITS components in FY2022	INR crore	36
2	Manpower expense in FY2022	INR crore	10
3	Civil Maintenance cost of CCT system (incl. routine maintenance of passenger and commercial areas, building maintenance etc.)	INR per sq m / year	2400
4	Administrative expenses	% of rental revenues	5%
5	Marketing Expenses	% of rental revenues	3%
6	Annual Escalation	p.a.	5%

Total operational cost envisaged in the TEFR for FY 2026 i.e. fully operational alignment is INR 54 crore as against our revised assumptions as detailed above of FY2025 O&M cost assumed as INR 56 crore. The O&M cost has been escalated with a factor of 5% per year to arrive at the costs for the relevant period.

Table 26 : O&M Cost Estimates for the CCT system

S#	FY	FY25	FY26	FY27	FY28	FY29	FY30	FY40	FY50	FY56
	Operational Year	**1**	**2**	**3**	**4**	**5**	**6**	**16**	**26**	**32**
1	Maintenance costs of Electro-magnetic, civil and ITS components	41	43	46	48	50	53	86	140	188
2	Marketing costs	0.8	0.9	1.1	1.2	1.5	2	6	25	58
3	Admin. & mktg. costs (commercial)	1.2	1.3	1.4	1.5	1.7	2	2	3	3
4	Power costs	1.0	1.0	1.0	1.0	1.1	1.1	1.38	1.77	2.05
5	Manpower costs	12	13	13	14	15	16	25	41	56
	Total	**56**	**59**	**63**	**66**	**69**	**73**	**121**	**211**	**306**

6.3 REVENUE PROFILE

From the financial feasibility perspective, if the expected revenues (inflows) under a reasonable scenario are found to be sufficient to cover all expected outflows, that is, all operation and maintenance costs, financial costs (interests), taxes, payback of debts, and payback of the invested equity with a reasonable return, the project is said to be financially feasible. However, financial feasibility is generally elusive in urban transport projects. Though the urban transport projects are generally highly beneficial economically, ensuring affordability of the transport service is a key concern for the policy makers.

Accordingly, the primary mode of revenue for the project, i.e. user charges is generally fixed considering affordability to general public. Further, as alternate modes of transport i.e. bus and shared taxis have very limited user charges, the user charges to be fixed for cable car transport have to be in tandem with these.

The Revenue analysis approach is essentially two tiered as below:

- Assess sufficiency of user charges & other direct revenues from project facilities: This will involve evaluating the ability of project revenues to generate surplus after covering the current operating costs, servicing of debt and equity and (if desired by the government) the ability of the project to pay a concession fee to the government;
- Assess public resources support that will make the project commercially viable such as any other development or revenue collection rights or direct government payments to the project company

A cable car based public transport network will potentially lead to a number of benefits. The benefits are both direct and indirect in nature. Direct benefits include charging fare from users of the transit service and advertisement revenues at transit stations / corridor. Indirect benefits from commercial development at CCT stations would arise through positive externalities flowing from project proximity. Since revenue generated from direct benefits captured are typically insufficient for recovery of capital in a project of this magnitude, commercial development at CCT stations subject to development control regulations and safety considerations for the CCT system can be looked at as an additional source of income.

6.3.1 Fare Box Revenue

Under TEFR, user charges have been considered as INR 10 per km, with average trip charge coming to INR 33 per passenger in the base year FY2022. Inflation rate of 5% on year on year basis has been assumed to project the increase in CCT fare. We have applied an escalation factor to accurately capture the expected fare during first operational year of 2025 as envisaged in our financial analysis. TEFR assumes that revenue shall start flowing in only at the end of 3 years of construction. Whereas, typically certain completed sections can be opened at the end of 2 years and certain internal accruals can start flowing in albeit partial O&M expenses would also be required to be incurred in such a scenario. Key assumptions for projecting the farebox revenues of the proposed CCT system are summarised in the table below:

Table 27 Farebox Revenue Assumptions

Parameter	Unit	Value
Average Fare / Trip per Passenger in FY 2025	INR	38
% pax charged	%	100%
Daily ridership / No. of Passengers in 1st operational year (FY2025)	No.	47,592
Ridership growth (p.a.) for first 10 years	%	6%
Ridership growth (p.a.) for next 10 years	%	4%
Ridership growth (p.a.) for subsequent years	%	5%
Annual Escalation Factor on User Charge	%	5%

Based on ridership estimates and fare as adopted, fare box revenues have been projected and presented in Table below.

Table 28: Projected Farebox Revenue profile of the CCT system

FY	FY25	FY26	FY27	FY28	FY29	FY30	FY40	FY50	FY56
Operational Year	1	2	3	4	5	6	16	26	32
Daily ridership	47,592	50,304	53,172	56,202	59,406	62,792	95,275	1,47,389	1,93,043
Annual Passenger Footfall (Crores)	1.71	1.81	1.91	2.02	2.14	2.26	3.43	5.31	6.95
User Charge per passenger (INR / trip)	38	40	44	46	49	51	78	121	158
Total Farebox Revenue (INR Cr)	**65**	**73**	**83**	**93**	**104**	**116**	**268**	**640**	**1,099**

The daily ridership i.e. the daily trips by cable car system calculated, is based on the assumption that the overall transportation infrastructure (feeder network, real estate etc.) of the city is developed in line with the proposals made as part of the cable car. TEFR has established the savings in travel time, fuel, emission reduction and vehicular km with the introduction of cable car for home -based work trips, home based educational trips as well as home based other work trips in Gangtok city.

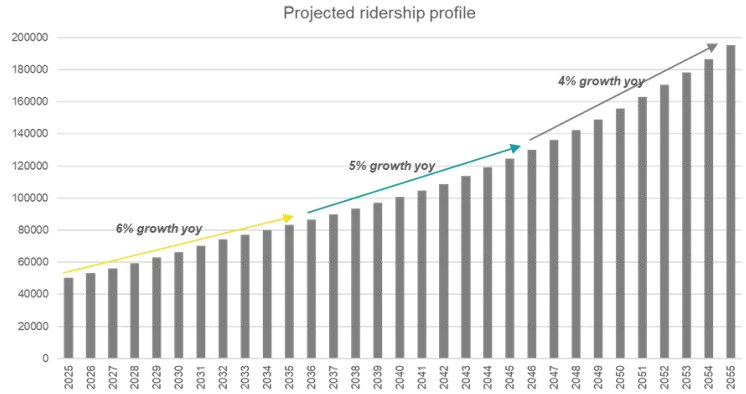


Figure 9 Ridership Growth

It may be noted that the projected ridership factors in a substantial modal shift from existing privately hired taxis to the ropeway transport. To realise this shift, concerted interventions will be

required such as making the taxis as feeder systems, policy interventions and bringing out a behavioural shift towards the usage of ropeway as public transport.

As mentioned in earlier sections, the shared taxi is the most popular mode of transport (45%) followed by walking (44%), personal cars and two wheelers (12%) and buses (0.2%). The shared taxi users are essentially the target user segment for CCT system and hence fare formulation strategy should also consider the affordability level to attract higher ridership and cause the modal shift.

It was observed from the interactions during site visit that at present the average trip distance is 2.98 km and the shared taxi user pay about Rs 30 per trip implying a per km charge of Rs 10. Since the user's acceptability of public transport is pegged at the price level of Rs 10 per km, the proposed cable car transport service pricing has been considered equivalent to prevailing shared taxi fares to assess financial viability. The base year per trip per passenger fare has been projected at INR 33. The same adjusted for first operational year of FY 2025 comes to INR 38 per trip escalated at the rate of 5% every year.

6.3.2 Non-Fare Box Revenues

Non-fare box revenues sources may be categorized into following two types:

1) Advertisement Revenue

Advertisement revenue could accrue from selling of advertisement spaces within the ropeway system infrastructure such as Stations, Towers along the corridors or on gondolas etc. or selling of station naming rights to the potential parties. These will fall into Out of Home (OOH) media publicity and typically have been tapped in airports, railway stations, bus stations in major urban centres in a big way. The best approach to assess these revenues is to estimate the inventory of space and take past rates at which OOH public spaces have been leased out. However, in absence of precedence of these data points in Gangtok, we have assumed advertisement revenue to be around 1% of the fare box revenue in proposed CCT system for Gangtok based on the existing trends in public transport systems and considering that the system would be the trunk transit mode with integrated commercial activities within the station premises and also considering the sizeable tourist influx in the city throughout the year.

2) Commercial Rentals at the Stations

Commercial development may be encouraged at the cable car stations to generate non-fare box revenues. Shops, eateries etc. may be developed to generate rental revenues. Built-up area has been given as 18,560 sq. m for all the 14 stations in the TEFR. Base year occupancy in our analysis has been assumed at 60% in FY 2025 with peak occupancy reaching and stabilising at 80%.

Table 29: Station wise area commercial area break-up

Station	Area for Commercial Development (Sq. M)
Ranipool	0
Tourism Office Complex	1800

Sikkim Manipal Hospital	760
Gangtok Municipal Corporation	2100
Denzong Cinema/Supermarket	3040
Old SNMT Hospital	1050
Taxi Stand North District	1520
Helipad	2100
Burtuk	1520
Hospital at Sichey	760
District Centre	1575
Chandmari Taxi Stand	1575
2nd Mile HPC Church	760
Total Area	**18560**

3) Parking Space at Stations

Parking revenues have been built up based on space assumptions based on TEFR inputs. Key parking space assumptions are as below:

Table 30: Parking revenue assumptions

Parking Facility	Area (m^2)	Spaces	Average Fees (INR)	Turn Over	Revenue (P. A)
Car	1316	105	20	3.5	₹ 26,46,000
2W	329	63	10	4	₹ 9,07,200
Total					₹ 35,53,200
Revenue Per Station					₹ 2,73,323

Basis the above assumptions, total non-fare box revenue potential has been presented below:

Table 31 ***Non-Fare Box Revenue Profile***

(All figures are in INR crore)

FY	FY25	FY26	FY27	FY28	FY29	FY30	FY40	FY50	FY56
Operational Year	1	2	3	4	5	6	16	26	32
Rental revenues from comml. space	14	16	18	19	21	22	28	36	41
Parking revenues	0.4	0.4	0.5	0.5	0.5	0.5	0.9	1.4	1.9
Advertisement revenues	0.7	0.7	0.8	0.9	1.0	1.2	2.7	6.4	11.0
Non-farebox Revenue	**15**	**17**	**19**	**21**	**23**	**23**	**31**	**43**	**54**

6.4 FINANCIAL VIABILITY

The objective of this analysis was to evaluate the financial performance of the project, its ability to source financing and meet "return" expectations of capital providers. Based on the same, the objective is to suggest a transaction structure with reasonable returns on investment to make the project commercially viable for a concessionaire.

As is the case with urban public transport projects in general, the project revenues are barely able to meet the operating and interest servicing requirements in the initial 10 years. From the point of becoming operational, at the projected ridership, the project is expected to break even in about eleven years, but it will only do this by continuing to market and price it such that it is used by regular commuters and tourists alike for moving around the city as an efficient transport link. The summarized projected Profit and Loss Statement over the project life period is set out in the table as under.

Table 32 Profit and Loss Statement – Scenario without any equity support grant

Particulars	FY25	FY26	FY27	FY28	FY29	FY30	FY 40	FY 50	FY 56
Farebox revenues	65	73	83	93	104	116	268	640	1,099
Non Farebox revenues	15	17	19	21	23	23	31	43	54
Total Revenue	**81**	**90**	**102**	**114**	**127**	**140**	**299**	**684**	**1,153**
Operational Expenses	56	59	63	66	69	73	121	211	306
EBITDA	**24**	**30**	**40**	**48**	**57**	**67**	**177**	**473**	**846**
Depreciation	*-69*	*-69*	*-69*	*-69*	*-69*	*-69*	*-7*	*-7*	*0*
EBIT	**-44**	**-38**	**-29**	**-21**	**-11**	**-2**	**170**	**466**	**846**
Interest	73	70	66	61	56	51	2	0	0
EBT	**-117**	**-109**	**-95**	**-81**	**-67**	**-53**	**168**	**466**	**846**
Tax	-	-	-	-	-	3	42	120	214
PAT	**-117**	**-109**	**-95**	**-81**	**-67**	**-56**	**126**	**345**	**632**

Without any grant support, the project is entirely funded by way of debt and equity. The financing costs as a result add substantial burden on the cashflows and does not allow for enough return on equity investor's capital. As is evident from the analysis above, Government of Sikkim would have the difficult task of trying to balance affordability for regular users with the broader aim of providing value for money, since the existing fares and ridership have been kept at levels that is expected to cause the modal shift from shared / private taxis to the ropeway mode of public transport.

For an equity investor, a project must be both bankable and provide an acceptable return for the risk of the investment. The two parameters used to assess the commercial feasibility, from the investors' perspective, are hence Net Present Value, based on the discounted equity cash flows, and the Internal Rate of Return of the project cashflows (Project IRR) and equity cash flows (Equity IRR). Key output parameters are summarized in the table below:

Table 33 : Key Financials-Viability Indicators without any grant support

Parameter	Unit	Combined Line
Total Project Cost	INR cr	1057
Project IRR	%	8.9%
Equity IRR	%	8.7%
NPV	INR Cr	₹ -226

As witnessed in the table above, based on the financial analysis it is evident that the project is not financially viable i.e. is not able to generate reasonable returns based on assumptions explained earlier. Under this scenario, the financing has been assumed based on 60:40 debt to equity financing mix. It is evident from the indicators that project's revenue streams are not enough to bring viability into the project. Therefore, this necessitates more government support in the form of capital support grant and funded works. This scenario is presented hereafter.

6.5 SCENARIO WITH GRANT SUPPORT AND "FUNDED WORKS"

The objective of this analysis was to evaluate the financial performance of the project, its ability to source financing and meet "return" expectations of capital providers. Based on the same, to suggest a transaction structure with good returns on investment to make the project commercially viable for a concessionaire, we have analysed the viability under the below scenario.

In view of the financial viability indicators without any grant, it can be inferred that the project may not be attractive enough to be funded by an investor on commercial basis. Hence, we have in this section analysed a scenario with 40% capital grant support under Viability Gap Funding (VGF) Scheme of the Government of India and the capex towards civil works for the station etc. included as Funded Works in scope of Concessionaire. This will reduce the requirement of commercial debt and concessionaire's equity in the project hence bringing in viability from an investor's point of view.

The Scheme for Financial Support to PPPs in Infrastructure (Viability Gap Funding scheme) of the Government of India is administered by the Ministry of Finance and provides financial support in the form of grants, one time or deferred, to infrastructure projects undertaken through PPPs with a view to make them commercially viable. Development of urban transport infrastructure requires large investments that cannot be undertaken out of public financing alone, and that to attract private capital as well as the techno-managerial efficiencies associated with it and to promote Public Private Partnerships (PPPs) in infrastructure, Viability Gap Funding Scheme was structured by Government of India to improve the viability of such projects. Meeting the funding gap to make economically essential projects commercially viable would obviate the need for Government funding for such projects and allow private sector participation in the projects, thus facilitating private sector efficiencies in infrastructure development. Viability Gap Funding under the Scheme would be normally in the form of a capital grant at the stage of project construction.

The Government of India provides total Viability Gap Funding up to 20% percent of the total project cost; normally in the form of a capital grant at the stage of project construction. The Government or statutory entity that owns the project (Government of Sikkim in this case) may, if it so decides, provide additional grant out of its own budget up to further 20% percent of the total project cost. The PPP projects may be posed by the Central Ministries, State Government or Statutory, which own the underlying assets. Key eligibility criteria for availing grant funding under this scheme are listed below:

- The PPP project should be implemented by a Private Sector Company to be selected through a transparent and open competitive bidding process

- The criterion for bidding should be the amount of Viability Gap Funding required
- The project should provide a service against payment of pre-determined user charge
- The approval to projects is given prior to invitation of bids
- The final VGF quantum is determined through the bidding as it forms the bidding parameter

While urban transport is included in the list of eligible sectors under the Viability Gap Funding Scheme, Ropeway /Cable car has since been included under the Harmonized Master List of Infrastructure Sub-sectors under Social & Commercial Infrastructure sub-categories vide Notification dated November 14, 2017. At present, there is no precedence of cable car/ ropeways as urban transport projects in India. However, this project may be considered as an infrastructure project under the VGF scheme and as per the updated Harmonized Master List of Infrastructure Sub-sectors.

This scenario has been assessed to check the sufficiency of expected project cashflows based on user charges and with 40% VGF support and with civil works for station development included as "Funded Works", to cover operating costs and service the debt and provide reasonable returns to the equity holders. Key parameters of the scenario are depicted in the table below:

Table 34 : Key Parameters of the "VGF Grant and Funded works Scenario"

Parameter	Details
Capital Grant	40% (20% by GoI and matching 20% by GoS)
Funded Works component	Civil Works for Station Development, INR 169 crore

Table 35 : Funding Pattern of the "VGF Grant and Funded works Scenario"

Funding Pattern	Amount (INR crore)	% of Capital Cost (Pvt. Concessionaire)	% of Capital Cost (Total)
Grant by GoI (VGF)	163	20%	16%
Grant by GoS (matching VGF)	163	20%	16%
Equity by Concessionaire	195	24%	20%
Project Debt availed by SPV	293	36%	29%
Total Project Cost (excl. funded works)	**814**	**100%**	**81%**
Funded Works by GoS (incl. escalation @5% and phasing)	169	-	17%
Land acquisition contribution by GoS	13	-	1%
TOTAL	**996**	**-**	**100%**

6.5.1 Funded Works

The civil works for station development, including commercial space at the station premises are proposed to be awarded as EPC / Design-Build contracts to the private concessionaire. This will not only reduce the debt & equity requirement but also de-risk the project from land acquisition / ROW related delays. Further, as the private concessionaire will itself perform the civil works and develop the stations, it can build the same keeping the overall design and technology in perspective. The payment and milestones for the civil works and structures will be pre-determined and funded

separately. This will balance the construction risk of the project and facilitate better availability of capital to finance the project. The Funded Works components are summarized in the below table:

Table 36 : Funded Works under the "VGF Grant and Funded works Scenario"

Parameter	Unit	Amount
Project Cost for Station Construction & other civil works	INR cr	152
Escalation p.a.	%	5%
Escalation over FY2022 - 2025	INR cr	17
Total Project Cost for Station Construction and Civil Works	**INR cr**	**169**

6.5.2 VGF Grant Disbursal

As per the VGF Guidelines, 2013, (Scheme and Guidelines for Financial Support to Public Private Partnerships in Infrastructure), VGF shall be disbursed only after the private concessionaire has subscribed and expended the equity contribution required for the project and will be released in proportion to debt disbursements remaining to be disbursed thereafter.

- The Empowered Institution will release the grant to the Lead Financial Institution as and when due and obtain reimbursement from the Finance Ministry.
- The Empowered Institution, the Lead Financial Institution and the Private Sector Concessionaire shall enter into a Tripartite Agreement for the purposes of this Scheme. The format of such Tripartite Agreement shall be prescribed by the Empowered Committee from time to time.

Thus, in this scenario grant is disbursed in the proportion of capex phasing, post Private Concessionaire's equity is expended. The means of finance and pro-rata disbursal assumed in the financial analysis are summarized below:

*Table 37 **Phasing and Means of Finance***

Parameter	Unit	Ratio	FY 22	FY 23	FY 24	Total
Capex Phasing	%	-	30%	30%	40%	100%
Project Cost (excl. funded works)	INR cr	100%	232	242	340	**814**
Debt	INR cr	36%	83	87	122	**292**
Equity	INR cr	24%	56	58	82	**196**
Grant	INR cr	40%	93	97	136	**326**

6.5.3 Key Project Indicators for the VGF Grant and Funded works Scenario

Key output parameters of the project for the scenario as explained above are summarized in the table below:

Table 38: Projected Profit & Loss statement for the VGF Grant and Funded works Scenario

Particulars	FY25	FY26	FY27	FY28	FY29	FY30	FY 40	FY 50	FY 56
Farebox revenues	65	73	83	93	104	116	268	640	1,099
Non Farebox revenues	15	17	19	21	23	23	31	43	54
Total Revenue	**81**	**90**	**102**	**114**	**127**	**140**	**299**	**684**	**1,153**
Operational Expenses	56	59	63	66	69	73	121	211	306
EBITDA	**24**	**30**	**40**	**48**	**57**	**67**	**177**	**473**	**846**
Depreciation	-53	-53	-53	-53	-53	-53	-5	-5	0
EBIT	**-28**	**-23**	**-13**	**-5**	**4**	**14**	**172**	**467**	**846**
Interest	34	33	30	28	26	24	1	-0	-0
EBT	**-62**	**-55**	**-44**	**-33**	**-21**	**-10**	**171**	**467**	**846**
Tax	-	-	2	4	7	9	43	120	214
PAT	**-62**	**-55**	**-46**	**-37**	**-28**	**-19**	**128**	**347**	**632**

The project generates substantially improved financial returns with grant of 40% towards capital support and funded works. This scenario will require the Concessionaire to obtain commercial debt to the extent of 36% of total capital cost to fund the project (i.e. 60% of the 60% non-grant portion). This scenario reduces the IDC component of the project cost and debt servicing outgo from the project cashflows.

Table 39 : Viability Indicators for the VGF Grant and Funded works Scenario

Parameter	Unit	Base Case
Total Project Cost (incl. funded works & land)	INR cr	996
VGF Grant by GOI	INR cr	163
VGF Grant by GOS	INR cr	163
Funded Works component	INR cr	169
Project IRR (post tax)	%	10%
Equity IRR (post tax)	%	15%
NPV	INR cr	223
Avg. DSCR	Ratio	1.92
PLCR	Ratio	1.83

6.6 PROPOSED SCENARIO

In view of the financial indicators, it is proposed that implementation of Gangtok Cable Car based public transport system is done with 40% capital grant as VGF support and civil works and station development undertaken as "Funded Works" on EPC / Design-Build contracts.

6.7 ADDITIONAL MECHANISMS TO ATTRACT PRIVATE INVESTMENT

In addition to the 40% grant and Funded Works, the following options are available for the implementing authority to make the project attractive for private investment.

- **Commercial Development Rights, in addition to station structures:** While development of commercial space is envisaged at present, the Government of Sikkim may provide additional Commercial Development Rights to the Concessionaire to enhance non-farebox revenues and the financial viability of the project. The sites need to be assessed from a technical

perspective for such development, which may include, but not be limited to development of hotel / mall / sports complex etc.

- **Increase in projected fare for the CCT:** This option is however limited by the fact that the demand is highly price elastic in urban transport as observed the world over. In addition to ridership, fare structure plays an important role in adoption of the system as a primary mode among the riders. Thus, high fare/ tariff could shift away demand if affordability is compromised. Fare structure impacts on mode change decisions of the commuters and thus impact the congestion levels that the public transport system seeks to reduce. Presently fare structure is proposed to be pegged at the level of fare charged by shared taxis.

- **Arranging concessional debt financing from developments funds and multilateral agencies:** Govt. of Sikkim could explore raising project specific funding from development funds and multilateral agencies like Asian Development Bank (ADB), World Bank (WB) group, Japan International Cooperation agency (JICA) etc. Generally, the cost of funds from these institutions is lower than those raised from commercial banks and financial institutions and the borrower is the State Government. Funds thus raised can be utilized by government to fund their grant contribution or could be structured as soft loans to mitigate the financing risk of the project. MDBs offer long tenure financing at lower than commercial debt rates. However, these require sovereign guarantee.

- **Land Value Capture:** Capital costs for new or rebuilt transit systems should be recovered from land value capture by the Government. Transit services create value they cannot fully capture themselves through the farebox (though they would capture more of this with higher fares). That value spills over to land owners in project site vicinity, whose property value / rentals increase due to the accessibility the transit system provides and thus, the higher rents they can charge. The Government of Sikkim could implement local taxes to subsidize the Concessionaire for the cost of building the public transport system.

6.8 FINANCING OPTIONS FOR GOVERNMENT OF SIKKIM

The various possible sources which may be explored by government of Sikkim for financing its grant payments under the PPP contract are provided below:

- **Funding from DONER:** The Ministry of Development of North Eastern Region (DONER) is responsible for matters relating to planning, execution and monitoring of development schemes and projects in the North Eastern Region. It has a few schemes under which funding for the cable car transport project could be sought. The North Eastern states have essentially depended on Central funding for their development works. All the States in the NER are Special Category States whose Development Plans are centrally financed based on 90% Central funding and 10% contribution by the states. Among the various schemes, it administers a Non-lapsable Central Pool of Resources (NLCPR) scheme to ensure speedy development of infrastructure in the North Eastern Region by increasing the flow of budgetary financing for new infrastructure projects/schemes in the Region. Both physical and social infrastructure sectors such as Irrigation and Flood Control, Power, Roads and Bridges, Education, Health, Water Supply and Sanitation - are considered for providing support under the Central Pool, with projects in physical infrastructure sector receiving priority. For identification of projects under Non-Lapsable Central Pool of Resources, states

are asked to submit, before the beginning of the financial year, a prioritized list of projects with a short write up on each project. The Planning and Development Department of the state concerned is the nodal department for NLCPR and that department is DONER's interface with all other departments of the state. The Committee scrutinizes the projects in the lists in order to identify and finally retain the suitable projects for detailed examination.

Detailed Project Report(s) for such retained projects are then prepared by the state concerned. These project proposals are thereafter examined in consultation with the concerned Central Ministry/Department. After approval of the Committee, funds are sanctioned and released by the Ministry of Development of North Eastern Region on submission of an implementation schedule. Subsequent releases are made only after receipt of Utilization Certificate of earlier releases.

However, with a new scheme, North East Special Infrastructure Development Scheme" (NESIDS) being launched in December 2017, no new project is being taken up under NLCPR funding. However, funding for ongoing projects under the Scheme will be continued till March, 2020 for their completion.

North East Special Infrastructure Development Scheme (NESIDS): It is a new Central Sector scheme, approved by the Government of India in December 2017. Under this scheme, **100% funding** is provided to the state governments of the North East region to fill the infrastructure gaps in. The NESIDS will accord focus on exploitation of the tourism potential through strengthening related infrastructure along with social sectors like health and education. The objective of NESIDS is to ensure focussed development of the North-East Region by providing financial assistance for projects of:

1. Physical Infrastructure: relating to connectivity, water supply, power, especially the projects promoting tourism
2. Social sector projects: for creation of infrastructure in the areas of primary and secondary sectors of education and health

Duration: The NESIDS will be implemented from 2017-18 to 2019-20 at a total outlay of INR 1600 crore.

The funds will be distributed among the North-East states on the basis of well-defined parameters such as area, population, human development index, road density etc. On the basis of this Sikkim's share comes to ~6.5% of the total available funds. Funds are released in two instalments of 40% and 60%. Initially a token amount of Rs. 10 lakhs are released and balance amount of first instalment are released after receipt of letter of award of the work.

Projects sanctioned: 22 projects costing INR 885 crore have been selected under the scheme. Of these, the 2 projects were sanctioned for Sikkim (one parking project and one bridge project).

Project Formulation and Identification under NESIDS: The Secretary, DONER and Chief Secretaries of the concerned states will identify the projects jointly with the below criteria:

- Cost of project will be above INR 20 crore
- The cost towards land acquisition and staff component will be inadmissible under the scheme.
- The cost for the maintenance of the assets created under the scheme will be met by the State Government
- 25% of projects will be earmarked for backward areas

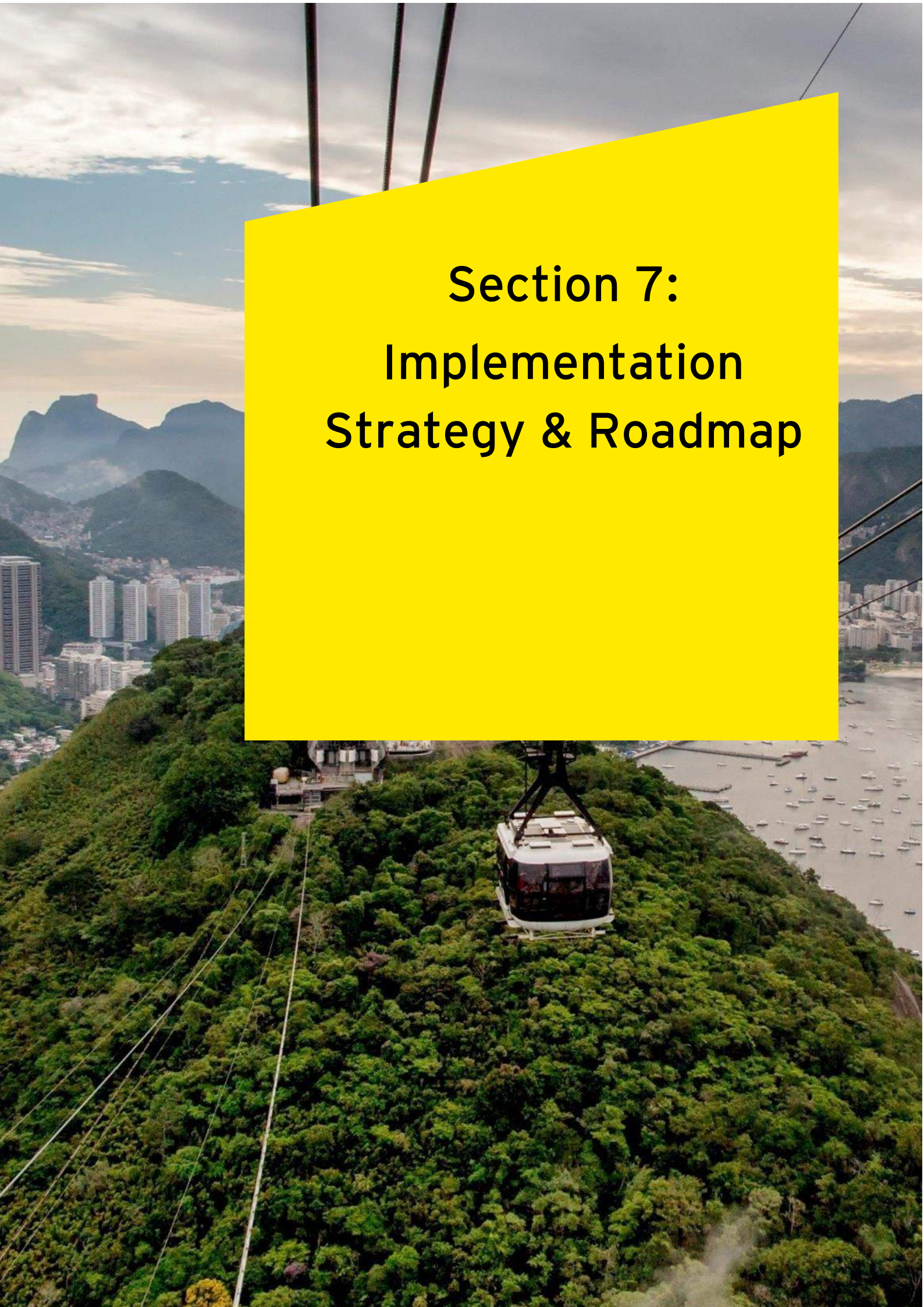
- The project will be at single location with detailed latitude longitude information

The NESIDS Committee will discuss the list of projects with the representatives of concerned line Ministries of Government of India and will make suitable recommendations for funding of identified projects. The State Government will prepare Detailed Project Reports (DPRs) of the identified projects communicated to them. The SLEC will authorize institutes of national repute like IIT/NIT/Engg. Colleges for the technical and economic appraisal of DPRs for projects recommended by IMC. The cost of DPR appraisal by these institutes shall be an admissible component to be included in the project cost. The DPR of the projects so prepared, will be placed before the State Level Empowered Committee (SLEC) for their techno-economic vetting and to make suitable recommendations to the Ministry of DONER for sanction/non-sanction. The SLEC recommendations for sanction/non-sanction of projects must be accompanied with all regulatory and statutory clearances like forest & environment, land acquisition, non-duplication certificate, availability of stone quarry etc. wherever applicable along with appraisal report.

In order to avail funding under NESIDS, the state of Sikkim needs to perform the below key activities:

1. Co-ordinate with DONER and recommend the cable car transport project to the NESIDS committee
2. Prepare a DPR as per the scheme's guidelines
3. Such a DPR should be vetted by an engineering institute of national repute such as IIT/ NIT etc.

The SLEC recommendation has to be accompanied with all regulatory and statutory clearances.



Section 7:
Implementation Strategy & Roadmap

Section 7: Implementation Strategy & Roadmap

7.1 IMPLEMENTATION STRATEGY

A number of ropeway / cable car-based projects have been implemented in India on PPP mode, however, most projects have been point to point facilities and primarily catering to tourists. Cable car as a mode of public transit on BOT mode has seen no precedents in India till date though recently similar concepts are under development in sections of cities such as Shimla and Mumbai.

To ensure that the project is implemented as targeted in this report it has to get the visible positive support from Government of Sikkim and Government of India. To enable Gangtok Cable Car project to be implemented without any loss of time and cost over-run, effective institutional arrangements would need to be set up. Presently, the project is being piloted by the Urban Development & Housing Department (UDHD) of the Government of Sikkim, but it will require support from the top-most levels in the State, including the different departments such as Finance, Transport and Power.

7.1.1 Development of the Project on PPP model

The Public Private Partnership approach assumes that the entire project / section/s is given to a private partner (Concessionaire) to develop and operate over the concession period. The private partner brings requisite funds and the efficiency of private sector management in the implementation as well as operation of the project. The role of Government of Sikkim is limited to that of a regulatory authority. Thus, the Authority would monitor the implementation of the project such as laying down the passengers' fares in form of a user fee notification upfront, targets for the minimum number of services to be run by the private partner, frequency, punctuality and reliability of these services, etc. In India, presently there are limited urban large-scale transport projects implemented through BOT model. Some of the large scale urban public transport projects implemented on BOT mode are Hyderabad and Mumbai Metro.

7.1.2 "Funded Works"

As another option, the government entity / SPV could contract all civil works and the associated station work on an EPC / Design-Build contract basis to the Concessionaire, while all other works like procurement, installation, finance, operations and maintenance of ropeway systems work are undertaken by the private partner over a pre-defined concession period (PPP basis). Under this model, the contractor designs and constructs the infrastructure and is paid for the construction works against pre-defined construction period payments (as in an EPC or Design-Build contract). The maintenance of the stations will also be in the private Concessionaire's scope. This will enable the Implementing Authority to monitor and adhere to quality and construction timelines for the project in a better way. Implementation of Airport Express Line in Delhi Metro is broadly an example of this model in India.

Typical EPC / Design Build contracts have a lack of natural incentives for the contractor to care about quality and resilience of the asset. However, the contractor does have a clear motivation to increase profits by reducing costs and hence compromising quality. The risk of reduced quality or increased costs for the public sector may only be controlled with intensive quality assurance

oversight and by defining the technical requirements. However, this risk can be mitigated if the Concessionaire responsible for design, building, installations and operations and maintenance of the ropeway systems work is allocated the scope for design and building the stations and associated civil works. Under this procurement model, the risk of unexpected maintenance costs can be transferred to the Concessionaire. The incentives for the Concessionaire to properly perform the works and deliver high construction quality are also enhanced. This will also de-risk the project to some extent from land acquisition and ROW related delays, if any.

7.2 PROPOSED PROJECT STRUCTURE

The proposed project structure as described above has been depicted in the exhibit below. UDHD to grant **DBFOT** Concession to develop and operate the CCT system and generate revenues and **EPC/DB** contract for civil works and construction of stations. The Concessionaire will create a Special Purpose Vehicle (SPV), which is a legal entity established for implementation of specific projects and is used to isolate the governing authority / stakeholder company from operational and financial risk. SPV has a management dedicated to the accomplishment of the specific objective. The SPV also allows securitization of assets without disturbing the managerial relationship. Under the arrangement, any predictable income stream generated by secure assets can be securitized.

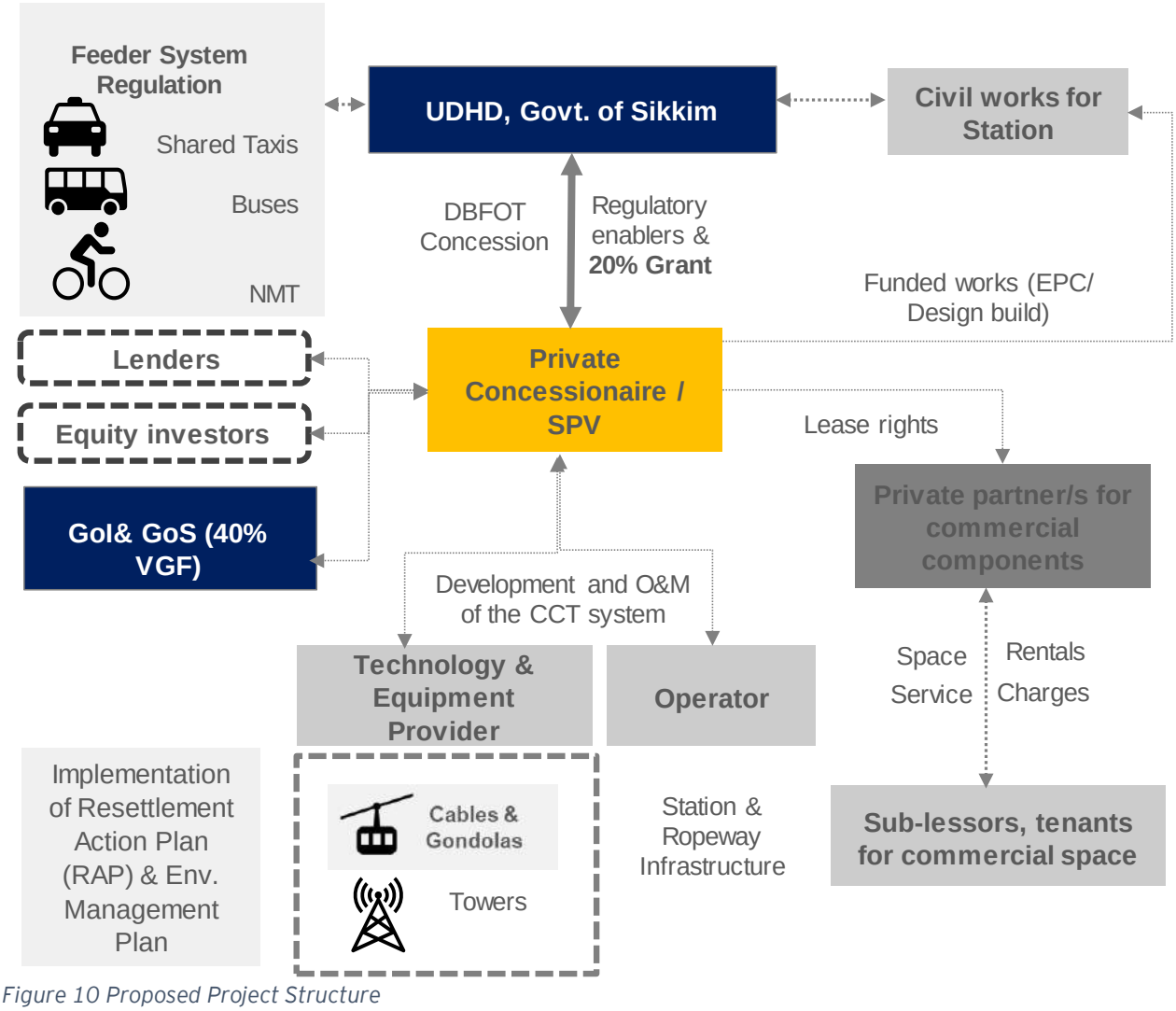


Figure 10 Proposed Project Structure

This section sets out a proposed option, in respect of private sector participation, commercial arrangements and risk transfer that have been designed to provide value for money for Government and to support an 'off balance sheet' outcome for the privately financed ropeway line for Gangtok city. In developing the proposed structure, we have used the risk allocation methodology based on the recent experience in PPP projects and key issues and risks that have affected the infrastructure projects. However, in our view, as part of transaction process, a Market Sounding must be conducted around a series of structured questions in respect of the Proposed Option. The results of the Market Sounding process should be used by the Authority to facilitate a decision as to whether the project can be progressed with private sector participation.

7.3 ROLES AND RESPONSIBILITIES OF THE PARTIES INVOLVED

The Gangtok Cable Car Transport (GCCT) system project is the proposed new public transport system along the North-South corridor with East and West lines in the Gangtok urban area. The project has been structured to comprise of two components:

Component A – Approximately 13 km ropeway corridor, associated site development works, towers construction, station structures
Component B – Electro-magnetic systems, cables and gondolas to ply on the alignment

Component A is structured to be conventionally funded and delivered by implementing Authority (UDHD, Government of Sikkim) due to the complexities of the interfaces and the constraints in land acquisition etc. Component B is assumed to be with private sector involvement in detailed design, financing, construction and maintenance is being considered to determine if it is a viable option that can meet value for money, risk allocation and timescale requirements.

This essentially means that the government entity would contract all civil works and the associated station work on an EPC / Design-Build contract basis to the Concessionaire as "Funded works" for component A, while all other works like procurement, installation, finance, operations and maintenance of ropeway systems work are undertaken by the private partner over a pre-defined concession period (PPP basis). Under this model, the contractor designs and constructs the infrastructure for Component A and is paid for the construction works against pre-defined construction period payments (as in an EPC or Design-Build contract). This will enable the Implementing Authority to monitor and adhere to quality and construction timelines for the project in a better way. Implementation of Airport Express Line in Delhi Metro is broadly an example of this model in India.

Typical EPC / Design Build contracts have a lack of natural incentives for the contractor to care about quality and resilience of the asset. However, the contractor does have a clear motivation to increase profits by reducing costs and hence compromising quality. The risk of reduced quality or increased costs for the public sector may only be controlled with intensive quality assurance oversight and by defining the technical requirements. However, this risk can be mitigated if the Concessionaire responsible for design, building, installations and operations and maintenance of the ropeway systems work is allocated the scope for design and building the stations and associated civil works.

Under this procurement model, the risk of unexpected maintenance costs can be transferred to the Concessionaire. The incentives for the Concessionaire to properly perform the works and deliver high construction quality are also enhanced. A summary table detailing the roles and responsibilities of the contracting parties is set out below.

Table 40 Roles and resposibilities of the key contracting parties

Government of Sikkim	▶ Government of Sikkim (through an empowered UDHD Department) to obtain approvals for the project, the means of obtaining permission for the development, and to be responsible for associated land acquisitions/ inter-departmental transfer. ▶ Sponsor of the project; ▶ Provision of viability gap funding and funded works to the project ▶ Approval of the terms of the Services standards and specifications ▶ Acceptance of the project infrastructure upon construction completion; ▶ Specifying the user fee notification upfront
Concessionaire	▶ The SPV will, following a procurement process, be contracted for a defined term under the Contract developed on PPP mode. The terms of the Concession Agreement will detail the specific duties, rights and obligations of the SPV in relation to infrastructure and maintenance responsibilities for the Component A and B assets. An outline of the SPV' s likely responsibilities is set out below. **For the Component A Project Assets, this may involve:** ▶ Detailed design, construction and maintenance; ▶ Commissioning of the project infrastructure; ▶ Ensuring availability of assets ▶ Obligation to handover the asset to Authority in accordance with the defined handover criteria set out in the Concession; ▶ Undertaking the role of the Infrastructure Manager (IM), as defined in the Concession Agreement, for the Component A infrastructure, ▶ Engage, and potentially enter into agreements with, key stakeholders at interfaces. **For the Component B Project Assets, this may involve:** ▶ Detailed design, construction, financing and maintenance, together with all relevant approvals; ▶ Commissioning of the project infrastructure; ▶ Ownership and stewardship for the life of the Concession; ▶ Ensuring availability of assets as well as service as per specifications and standards set out in the Concession agreement ▶ Obligation to handover the asset to Authority in accordance with the defined handover criteria set out in the Concession agreement ▶ Engage, and potentially enter into agreements with, key stakeholders mainly ropeway users at interfaces.

7.4 IMPLEMENTATION ROADMAP

This section deals with defining the steps involved in the project implementation and the PPP transaction process. The broad roadmap for the project has been presented in the figure below.

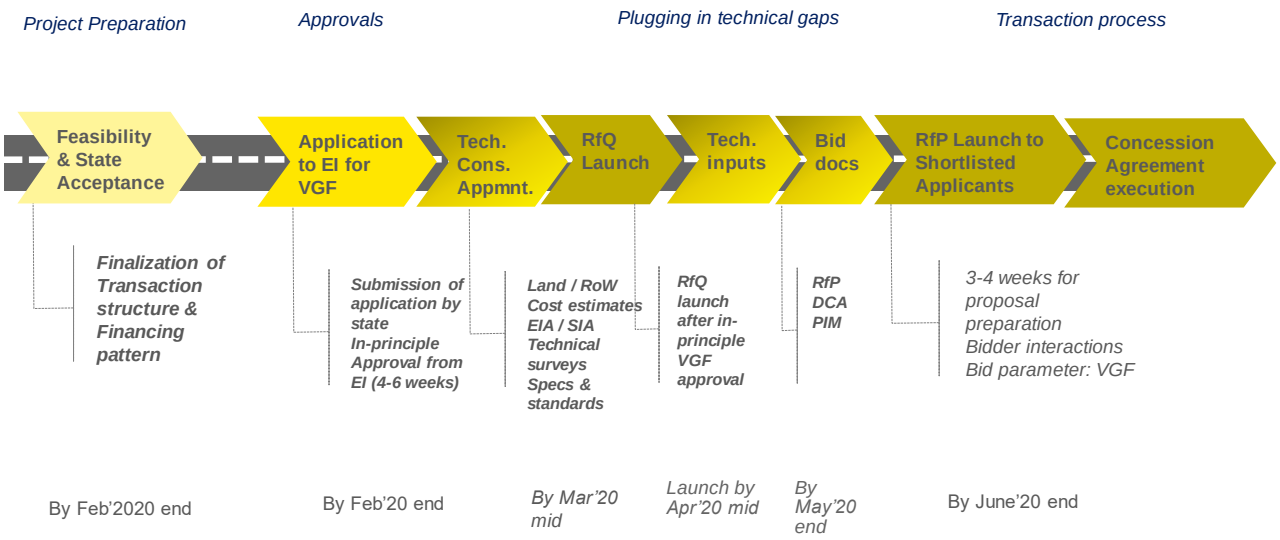


Figure 11 : Implementation Roadmap

As the next step, the project preparation activities need to commence to roll out the project implementation process. These include discussions with key stakeholders in the UDHD, obtaining preliminary acceptance of Pre-feasibility report findings, deciding on the preferred implementation strategy and financing structure, plugging in technical gaps, commissioning of Supplementary Technical Studies, a rapid Environment Impact Assessment and Social Impact Assessment study etc. UDHD would need to obtain an approval from Empowered Institution at the Centre for the VGF for the project prior to launch of transaction process. The process flow for obtaining the VGF approval is set out in exhibit below.

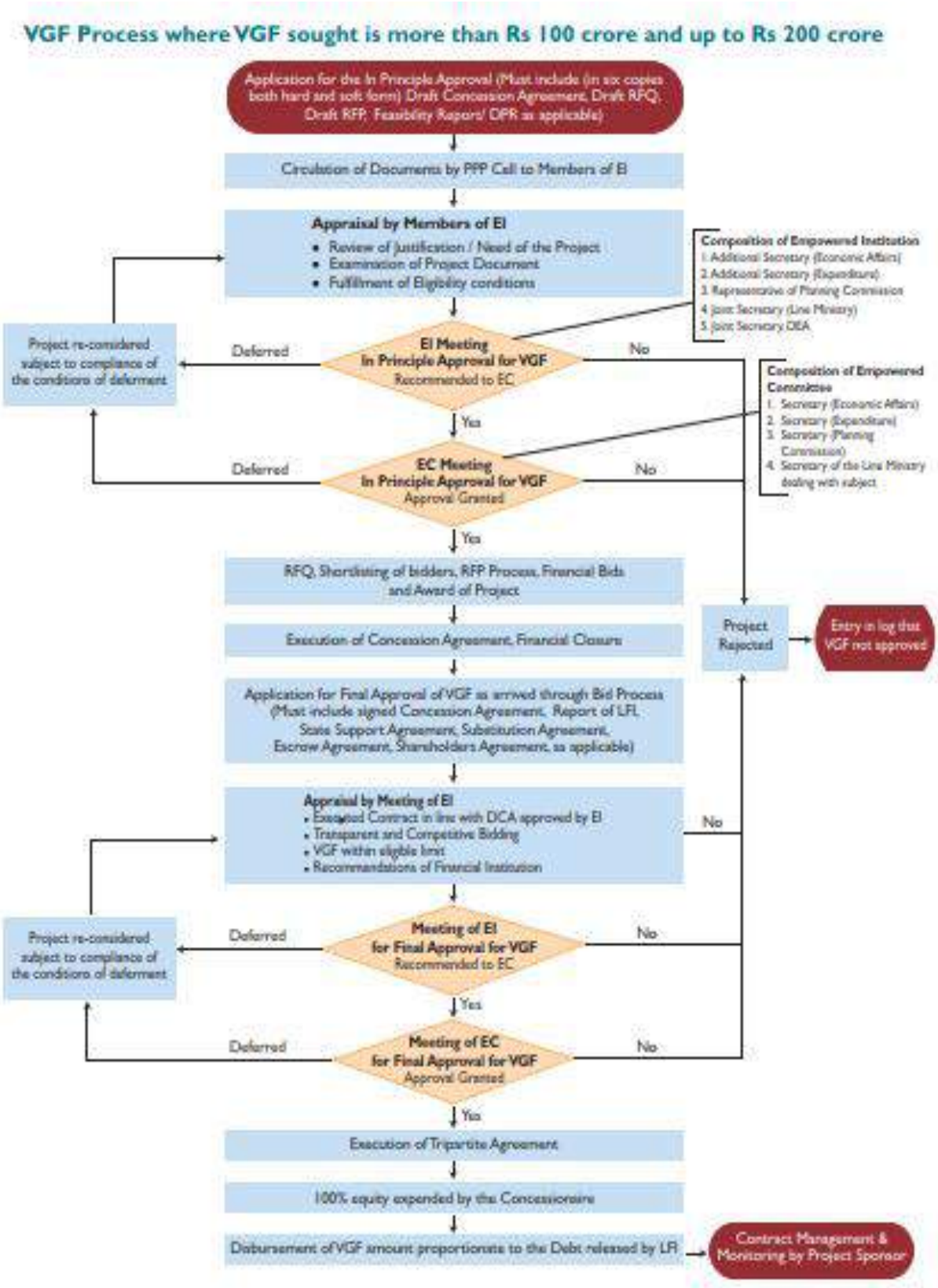


Figure 12: VGF Process where VGF sought is INR 100-200 crore

7.4.1 Appointment of Technical Consultant for Supplementary Technical Studies

Technical consultant will be appointed by the UDHD, Govt. of Sikkim for a Supplementary Technical Studies for the proposed alignments. The Study is required which shall cover the following aspects in details:

- Geometric designing parameters and alignment description
- Land / RoW
- Validation of Cost estimates
- Environment & Social Impact Assessment (EIA / SIA)
- Geo-technical surveys
- Specifications & standards and assistance in creating technical schedules and specifications for the Concession Agreement

The technical consultant will provide the General Alignment drawing sufficient enough to carry out the Social Impact assessment and Environment Impact Assessment.

7.4.2 Social Impact Assessment

Since the Cable car alignment is proposed on the national highway which has high vehicular traffic and pedestrian traffic, the construction work might lead to social hazards and hinder the national highway. Most of the proposed sites have sensitive receptors in the close proximity. Also, some of the sites are proposed on private/semi government land, a detailed social Impact Assessment (SIA) report shall be prepared which will detail out the process of land acquisition and compensation to titleholders and Non-Titleholders. Even though the social hazards related to construction works and operations are mostly of temporary nature, mitigation measure shall be suggested in SIA report. The SIA report shall cover the following aspects in details:

- SIA study approach and methodology
- Project impacts and inventory loss
- Socio-economic profile of the affected area(s)
- Public notification, information, appraisal and consultations.
- Resettlement framework
- Institutional arrangement inc. Grievance Redress Committee(GRC)
- Income/Livelihood restoration
- The activity flow chart for preparation of SIA report has been depicted below

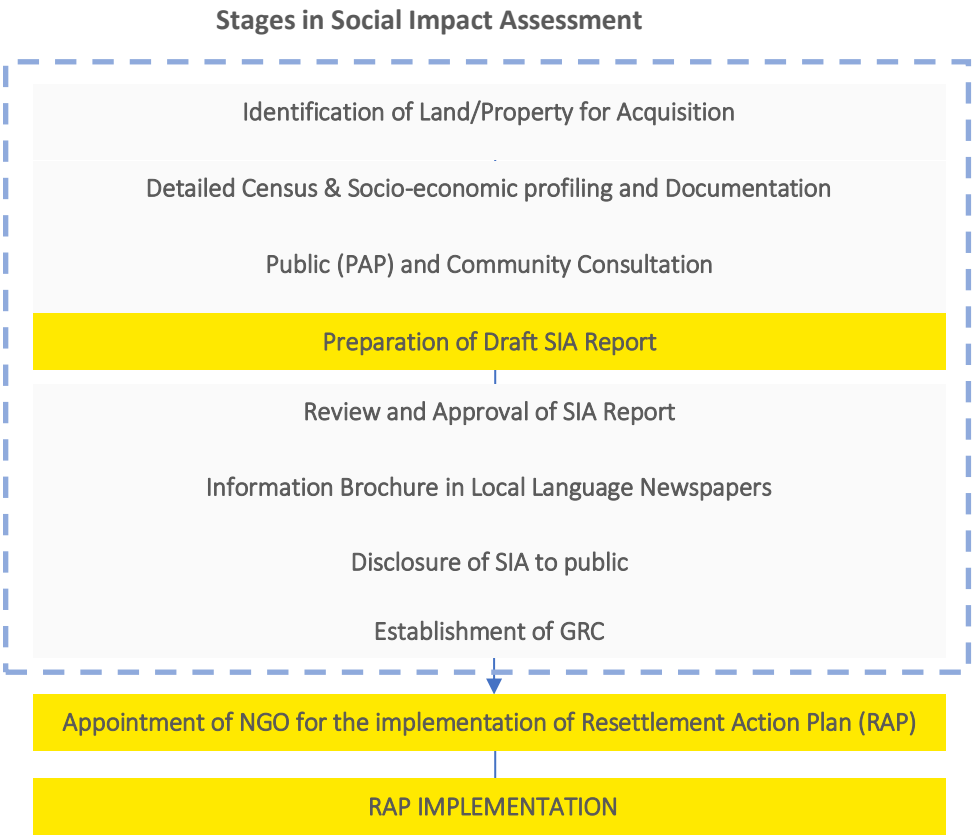


Figure 13 Stages in SIA

7.4.3 Environment Impact Assessment

It is imperative to conduct an Environmental Impact Assessment study as per the EIA & EMP guidelines. The study should ascertain the existing baseline conditions and assess the impacts as a result of procurement, transportation, construction and operation of the project. The changes likely to occur in different components of the environment such as physical (Built-up), flora-fauna and socio-economic etc. shall be documented, assessed and quantified. The National Acts, Legislation and Laws, local laws, bye laws and policies shall be consulted with a view to ensure compliance with various requirements. The consultant shall collate and compile the environmental baseline data for environmental attributes from primary and secondary sources. The following Acts, legislation and laws will be consulted with a view to ensure compliance with various requirements.

- Air (Prevention & Control of Pollution) Act, 1981
- EIA Guidelines, MoEF, Govt. of India Notification, 2006
- Environment (Protection) Act, 1986
- Hazardous Wastes (Management, Handling and Trans boundary Movement) Rules, 2008
- Municipal Solid Waste Rules, 2000
- Noise Pollution (Regulation and Control) Rules, 2000 amendment in 2010
- The Wildlife (Protection) Act, Rules and Amendments, 1972, 1973, 1991
- The Forest (Conservation) Act and Rules, 1980, 1981 amended in 1989.
- Water (Prevention & Control of Pollution) Act, 1974 with Amendment 1991

Data Collection of the below nature will be required to conduct EIA comprehensively

- Documentation of Terrestrial ecology through the past documentation and field investigations
- Meteorological data for temperature, relative humidity, wind speed, wind direction, rainfall and cloud cover
- Monitoring of Ambient air quality and noise levels in and around project alignment
- Physical and chemical parameters of soils and Water (surface and ground)
- Vibration levels along the project corridor along the sensitive identified locations

Based on the assessment of baseline data, identification and quantification of potential impacts because of the proposed project alignment shall be done. Both positive and negative impacts on the environment must be evaluated to assess net resultant impacts. These impacts are assessed for various phases of project cycle such as procurement, transportation, construction and operation. An **Environmental Management Plan** shall be devised to mitigate the adverse impacts during the pre-construction, construction and operation phases of the project. The strategies shall include evaluation of alternative methods to reduce or eliminate adverse impacts of the most critical areas likely to contribute to the most significant environmental burdens. The **Environmental Action Plan (EAP)** shall specifically highlight the proposed mitigation measures to be implemented during project construction phase like compensatory afforestation plan, infrastructure facilities like sanitation, labour camps, and refuse disposal etc.

7.5 PPP PROCUREMENT PROCESS

A two stage, competitive bidding process is envisaged in this project.

- **Pre-qualification stage:** This stage will commence with launch of a RfQ by the GoS Upon obtaining the in-principle ECI / EGM approval for the project, a RfQ inviting interested parties with requisite experience would be published. The document would detail the pre-qualification criteria and guidelines. The interested parties would be requested for qualification within a specified timeframe. RfQ will be open for all eligible and qualified firms that possess the requisite qualifications and experience. Prequalification will consist of selecting firms with the appropriate competence, experience and capacity to handle a project of this nature and scale.

- **Proposal stage:** During the proposal stage, technical and financial proposals to be invited from prequalified bidders. The request for proposal document will also include the draft Concession Agreement. The bidders will be given a total time of ~6-8 weeks to review the documents to carry out their due diligence on the technical aspects of the Project and submit their bids. During this period, bidders will be invited to participate in a bidders' consultation conference to discuss various aspects of the contractual structure and project with the UDHD, GoS. Once the bidders' consultation has been concluded, UDHD. GoS shall update the PPP Agreement to correct and/or amend any issues that were raised by bidders and approved by the competent authorities. Once the final bids are received, the authority shall evaluate the bids and identify a preferred bidder.

7.6 INDICATIVE APPROVALS AND CLEARANCES

The Government of Sikkim may consider enabling legislation to authorize, facilitate and regulate the construction, operations and maintenance of the Cable car system and safeguard the

commissioning of the project. For instance, Uttarakhand state regulates the ropeway projects under "The Uttarakhand Ropeways Act, 2014".

- Approval to the Technical Consultancy / Detailed Project Report, Social Impact Assessment report and Environment Impact Assessment report to be taken from Government of Sikkim
- The DPR, SIA report and EIA report shall be forwarded to the Ministry of Housing and Urban Affairs, Government of India (GOI), NITI Aayog and Finance Ministry with the request for approving the project and for financial participation

7.6.1 The Forest (Conservation) Act, 1980

This Act provides for the conservation of forests and regulating diversion of forestlands for non-forestry purposes. When projects fall within forestlands, prior clearance is required from relevant authorities under the Forest (Conservation) Act, 1980. State governments cannot de-reserve any forestland or authorize its use for any non-forest purposes without approval from the Central government.

Applicability: To be worked out in Technical Consultancy Stage,

Notification and Guidelines: In exercise of the powers conferred by Sub-section (1) Section 4 of the Forest (Conservation) Act, 1980 (69 of 1980), the Central Government has notified the Forest (Conservation) Amendment Rules, 2004. These rules provide guidelines for submission of proposals seeking approval of the Central Government under Section 2 the Act.

Process: For approval, the proposal will be submitted in accordance with the Standard Operating Procedure Document to the concerned Divisional Forest Officer (DFO) and then forwarded to the Nodal officer through Conservator Forest. The State Government recommends the proposal for further processing and approval to a) Concerned Regional Office of the MoEF, if the area involved is 40 hectare or less and to b) MoEF, New Delhi if the area is more than 40 hectare.

To facilitate speedy approval of forest proposal involving lesser area, Ministry of Environment & Forests had established Regional Offices in each region for processing and approving these proposals.

The MoEF approves the proposal in two stages. In principle or first stage approval is accorded with certain conditions depending upon the case. Second stage or final approval is provided after the compliance report of the conditions stipulated in in-principal approval is fulfilled.

7.6.2 Environmental (Protection) Act, 1986 and EIA Notification, 2006

The Environment (Protection) Act, 1986 was introduced as an umbrella legislation that provides a holistic framework for the protection and improvement to the environment. In terms of responsibilities, the Act and the associated Rules requires for obtaining environmental clearances for specific types of new / expansion projects (as per EIA Notification 2006) and for submission of an environmental impact assessment plan.

Applicability: All aerial ropeway projects as per the EIA notification, 2006 and its amendments of Dec, 2009 fall under Category B. In the event, the project is located in whole or in part within 10 km from boundary of Protected areas notified under the Wildlife (Protection Act), 1972 and if the project is located at an altitude of 1000 mts and above, the same shall be treated as Category A project.

Notification and Guidelines: Environmental Impact Notification S.O.1533 (E), dt.14th September 2006, as amended 2009, issued under Environment (Protection) Act 1986, has made it mandatory to obtain environmental clearance for scheduled development projects. The notification has classified projects under two categories 'A' & 'B'. Category A projects (including expansion and modernization of existing projects) require clearance from Ministry of Environment and Forest (MoEF), Govt. of India (GoI) and for category B from State Environmental Impact Assessment Authority (SEIAA), constituted by Government of India.

7.6.3 Private Land Acquisition

All land owned by the individual citizens to be acquired under "The Right to Fair Compensation and Transparency In Land Acquisition, Rehabilitation And Resettlement Act, 2013". Applicability: The detail and ownership of land would be carried out at the Technical Consultancy stage.

7.6.4 Other Broad List of Approvals

Table 41: Broad list of approvals

Sl.No	Approval
1	Consent to Establish and Consent to Operate under the Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974 from State Pollution Control Board (State and Centre)
2	Compliance under the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996.
3	Forest clearance from Ministry of Environment and Forest.
4	No-Objection certificate from relevant panchayat in whose territorial limits the project is located, if applicable.
5	Clearance of fire safety standards and protection apparatus and system under the Factories Act, 1948, and standards mandated by the local fire department, if applicable from Chief Inspector of Factories or any other designated authority appointed.
6	License for usage and storage of fuel oil storage tank, pressurized vessels, explosive and inflammable liquids, gases and chemicals under (a) Explosives Act, 1884 read with Explosives Rules, 2008 and Gas Cylinder Rules, 2004; and (b) Petroleum Act, 1934 read with Petroleum Rules, 2002, if applicable from Chief Controller of Explosives, GoI, if applicable.
7	Approval under the Electricity Act 2003 for electrical installations and works form Chief Electrical Inspector
8	Other facilitation that could be obtained from the nodal agency is statutory clearances from Govt. Departments/Agencies, Evacuation approval from State Transmission Utility (STU), Connectivity to the substation of STU, clearances from State Pollution Control Board (SPCB), whenever feasible.
9	Certificate of Registration from the labour department issued under the InterState Migrant Workmen (Regulations of Employment and Conditions of Services) Act, 1979 in relation to employment of migrant workmen.

10	Registration under Section 7 of Contract Labour (Regulation and Abolition) Act, 1970.
11	Authorization for management and handling of hazardous waste under Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016.
12	Consent for Right of Way under applicable law.
13	NOC for height clearance from directorate of air traffic management, Airport Authority of India when project lies within 20Kms radius of air strips/funnel.
14	Approval under Ancient Monuments and Archaeological Sites and Remains (if applicable)

Every ropeway project will need specific approval/permits from the list of permits detailed in the table above. The Authority will define the applicable permits based on specific needs of the project. Ropeway applications viz. the use of ropeway will require permits/approvals from various agencies. The applications could be urban transit, tourism, adventure, leisure, material transport etc. While some permits are common to all ropeway systems, others will have to be defined as per local conditions and laws of land of various state governments/Central Government. The above list of approvals are a broad list and indicative in nature required for installation of a typical ropeway project. The private concessionaire upon award will have to define the ropeway terms of reference, activities planned to draw out a comprehensive list of permits required for setting up the ropeway project. Standard approvals for electricity, water, sewage disposal as per local rules and regulations will also apply for the ropeway project.

7.7 RISK ASSESSMENT & ALLOCATION

In relation to project specific risk transfer considerations, the following initial allocation of risk has been developed to deliver a value for money outcome. This should be considered indicative to provide a basis for the Market Sounding sessions and will remain subject to further development.

Table 42 : Risk Matrix and treatment

Area	Risk	Party primarily at risk		Proposed treatment / Mitigation
		Public	Private	
Risk of delayed site handover	Delay in Construction and increased project cost	✓		GoS to be responsible for handing over peaceful possession of encumbrance free site to concessionaire
Land Acquisition Risk	Delay in land acquisition of provision of Right of Way	✓		GoS should ensure timely acquisition of land parcels basis the site identification at technical consultancy stage
Design risk	Inadequate technical design, design defects / non-conformance to technical drawing impacting the useful life of project		✓	
Construction risk	Risk of non-adherence to safety measures at the construction site		✓	Enforcement of health and safety standards agreed with contractor and use of Contractors' All Risk Insurance policy
Project Structuring Risk	Inadequate project structuring leading to financial risk	✓		
Contracting and Procurement Risk	Procurement delay leading to delay in service delivery	✓		Getting capable concessionaire with adequate technical knowhow about the implementation of similar project will be ensured during the bid-process by setting up the eligibility criteria right.
Environmental risks	Incidents of environmental		✓	Secure necessary approvals before starting construction and put in place an EMP and EAP.

Area	Risk	Party primarily at risk		Proposed treatment / Mitigation
		Public	Private	
	pollution arising due to construction of cable car system			
Financing risks	High financing cost in terms of interest on commercial loan and non-availability of financing from other institutions		✓	Lock in interest rates. Secure loan sanctions from agencies which provide loans at concessional rates
O&M risk	Non-conformance to regular maintenance requirements during O&M period		✓	Put Service Level Agreements and performance parameters in place
Force Majeure risk	Risk that events beyond the control of either entity may occur, resulting into a material adverse impact on either party's ability to perform its obligations under the operations /construction contract	✓		Pre-agreed clauses on what happens in case of a force majeure event, with clearly defined risk triggers and force majeure insurance to cover such events
Demand risk	Actual demand is less than projected demand affecting viability of project	✓		Detailed demand assessment and stakeholder interaction to effectively measure and validate demand
Market risks for commercial space	Risk of no / less than adequate uptake for commercial space designed at the stations		✓	Detailed market assessment and stakeholder consultation along with marketing to increase uptake of commercial space
Legal risks	Non-compliance to current legislations and frameworks	✓	✓	Engage with key stakeholders and legal authorities to understand requirements for compliance and approvals

Area	Risk	Party primarily at risk		Proposed treatment / Mitigation
		Public	Private	
Political Risk	Risk of delayed approvals due to change in government	✓		Plan and engage with key stakeholders for timely approvals on key compliance requirements
Default Risk	Not meeting obligations under the contract		✓	Penalty Deduction clause in the concession agreement (on concessionaire for failure to meet contractual obligations) to be incorporated to charge, compensation or remedy from the concessionaire for any loss sustained by it as a result of the breach
Maintenance Cost Overrun	Risk of maintenance cost overrun due to improper planning /proper project implementation /Force majeure		✓	Extensive planning and detailed studies to be undertaken at project planning stage and pre-emptive scenario analysis for occasions of maintenance cost overruns

The advantage of using the public-private partnership model for implementing the project consists in an optimal, balanced and economically effective distribution of the risks associated with project implementation between the parties to the long-term contract agreement. The optimal risk distribution is based on the principle that risks beyond the control or competence of the developer are borne by the government. The developer will have the responsibility for a significant part of the risk related to construction, design, operation and maintenance and financing of the Project. Table above is a general indication of the preliminary view about allocation of key project risks and is not an exhaustive list of the Project's risks.

Section 8: Conclusion and Way forward

Section 8: Conclusion & Way forward

1. As Gangtok is growing, so is the need and expectation of the commuters in the city – and mobility networks and infrastructure are struggling to keep up. Recognising the importance of increasing congestion in the state, Government of Sikkim (GoS) has initiated steps to improve its local transit system by developing a cable car system as an efficient mode of public transport in the capital city of Gangtok.

2. The Urban Development and Housing Department of the Government of Sikkim is seeking an affordable solution for delivering improved public transport service to its citizens and has therefore requested NITI Aayog to help in assessing the feasibility of the project, and in structuring a PPP transaction to attract private sector capital and to tap private sector efficiencies under an appropriate PPP structure for the project. The State government had already commissioned a Techno-Economic Feasibility Report (TEFR), to examine the location conditions, validate the technology and identify the associated risks for the proposed project. The objective of this study, however, is to take the assessment from the TEFR a step further and to chart out a clear transaction structure and implementation roadmap with stakeholders' support through enabling institutional structures and financing frameworks.

3. As a part of TEFR, various surveys were undertaken to assess the transportation scenario in the city. Our discussions with the key stakeholders reiterated these findings. A high share of shared taxis confirms the existence of substantial public transit demand and implies the need for an organized public transport system. Lower average travel speeds implies existing roads are nearing saturation and a non-road based public transit mode will be ideal for the city of Gangtok. Gangtok receives substantial tourists during peak seasons who in the absence of an organized public transport system rely on shared and reserved taxies for commuting which adds to there expenditure substantially, an organized non-road based public transport system will be a boon for the tourists and in turn these tourists will be an additional season ridership for the transit system. The core idea of Government of Sikkim is not to obtain a ropeway system as a singular piece of transportation infrastructure, but have it be a cornerstone of a fully redesigned urban mobility plan for the state, ready for the 21st century.

4. Gangtok has a linear road network which means that fundamentally the requirement is of a mass transit system along the trunk line (NH-10) and feeder systems to cover the inner areas. For location of boarding / de-boarding points and planning, high population density areas and employment centres have been considered in the TEFR. Considering the increasing travel demand in future years, the TEFR has proposed that a Cable Car system be provided as mass transit mode along the trunk network and shared taxies which are currently plying along trunk network shall be reorganized to serve as a feeder system.

5. The total network length envisaged is approximately 13 km with North-South Line from Ranipool Taxi Stand to Burtuk Ward. The west alignment connects Taxi stand north district to District administrative centre and Hospital at Sichey. The east alignment connects the Chandmari ward to the Old STNM Hospital station. The stations are placed within dense built-up areas thus ensuring that maximum potential usage lies within walkable distance. Station at

Taxi Stand North District, Sikkim National Transport, Gangtok Municipal Corporation and Ranipool Taxi stand can be developed as multimodal interchange hub (cable car to taxi/bus).

6. The station cost estimates are preliminary and need to be finalised by the state on the basis of availability of land and technical suitability. We have undertaken a site visit of each of the proposed station location. Detailed site appreciation and assessment is presented in the report. Key broad aspects that need to be assessed for station locations during the Supplementary Technical Study stage are:

- The land ownership details of the sites proposed to correctly ascertain the land acquisition requirement and financial outgo
- A social impact assessment (SIA) and an Environmental Impact Assessment (EIA) is needed to address the acquisition / R&R process and assess likely negative impacts such as tree felling, soil erosion, muck disposal, river water pollution etc.
- The construction on a number of station sites lying on the sloped part might require cut and fill construction technology. Hence, the land suitability (detailed soil characteristics i.e. typology, stability etc.) needs to be assessed.
- Geotechnical investigation study should be conducted to assess the station site areas and the deep layers before final design and layout of the station area and access area.

7. In order to ease the implementation, it is crucial that land acquisition is minimized as much as possible. Therefore, in the TEFR, the station sites have been chosen such that most of the sites are in possession of government. Besides the sites for the stations, additional plots of land need to be available during construction for stocking of material, pre-assembling of towers, loading and unloading pieces of the system, and for helicopter landing. These areas must be secured and accessible for heavy trucks. Based on preliminary discussions with the state, out of the total land requirement of 29,618 sq m, about 76% is government land i.e. with State government or CPWD or Forest land. Balance 24% is private land and would need to be acquired. Accordingly, land acquisition, R&R costs of INR 13 crore to be borne by state Government.

8. Public transport projects require heavy capital outlay. With reasonable fare level, ensuring servicing of the debt and return on capital invested loans often pose problems. Therefore, to make the project financially viable, the fares will have to be substantially increased, but this will result in their reaching socially un-acceptable levels. This will result in the ridership coming down significantly, as it is sensitive to increase in the fare levels. Thus, the very objective of constructing the cable car based public transport system to provide an affordable mode of mass travel for public is defeated. It, therefore, becomes necessary to keep the initial capital cost of the project as low as possible so that the fare level can be kept at reasonable level. Accordingly, scenarios have been analysed proposing civil works for station development as funded works in the scope of the private concessionaire. Further, GST on the electro-mechanical equipment is expected to be claimed as Input Tax Credit, decreasing the project cost for the Concessionaire.

Table 43: Project Cost under the proposed scenario with grant and funded works

Funding Pattern	Amount (INR crore)	% of Capital Cost (Pvt. Concessionaire)	% of Capital Cost (Total)

Grant by GoI (VGF)	163	20%	16%
Grant by GoS (matching VGF)	163	20%	16%
Equity by Concessionaire	195	24%	20%
Project Debt availed by SPV	193	36%	29%
Total Project Cost (excl. funded works)	**814**	**100%**	**81%**
Funded Works by GoS (incl. escalation @5% and phasing)	169	-	17%
Land acquisition contribution by GoS	13	-	1%
TOTAL	**996**	**-**	**100%**

9. The project implementation period in our analysis has been phased over 3 years. The construction is expected to commence at the start of FY 2022 and end by the end of FY 2024. The total capital cost for the project under the proposed scenario (with Grant and funded works) has been estimated at INR 996 crores.

Table 44: Project Cost phasing under the proposed scenario with grant and funded works

Parameter	Unit	Ratio	FY 22	FY 23	FY 24	Total
Capex Phasing	%	-	30%	30%	40%	100%
Project Cost (excl. funded works & land)	INR cr	100%	232	242	340	**814**
Debt	INR cr	36%	83	87	122	**292**
Equity	INR cr	24%	56	58	82	**196**
Grant	INR cr	40%	93	97	136	**326**
Land	INR cr	-	13	-	-	**13**
Funded works	INR cr	-	**48**	**50**	**70**	**169**
Total Project Cost (including funded works & land)			**293**	**293**	**410**	**996**

10. For an equity investor, a project must be both bankable and provide an acceptable return for the risk of the investment. The two parameters used to assess the commercial feasibility, from the investors' perspective, are Net Present Value, based on the discounted equity cash flows, and the Internal Rate of Return of the project cashflows (Project IRR) and equity cash flows (Equity IRR). Based on the financial analysis, the project's revenue streams are not sufficient to bring viability into the project. Therefore, grant funding scenarios have been assessed. Key output parameters are summarized below:

Table 45 : Key Financial Indicators under the proposed scenario with grant

Parameter	Unit	Value
Total Project Cost (incl. funded works & land)	INR cr	996
VGF Grant by GOI	INR cr	163

VGF Grant by GOS	INR cr	163
Funded Works component	INR cr	169
Project IRR (post tax)	%	10%
Equity IRR (post tax)	%	15%
NPV	INR cr	223
Avg. DSCR	Ratio	1.92
PLCR	Ratio	1.83

11. Mass urban transit systems such as Gangtok Cable car system are characterised by heavy capital investments coupled with long gestation period leading to low financial rates of return although the economic benefits to the city/region are immense. However, experience all over the world reveals that both construction and operations of public transport systems are highly subsidised. Therefore, government involvement in the funding and regulation of pubic transport systems is a foregone conclusion.

12. Due to low financial returns in the base case, it is proposed the UDHD grant DBFOT Concession, with 40% VGF Grant, to develop and operate the CCT system and include the civil works for station development as "Funded Works" in the scope of the Concessionaire.

13. Uninterrupted and reliable power supply is one of the key elements for financial viability of the project. In addition to ensuring optimum energy consumption, it is also necessary that the electric power tariff be kept at a minimum in order to contain the O& M costs. It is proposed that Government of Sikkim will take necessary steps to fix power tariff for the CCT at "No Profit No Loss" basis.

14. As the next step, the project preparation activities need to commence. These include acceptance of Pre-feasibility Report, seeking EI and state level approval for VGF, finalizing financing and transaction structure, plugging in technical gaps through commissioning a Supplementary Technical Study, environment impact assessment, social impact assessment etc.

Our offices

Ahmedabad

2nd floor, Shivalik Ishaan

Near C.N. Vidhyalaya

Ambawadi

Ahmedabad - 380 015

Tel: + 91 79 6608 3800

Fax: + 91 79 6608 3900

Bengaluru

6th, 12th & 13th floor

"UB City", Canberra Block

No.24 Vittal Mallya Road

Bengaluru - 560 001

Tel: + 91 80 4027 5000

+ 91 80 6727 5000

+ 91 80 2224 0696

Fax: + 91 80 2210 6000

Ground Floor, 'A' wing

Delhi NCR

Golf View Corporate Tower B

Sector 42, Sector Road

Gurgaon - 122 002

Tel: + 91 124 464 4000

Fax: + 91 124 464 4050

3rd & 6th Floor, Worldmark-1

IGI Airport Hospitality District

Aerocity, New Delhi - 110 037

Tel: + 91 11 6671 8000

Fax + 91 11 6671 9999

4th & 5th Floor, Plot No 2B

Tower 2, Sector 126

NOIDA - 201 304

Gautam Budh Nagar, U.P.

Tel: + 91 120 671 7000

Fax: + 91 120 671 7171

Hyderabad

Oval Office, 18, iLabs Centre

Hitech City, Madhapur

Hyderabad - 500 081

Kolkata

22 Camac Street

3rd Floor, Block 'C'

Kolkata - 700 016

Tel: + 91 33 6615 3400

Fax: + 91 33 2281 7750

Mumbai

14th Floor, The Ruby

29 Senapati Bapat Marg

Dadar (W), Mumbai - 400 028

Tel: + 91 22 6192 0000

Fax: + 91 22 6192 1000

5th Floor, Block B-2

Nirlon Knowledge Park

Off. Western Express Highway

About EY

EY is a global leader in assurance, tax, transaction and advisory services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. We develop outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities.

EY refers to the global organization, and may refer to one or more, of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity. Ernst & Young Global Limited, a UK company limited by guarantee, does not provide services to clients. For more information about our organization, please visit ey.com.

Ernst & Young LLP is one of the Indian client serving member firms of EYGM Limited. For more information about our organization, please visit www.ey.com/in.

Ernst & Young LLP is a Limited Liability Partnership, registered under the Limited Liability Partnership Act, 2008 in India, having its registered office at 22 Camac Street, 3rd Floor, Block C, Kolkata - 700016