

Preliminary Project Proposal Report - (PPRID - 10721)

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SNO.	Item	Details
1.	Name of the Project	Development of Best in Class Transport (Roads & Public Transport) Infrastructure in Dehradun & Mussoorie
2.	Sectoral Area	-Urban Mobilty
3.	Central Line Ministry or Department for the Project	Ministry of Housing and Urban Affairs
4.	State Line Department for the Project.	Uttarakhand
5.	Proposed Project Implementation Agency	-Urban Development Department -
6.	Institutional Structure for Delivery	SPV
7.	Basic Design of the Project	

SNO.	Item	Details
	Goals and Objectives	Dehradun is the capital city of Uttarakhand and India's school capital. The city is the transit point to reach Haridwar, Rishikesh and other popular pilgrimage centers. In the recent years, the city has highlighted the need for a commuter centric mobility system. -To improve the traffic conditions for seamless movement. -To enhance e-mobility by applying smart solutions e.g., RFID and PIS services. -Provide access to safe and affordable transport systems -To reduce air pollution and improve the health of ecosystems -Improve road quality through multi-utility ducts
	Activities Involved	-Roads upgradation, flyovers, multilevel parking (for car in Mussoorie), cycle (Dehradun and underground utilities incorporating principles of WSUDs - Revamping the existing roads and pedestrian ways -Signages to indicate directions and amenities on all roads for better way-finding. -Solar powered smart poles and kiosks, energy saving light/WiFi/SOS buttons. -RFID and PIS on-board and WIFI services at bus bays and parking bays. -Pedestrian plazas incorporating identified vending zones. - Grade separated pedestrian, cycle and disabled friendly pathways -100 electric public transport buses

SNO.	Item	Details
	Outputs of the Project	<ul style="list-style-type: none"> -Enhanced road conditions with reduced congestion and urban floods -ICT enabled real-time information & updates about bus traffic and weather monitoring -Safe and improved parking management and enhanced revenue generation -Extension of Smart Road Program to encourage walking & cycling -Provision of Universally Accessible low carbon public transport -Bi-cycle tracks with landscape design and repair shops, bi-cycle share in tourist areas -Environment and child friendly zones
	Outcome of the Project	<ul style="list-style-type: none"> -A low-carbon mobility growth scenario for the city -Greater economic accessibility and increased employment -Increase in walk trips – better health and lower pollution -Lower usage of Highly Polluting Auto Rikshaws and Vikrams -Reduced environmental impact due to the NMT infrastructure -Enhanced economic growth based on transit-oriented development with efficient movement of goods -ICT enabled infrastructure for improving decision-making and fostering innovation. -Improved safety and access -Ease of living in Dehradun
8.	Finance Plus Element	
	System and Transformational Impact	<p>The proposed project aims to provide accessible, affordable and sustainable transportation aiding in better living conditions. Following positive impacts are targeted to be achieved:</p> <ul style="list-style-type: none"> -Infrastructural transformation -Transit Oriented Development induced economic growth -Intelligent and zero carbon transportation system -Image re-brand of Dehradun

SNO.	Item	Details
	Innovations and Piloting of New Approaches	-City-wide incorporation of universal design principles for access to the transport system. -Enhancing green cover along the highways to act as lungs for the city - Comprehensive e-mobility plan for entire city -Introduction of vehicular quota / similar systems -Road designs as per UDP -Multi-level cycle parking and cycle repair shops - At grate full signal crossing -Implementation of Masterplan in the best possible way
	Innovations in Financing Leveraging	-Convergence of national and state missions and externally sourced funds. - Value capture financing -Public Private Partnership (PPP) based on value for money assessment including post-award governance aspects. -CSR funds -Public transport provided through in Gross Cost Contract Model. -Introduction of Congestion and Pollution Tax. -Municipal / Green Bonds.
	International Best Practices Proposed to be Adopted	-ICT infrastructure along the roads -NMT model -Congestion pricing (Singapore) - Stacked cycle parking (Shanghai) -S.U.R.E (Bengaluru)
9.	Other Element(if any)	
	Private Sector Engagement (Financing, Supply Side,Involvement,Provision of Services)	-Hybrid Annuity Model to trigger private sector investments for roads. -CSR and private funding (advertisement) for O&M of ICT and NMT infrastructure -Small business investment in O&M for bicycles and road maintenance
	Climate Mitigation/Adaptation	-Promotion of NMT to aid in reduced carbon emissions. -City level evacuation planning supported for reduced emergency response time. -Develop a decision support tool for climate-smart infrastructure development.

SNO.	Item	Details
	Beneficiary Engagement/Community Involvement/Community Monitoring	-Implementation of projects, designs and models with community participation. -Public spaces created with additional infrastructure to provide new congregation spaces. - Setting up of citizen monitoring committee to encourage public participation in service delivery governance -Public Private Partnership (PPP) models O&M of roads
	Mainstreaming of Gender	Women only transportation initiative as an option to save public transit
10.	Name/Names of the State/StatesInvolved	Uttarakhand
11.	Name/Names of the District/Districts Involved	Dehradun and Mussorrie
12.	Proposed Project Duration	
	From -	01/02/2020
	To -	31/01/2023
	Years -	2
	Month-	11
13.	Type of Project	State Sector
14.	Category of State	General
15.	Financial Arrangement	

SNO.	Item	Details							
		Tranche	Total external assistance sought	Implementing Agency	State Govt	Central Govt	Others, If any	Total Cost	
		In INR							
		Tranche-1	1168.87	0	292.218	0	0	1461.088	
		Tranche-2	0	0	0	0	0	0	
		Tranche-3	0	0	0	0	0	0	
		Total	1168.87	0	292.218	0	0	1461.09	
		Percentage	80	0	20	0	0	100	
		Amount in USD million							
		One USD = 70.0000							
		Tranche-1	166.9814	0	41.7454	0	0	208.7269	
		Tranche-2	0	0	0	0	0	0	
		Tranche-3	0	0	0	0	0	0	
		Total	166.9814	0	41.7454	0	0	208.7268	
		Percentage	80	0	20	0	0	100	
16.	Year wise financial projections of fund utilisation								
	Year	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Total
	INR	292.22	584.44	438.33	146.11	0	0	0	1461.1
	USD	41.7457	83.4914	62.6186	20.8729	0	0	0	208.7286
17.	Name of the Multilateral Development Bank/ International Financial Institution			AIB-Asian Infrastructure Investment Bank					
18.	Previous Phase, If any			No					
19.	Whether Feasibility Study for the project is available?			No					
20.	Whether Detailed Project Report(DPR) or Detailed Engineering Design for the project is available ?			No					

SNO.	Item	Details
21.	Whether following clearances are involved in the project	
	Environment	No
	Coastal Regulation Zone	No
	Forest	No
	Heritage	No
	Any Other(Please Specify)	NA
22.	Whether any court or tribunal proceedings are pending that could impact the project?	No
23.	Whether Land pooling/land acquisition/Resettlement and Rehabilitation is involved in the project?	
	Land Pooling	No
	Land Acquisition	No
	Resettlement & Rehabilitation	No
	Any Other(Please Specify)	NA
24.	Whether External Assistance has been availed in the past for similar project(i.e., earlier phase etc.) ? - No	
25.	Details of externally aided projectes (completed/ongoing/pipeline/posed/under examination) since 01.04.2008 undertaken by the proposed borrowing Agency (Central line Ministry/Department/Central PSU/State Government)	
No		
26.	Upload relevant documents(including Feasibility Study,DPR) - No	
	Relevant Document I	

Preliminary Project Report (PPRID 10721) for Development of Best-in-Class Transport (Roads and Public Transport) Infrastructure in Dehradun and Mussoorie – regarding

Brief note on Gap Analysis

The proposal submitted by the Dehradun Smart City Limited (DSCL) covers provisioning of the following infrastructure and services:

1. Smart roads and footpaths with universal design principles
2. Multi-utility ducts (integrated with smart roads)
3. Smart street lighting system
4. Water supply
5. Sewer lines
6. Storm water drainage
7. Street furniture (signages, grade separators, refuge islands for children, women and senior citizen)
8. Cycle and car parking facilities
9. Provision of 100 electric buses along with bus-shelters integrated with interactive PIS, Wi-Fi and Variable Message Signboard (VMS)

While there are multiple agencies involved in the sectors of roads, water, wastewater and stormwater management, transportation but all the above projects are new and are not proposed or covered through any other project – ongoing or proposed. The proposed projects would be financed exclusively through the funds received through external assistance and required State Government share. The following table provides an overview of the various projects being undertaken in areas concerning this proposal.

Sl. No.	Sector / Service	Agencies involved	Remarks
1	Smart roads and footpaths with universal design principles and street furniture	<ul style="list-style-type: none"> · Dehradun Smart City Limited (DSCL) · Nagar Nigam Dehradun (NND) · Public Works Department (PWD) · Mussoorie Dehradun Development Authority (MDDA) · Uttarakhand Urban Sector Development Agency (UUSDA) 	<ul style="list-style-type: none"> · Dehradun city has about 70 kms of arterial / major roads. Existing footpaths are of poor quality along with obstructions caused by hoardings and utility boxes / junctions. · The DSCL is upgrading about 10 kilometres of roads within a small area of Dehradun i.e., Area Based Development (ABD) of Dehradun. These roads

Sl. No.	Sector / Service	Agencies involved	Remarks
			<p>include Haridwar Road, EC Road, Rajpur Road, Chakrata Road and Gandhi Road. Details of these roads are provided in the Annexure</p> <ul style="list-style-type: none"> · The Nagar Nigam Dehradun undertake O&M of minor roads and streets within NND boundary and there are no plans for major road upgradation by NND · The Public Works Department is entrusted with the responsibility of maintaining the national and state highways. The PWD implemented the Uttarakhand State Road Investment Programme (USRIP) supported by the ADB from 2013. Under Phase 3 of the project, about 116 kms of road projects are being implemented in the Dehradun District with no overlap with the road stretches identified in this proposal. Details of the road stretches covered under Phase 3 of the USRIP is given in the Annexure. · MDDA is involved in road construction and O&M only in new development areas. It has not identified any road for upgradation into smart roads · UUSDA has carried out the construction of pedestrian footpath and beautification works in the road stretch of 4.8 km from Dilaram Bazar to Mussoorie Diversion
2.	Multi-utility ducts (integrated with smart roads)	· Dehradun Smart City Limited	· DSCL is currently implementing 10 kms of smart roads that will

Sl. No.	Sector / Service	Agencies involved	Remarks
			<p>be integrated with multi-utility ducts.</p> <ul style="list-style-type: none"> No other road project in the city is embedding multi-utility ducts currently
3.	Smart street lighting system	<ul style="list-style-type: none"> Dehradun Smart City Limited 	<ul style="list-style-type: none"> DSCL is currently implementing the model road project would have smart LED lights and sensory lighting. This is part of the 10 kms of the smart roads being implemented by DSCL in the ABD area of Dehradun Smart City only. No other road stretch has been identified for smart street lighting by any State or local government agency
4.	Water supply	<ul style="list-style-type: none"> Peyjal Nigam Jal Sansthan DSCL Nagar Nigam Dehradun 	<ul style="list-style-type: none"> Dehradun provides about 135 lpcd of water to its residents and hence meets the required benchmark. However, household coverage of direct water supply connection is about 78% as per the AMRUT baseline report. Further, only 80% of the
5.	Sewer lines	<ul style="list-style-type: none"> Peyjal Nigam Jal Sansthan UUSDIP Nagar Nigam Dehradun 	<ul style="list-style-type: none"> Dehradun's sewerage network coverage is about 15%, collection efficiency of 25% and treatment efficiency of 15% as per the AMRUT baseline report The projects being undertaken through AMRUT for Dehradun does not cover the identified 60 kms of road stretches in this proposal. Areas covered under AMRUT include <i>Divyanchal Vihar -1, Saraswati Vihar, Cabal Vihar.</i> Only INR 48.55 Cr is allocated for entire Dehradun for sewerage & septage management under AMRUT

Sl. No.	Sector / Service	Agencies involved	Remarks
6.	Storm water drainage	<ul style="list-style-type: none"> · <i>Peyjal Nigam</i> · UUSDIP · Nagar Nigam Dehradun 	<ul style="list-style-type: none"> · Dehradun's storm water drainage coverage is only 11% as per the AMRUT baseline report · The projects being undertaken for Dehradun doesn't cover the identified 60 kms of road stretches in this proposal. · AMRUT covers Improvement of Drainage System of various areas of <i>Brahmapuri, Patel Nagar & Kargi ward</i> · Only INR 21.47 Cr is allocated for entire Dehradun for storm water drainage under AMRUT
7.	Cycle and car parking facilities	<ul style="list-style-type: none"> · Dehradun Smart City Limited · Nagar Nigam Dehradun 	<ul style="list-style-type: none"> · DSCL is implementing a public bicycle sharing system project in the ABD area on a pilot basis. About 200 public-bicycles will be provided. · However, under this proposal the idea is to shift from public cycle sharing to usage of personal bicycles by the residents. This would include building an entire ecosystem for people to use bicycles including bi-cycle tracks, dedicated or integrated bi-cycle parking facilities near public spaces, bi-cycle learning and repair centres etc. · No other agency has proposed or is implementing a similar initiative in Dehradun
8.	Provision of 100 electric buses along with bus-shelters integrated with interactive PIS, Wi-Fi and Variable Message Signboard (VMS)	<ul style="list-style-type: none"> · Dehradun Smart City Limited · Uttarakhand Transport Corporation (UTC) · Uttarakhand Transport Department 	<ul style="list-style-type: none"> · Dehradun's public transportation share is about 17%. There is a need to increase Dehradun's public transport share to global standards. Given the ecological sensitivity of Dehradun, Electric Buses are more environment friendly.

Sl. No.	Sector / Service	Agencies involved	Remarks
			<ul style="list-style-type: none"> · At present only 30 electric buses are proposed by DSCL for Dehradun of which only 22 would ply within the Dehradun City. · The UTC primarily operates inter-city bus services. The UTC in October 2019 announced to procure about 50 electric and 10 CNG buses for inter-city · DSCL's proposal to purchase 100 electric buses is for intra-Dehradun public transportation service and would help increase the city's public transportation share to about 30% · There is no provision for urban transportation projects under AMRUT

Annexure:

1. Details of smart roads being constructed by DSCL:

Phase I:

Haridwar Road (Prince Chowk – Araghar Chowk) – 1.5 Km.

EC Road (Araghar – Behl Chowk) – 2.9 Km

Phase II:

Rajpur Road (Clock Tower- Dilaram Chowk) – 1.8 Km.

Chakrata Road (Clock Tower - Kishanagar Chowk) – 1.9Km

Phase III

Gandhi Road – 1.9 Km.

Total road length – 10 Km

2. Details of road stretches implemented by PWD under the USRIP

Sl. No.	Road Stretch	Length (in km)
1	Kotigram-Sardi	7.45
2	Ubhahu - Qiari Kuchta	15.13
3	Langha - Toli	5.8
4	Kalsi-Beratt Khai to Kaha - Nehra – Unaha	7.8
5	Nanda Ki Chowki - Kotra Santoor Phalsiyani Aamwala	11.75
6	Sahia-Kuanu	5.09
7	Sahiya-Damta-Panua – Badnu	6.024
8	Chakrata Lakhamandal (chainage 0.000 km to 40.000 km)	40.0
9	Lalpul-Bishnoi	6.6
10	Lohanband- Bhavdidhar (LVR)	10.46
11	Total	~111

Submitted by:



DEVELOPMENT OF BEST-IN-CLASS
**TRANSPORT (ROADS
AND PUBLIC TRANSPORT)**
INFRASTRUCTURE IN DEHRA-
DUN AND MUSSOORIE

P R E - F E A S I B I L I T Y R E P O R T

DEC 2019

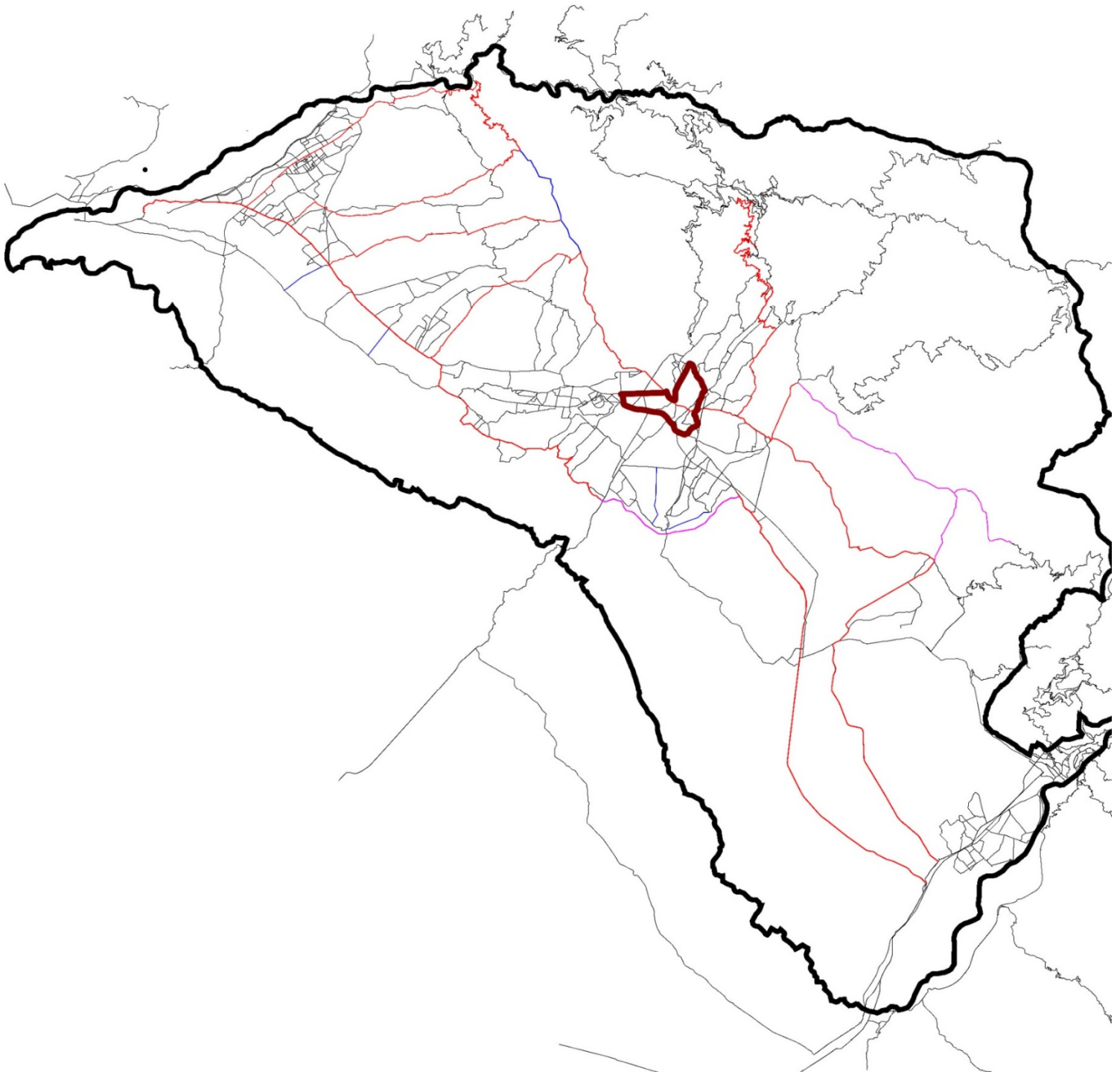


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List of Abbreviations

CBD	Core Business District
CEO	Chief Executive Officer
CFC	Child Friendly City
CMP	Comprehensive Mobility Plan
DCP	District Cooling Pipe
DPR	Detailed Project Report
DSCL	Dehradun Smart City Limited
FAME	Faster Adaptation and Manufacturing of Electric Vehicles
GCC	Gross Cost Contract
Pack	Government of India
IAS	Indian Administrative Service
ISBT	Inter State Bus Terminal
MDDA	Mussoorie Dehradun Development Authority
MoHUA	Ministry of Housing and Urban Affairs
NCR	National Capital Region
NH	National Highway
NMT	Non-motorised Transport
Nrw	Non-Revenue Water
Pis	Passenger Information System
PWD	Public Works Department
RFID	Radio Frequency Identification
RoW	Right of Way
RTO	Regional Transport Office
SPV	Special Purpose Vehicle
SURE	Specifications for Urban Road Extension
Office	Uttarakhand Renewable Energy Development Agency
UUSDA	Uttarakhand Urban Sector Development Agency
UUSDIP	Uttarakhand Urban Sector Development Investment Programme
WTP	Water Treatment Plant

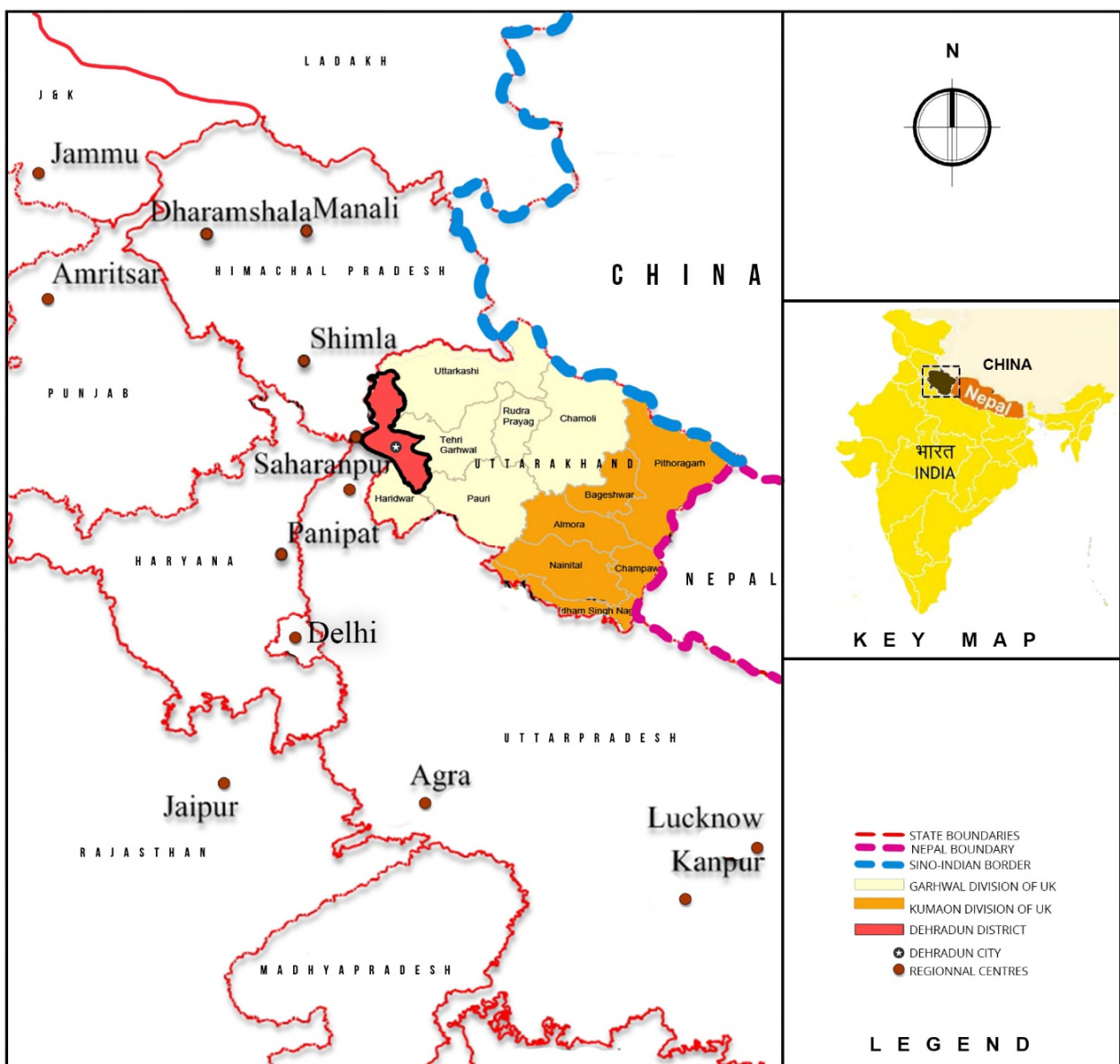
1. Project Background

This preliminary project report has been prepared by Dehradun Smart City Private Limited (DSCPL) to provide background information to external lending agency(ies) and help inform its decision to extend a line of credit for the project - "Development of best-in-class transport (roads and public transport) infrastructure in Dehradun and Mussoorie".

DSCPL's main objective for this study is to highlight the gap between the current and required state of public transportation infrastructure and service delivery in Dehradun and the need for undertaking immediate interventions to enhance mobility in Dehradun

2. City Profile

Location and Topography:



The project location is *Dehradun* which is the capital of Uttarakhand – a state in north India. ¹ *Dehradun*, which is also a district, lies between 29°58' and 31°2'20" north latitudes and 77°34'45" and 78°18'30" east longitudes. *Dehradun* is situated at an altitude of 640 mts (2100 fts) to 1,000 mts (3280 fts) above mean sea level. Situated in the north-western corner of the state, *Dehradun* is bounded on the north by *Uttarkashi* district, in the east by *Tehri Garhwal* and *Pauri-Garhwal* districts and in the south by *Saharanpur* and *Haridwar* districts. *Dehradun's* western boundary adjoins the *Sirmur* district of *Himachal Pradesh*. Dehradun has no international borders and no international rivers.

Dehradun has long been a premier educational hub and is known as the **school capital of India**. With more than 300 schools including the *Doon School*, *St. Thomas School* and *St. Joseph*, it attracts students from both India and abroad. The city is also a major tourist destination and transit place for international and domestic tourists who travel further to *Rishikesh*, *Haridwar*, *Mussoorie* etc. for spiritual, adventure and wellness purposes.

Demography and Land Use:

Dehradun is spread over an area of 71.62 sq. kms. (approx.) With a population of about 0.57 million (Census, 2011), the population density is ~87 persons per hectare. *Dehradun* is likely to become a million plus city by the year 2028. ² *Dehradun* along with its outgrowths i.e., *Dehradun* Municipal Area, *Clement Town*, *Doiwala* and *Vikasnagar* form the *Dehradun* Urban Agglomeration has a total population of 0.76 million (Census 2011) Being a major tourist destination, Dehradun witnesses a surge in its floating population during certain months of the year. As per the Department of Tourism, Government of *Uttarakhand*, 2.45 million tourists visited Dehradun in the year 2018, 30,291 of which were foreign tourists.

Development of *Dehradun* is governed by the physiography of the surrounding area and the rivers *Bindal* and *Rispana*. The two rivers - *Bindal* and *Rispana* are seasonal rivers and they serve as natural drainage of rainwater during monsoon. These physical constraints when combined with the foothills are defined as a form of ribbon development of cities. As per the city's Master Plan 2025, residential land covers 14.84% of the total area with commercial and industrial land covering 3.76% and 0.92%, respectively. Public and semi-public land covers 3.25%, recreational 3.39% and transportation 4.23%. The largest share is of agriculture/vacant/forest and water bodies at 69.7%.

With a view to check the uncontrolled haphazard growth of *Dehradun* and the other areas surrounding it, the state government, in 1963, declared the area falling within municipal limits and the areas falling within 5-mile radius beyond municipal limit as "Regulated Area" under Section 3 of the UP (Regulation of Building Operations) Act, 1958.

The Mussoorie Dehradun Development Authority is in the process of preparing a new GIS-based master plan for the twin cities of Mussoorie and Dehradun that will formally promote mixed land use and compact development of the area. MDDA is also in the process of preparing a development plan of Dehradun - Plan Dehradun 2040.

¹ A very small component of the proposed project would be taken up in Mussoorie which is about 35 kms from Dehradun.

² As per the Comprehensive Mobility Plan of Dehradun-Rishikesh-Haridwar prepared in the year 2019.

Connectivity:

The city is one of the most developed city in the state and is accessible through rail, road and air transportation. National Highway 72 (NH72) covers a significant part of the Dehradun district and NH58 & NH123 also pass through it. The Jolly Grant Airport is about 20-25 kilometers (kms) from the city and its connected with many Indian cities including *New Delhi, Ahmedabad, Hyderabad, Kolkata, Bengaluru*, etc. *Dehradun* is located about 250 kms from *New Delhi* – the National Capital of India.

City Economy:

Being the state capital of *Uttarakhand*, *Dehradun* is one of the largest economic growth centres followed by *Haridwar* and *Nainital*. It is one of the "counter magnets" of the National Capital Region (NCR) being developed as an alternative centre of growth to help ease the migration and population explosion in the *Delhi* Metropolitan Area.

Public Transport Infrastructure in Dehradun:

Roads: *Dehradun* city is surrounded by hills on all sides and main roads of the city emanate from the central focal point – Clock Tower. *Rajpur Road, Haridwar Road, Chakrata Road* and *Saharanpur Road* are the main through fare in the city. A bypass road connecting *Haridwar Road* and *Chakrata Road* is being developed, which functions as an alternative for the goods and other traffic to avoid entering the main city areas.

Public Transport in *Dehradun* is provided by mini buses of 20 seat capacity by private operators. The routes and licenses for operating the buses is given by the Regional Transport Office (RTO) Department, Government of *Uttarakhand*. However, there is no public transport in *Mussoorie*.

Large Auto Rickshaws (locally referred to as *Vikram*) with seating capacity of 7 persons operate on fixed routes within *Dehradun*. As per the Comprehensive Mobility Plan 2018 prepared Dehradun-Rishikesh-Haridwar, 2460 *Vikrams* and auto rickshaws operate in *Dehradun*. Apart from this, regular auto *rickshaws* also ply in the city carrying passengers from main junctions and roadside to their desired destination.

Intermediate Public Transport: Regular auto rickshaws also ply in the city carrying passengers from main junctions and roadside to their desired destination. A number of these auto rickshaws are battery operated e-rickshaws that are less polluting but travel at a slightly lower speed. Given the average travel speeds in the city and the delays at junctions – the lower speed and acceleration characteristics may not make any significant difference to the time taken for the trip.

3. Smart Cities Mission – Dehradun Smart City Limited

The Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI) launched the Smart Cities Mission in 2015 to enable the holistic development of Indian cities. The mission seeks to drive economic growth and improve the quality of life of people by enabling local development and harnessing technology to create smart outcomes for its people. Dehradun is one of 100 Indian cities selected under the MoHUA's Smart Cities Mission. Under the Smart Cities Mission, Dehradun Smart City Limited has identified several projects involving urban transportation such as development of Smart Roads with integrated multi utility ducts, electric buses, interactive bus stops and *Doon* Smart Parking System. Other major projects include,

setting up of *Doon* Integrated Command and Control Centre, Smart Toilets, water supply augmentation, sewerage and Smart Schools. Dehradun City was selected in the third round.

For the purpose of implementing the *Dehradun* Smart City project, *Dehradun* Smart City Limited (DSCL) has been incorporated under the Indian Companies Act 2013. DSCL is governed by a Board of Directors and is managed by a Chairman, a Chief Executive Officer (CEO) and an Additional CEO, who are officers of the Indian Administrative Service (IAS). The Dehradun Municipal Corporation Commissioner is the Chairman of the Board of DSCL. The organizational structure of the DSCL is presented below for reference:

Administrative Set up:

Organisation Chart of Dehradun Smart City Limited



Dehradun City is governed by the *Dehradun* Municipal Corporation (*Nagar Nigam Dehradun*) that is responsible for provisioning of municipal services such as management of municipal waste, streetlights, roads, parks etc. to people. Other urban entities involved in civic services and city governance and management include the *Mussoorie Dehradun* Development Authority (MDDA), *Dehradun* Smart City Limited, *Jal Sansthan*, and *Jal Nigam*, Transportation Department, and Office of the District Collector.

4. Project Rationale

Over the past decades, *Dehradun* has grown manifold after being declared as the capital of *Uttarakhand* state in year 2000. As per the Census estimates, the population falling under the *Dehradun* Municipal Corporation area has witnessed a tremendous growth of 33%; the population grew from 0.42 million in 2001 to 0.57 million in 2011.

Rapid urbanisation, coupled with unprecedented growth in number of registered vehicles and influx of vehicles on city roads from surrounding areas, has contributed to large-scale increase of traffic in the city. This increasing intensity of traffic has resulted in traffic congestion, delays, rise in accidents, pollution levels, etc. which pose a threat to the economic vitality and productive efficiency of the city. The extremely narrow roads in the core city area, inadequate traffic management throughout the city and a general lack of proper road hierarchy requires a sustained effort over a period to reorganise the road sector. Public transport, which is in a

rudimentary state, also requires large scale investment to support economic activity commensurate with the growth potential. This calls for a low-carbon commuter centric mobility plan for the city, with emphasis on providing access to safe and affordable transport systems, reduced air pollution and thereby improve the health of the ecosystem.

To address these critical issues, the DSCL intends to develop a best in class road network in Dehradun and Mussoorie which would facilitate a safe and sustainable environment for residents and tourists. Our work under the DSCL and CFCs covers a very small pocket and remains insufficient to make city wide improvements and thereby become inconsequential.

5. Institutional Structure of Urban Transportation in Dehradun

Municipal Corporations in Uttarakhand can provide public transportation services to the people. However, none of the urban local bodies in Uttarakhand have taken up service delivery of this sector yet. The Transport Department, Government of Uttarakhand operates and maintains buses for inter-city services in the state. Apart from Government owned buses, there are private buses, *vikrams* and auto *rickshaws* plying in the city Through its Regional Transport Offices, the Transport Department regulates vehicle permits and licenses. Construction and maintenance of roads and footpaths of stretches other than National and State Highways in the city is done by the DMC and MDDA; the Public Works Department (PWD) of Government of Uttarakhand constructs and maintains the NHs and SHs in the entire state. DMC and MDDA also provide streetlights and related traffic furniture in the city. The Traffic Police Department is responsible for regulation of traffic and aspects related to road safety in the city.

Dehradun Smart City Limited has taken up an initiative to improve the quality of public transport in *Dehradun* by provisioning of 30 electric buses in *Dehradun* through Gross Cost Contract (GCC) model. DSCL is also introducing 200 e-rickshaws in the city. The Urban Development Department, Government of *Uttarakhand* is currently evaluating setting up a Special Purpose Vehicle (SPV) at the local level for improving the state of public transportation in the cities beginning with *Dehradun*. Several Indian cities like *Ahmedabad*, *Indore*, *Jaipur* have taken the SPV route to provide city level public transportation services.

The role played by various institutions in the urban transportation sector in Dehradun is presented below:

S. No.	Name of the Organisation	Roles and Responsibilities in the Urban Transport Sector in Dehradun
1	State Transport Department, Government of Uttarakhand	<ul style="list-style-type: none"> The Transport Department was constituted in 1945 under the provisions of Section 133 A of the Motor Vehicles' Act 1939. The Transport Department is the regulatory authority for the transport services in the state.
2	Uttarakhand State Transport Corporation	<ul style="list-style-type: none"> UTC is a public sector passenger road transport corporation providing services in the state of Uttarakhand and other adjoining states in North India. With a fleet size of around 1247 buses and operate over 3.87 lakh kilometers catering to the travel needs of over 1.20 lakh

S. No.	Name of the Organisation	Roles and Responsibilities in the Urban Transport Sector in Dehradun
		people every day.
3	Regional Transport Office, Dehradun	<ul style="list-style-type: none"> • The RTO issues driving licenses sells personalized registrations and maintains the collection of excise duty such as road tax. Insurance check and pollution test of vehicles are also conducted by the Regional Transport Office.
4	MDDA	<ul style="list-style-type: none"> • MDDA was established in 1984 with objective of planning and development of the city. • Vested with powers to acquire land for the implementation of roads and is responsible for the enforcement of plans and development schemes. • Planning and conception of Bus and Mass transit terminals. e.g., <i>Dehradun</i> Inter State Bus Terminal (ISBT) is the first ISBT in the country to be operated on BOT basis. The ISBT is run through a joint venture entered between MDDA and the Ramky Group. • Planning of public amenities, including street lighting and parking lots.
5	Public Works Department of the state	<ul style="list-style-type: none"> • PWD is responsible for construction, maintenance and planning of roads (only NHs and SHs), bridges and govt. buildings.
6.	Dehradun Municipal Corporation (Nagar Nigam Dehradun)	<ul style="list-style-type: none"> • Planning and implementation of ward level roads and footpaths. • Streetlight department and the public works unit under the DMC are responsible for laying streetlight and street furniture in the streets which fall under municipal limits. • Construction of bus shelters. • DMC along with Uttarakhand Renewable Energy Development Agency (UREDA) is responsible for the implementation of solar roof tops on bus stands.
6	Dehradun Smart City Limited	<ul style="list-style-type: none"> • Planning and implementation of the routes for public transport with 30 electric buses, interactive bus stops, Wi-Fi and touch-screen kiosks; (Convg. FAME scheme) and non-motorised transport (bicycles and e-rickshaws) • Planning and implementation of the Smart Road project in the ABD area. • Planning and implementation of pedestrianised streets

S. No.	Name of the Organisation	Roles and Responsibilities in the Urban Transport Sector in Dehradun
		<i>(Paltan Bazaar /Market)</i>
7.	Uttarakhand Urban Sector Development Agency (UUSDA)	<ul style="list-style-type: none"> • The UUSDA has been established as a society registered under the Societies Registration Act of India in the name of Uttarakhand Urban Sector Development Agency (UUSDA) as an independent entity but under the overall regulatory control of the Urban Development Department (UDD), Government of Uttarakhand. • Interventions will aim at improving traffic conditions, reducing journey times, and improving safety of all users and particularly the most vulnerable (pedestrians, cyclists, and motorcyclists) through a combination of investments. These will generally focus on major roads and include <ul style="list-style-type: none"> - road widening and strengthening to create greater road capacity, thus relieving congestion and easing traffic flows; - car parking restrictions and provision of multi-storey car parks, and bus and truck terminals, where possible, through PSP to improve passenger convenience and increase road space - providing of pedestrian subways and footpaths to improve pedestrian movement and safety; - improving traffic management improvement; and - street lighting for improved traffic and pedestrian safety and security.

6. Urban Development and Urban Transportation: Current scenario and Issues

Urban service delivery in Dehradun is facing increasing stress due to high levels of urbanisation and governance gaps in the service delivery architecture. As the state capital, Dehradun caters to a wide range of needs, including institutional, educational and tourism. The provision of urban infrastructure – both quantity and quality in the city, has not kept pace with the rapid rate of urbanisation witnessed by it over the past two decades. During the period 2001 to 2011 Dehradun (district) recorded a population density growth of about 33%.³ The stress on the existing infrastructure due to rapid urbanisation along with peak level fluctuations negatively impacts liveability of Dehradun. As stated earlier, Dehradun has a base population of about 0.57 million as per Census 2011 but the total number of tourists that visited Dehradun in 2018 is about 2.5 million. Similarly, Mussoorie has a base population of only 38000 people but the annual tourist footfall in 2018 was 2.8 million. Dehradun has been witnessing an annual

³ For details, please refer 14th SFC Report Uttarakhand (2018).

vehicular growth of about 10% which along with poor city planning and road designs, limited right of way and poorly regulated traffic makes commuting difficult for people - especially students, women & elderly and businesses. Commuting becomes more difficult during the monsoon season due to limited and poor quality of storm water drainage systems and unplanned development that restricts the run-off of rainfall. Some of the major issues pertaining to urban development in general and urban transportation, are presented below for quick reference:

Urban Development Issues

1. Haphazard growth along major routes such as Rajpur Road, Chakrata Road, Saharanpur Road. This has led to unplanned development spawning densely populated areas. The neighborhoods in these areas are built with inadequate infrastructure. All the primary radial transit routes that emanate from the core of the city particularly Rajpur Road and Haridwar Road are rendered inefficient due to ribbon development. This in turn creates congestion, poor utilisation of the right-of-way, increased travel times and air pollution (CMP 2019).
2. Due to urban sprawl, fringe areas are expecting massive growth but currently there is no planned development taking place. The agricultural land and water resources in the fringe areas are being displaced with the upcoming residential and commercial areas.
3. There is a lack of affordable housing made available for the economically weaker sections. This has resulted in surging growth of slums and shanty towns in the cities such as the slums along the Bindal River, Kanawali, Lakhipur and Premnagar
4. It is observed there is a slow and weak implementation of master plan which has derailed city growth.
5. Lack of developed land for affordable housing: Discussions with local people suggests that there is a shortage of affordable housing in Dehradun (CMP2013). Due to a shortage of affordable housing, slum areas are growing in the city and surrounding areas. The poor cannot have developed sites for house construction at an affordable price because of the high cost of land and non-expansion of infrastructure in a planned way which has resulted in squatter settlements on urban fringe areas
6. Urban flooding causes significant economic loss, damage of urban infrastructure and local environment in Dehradun. Dehradun has many large and small drains, but it is mainly drained by two rivers, namely Bindal and Rispana (both are seasonal rivers originating from Dehradun). Urban flooding is a multi-pronged issue in Dehradun which is caused due to (a) general trend of increase in quantum of annual rainfall (b) increase in runoff volume (due to land-use change), (c) encroachment of river-beds and (d) inadequate carrying capacity of storm water drains coupled with poor infrastructure quality and results in damaging of roads and other infrastructure services like electricity, water supply, sewerage disposal etc. and disrupts traffic. Maintenance of storm water drains is complex in hilly terrain compared to plains

Urban Transport Issues

1. Poor quality of urban roads and footpaths

Dehradun has 438 kms of road network. Including minor streets the network strength is estimated to be approximately 700 kms. 67.4% of the 438 kms road network do not have

footpaths. Improper traffic lights and lack of signs has made navigation and traffic management in the city very poor. When coupled with poor road conditions, this increases the chances for severe road incidents. It also discourages residents especially school students from walking and cycling from home to schools and neighborhoods. As the national school capital, Dehradun has one of the highest densities of school students in the city.

2. Unreliable and unsafe public transportation system

Dehradun's public transport infrastructure is in a rudimentary state. As per surveys undertaken in preparation for the Comprehensive Mobility Plan for Dehradun in 2018, the share of public transport trips in Dehradun is 18% - which is very low compared to about 40% in many cities with organized public transport system. As per predictions of the same study the share of public transport trips is expected to go down to 14% in the next 20 years, if no improvements are brought in the public transport systems. Mini-buses do not have defined stoppages, fixed itineraries, climate control and most of the vehicles are poorly maintained from a cleanliness as well as a comfort perspective. Today *vikrams* also operates in the same routes as mini-buses and effectively compete, especially for short distance trips around the city centre. The vehicles are overcrowded most of the times and pose a safety hazard for commuters.



3. Huge dependency on private transportation

Dehradun accounts for about 30% of total vehicles registered in the state with the annual vehicular growth reaching an unprecedented rate of 10% over the past decade. About 70,000 new vehicles are registered with the Dehradun RTO every year. The number of vehicles plying in the city is much higher during period of tourist influx from surrounding areas.

4. Poor traffic management and slow rate of traffic

Average traffic speed is 20-30 km/hour in Dehradun. The extremely narrow roads in the core city area, inadequate traffic management throughout the city and a general lack of proper road hierarchy are key reasons for prolonged congestion on the streets. Erratic change of streets widths adds to slow rate of traffic.

5. Increase in overall pollution levels in the city

Increased volume of traffic has led to excess vehicular emissions contaminating the air with harmful components such as PM 2.5/10, carbon monoxide and sulphur. A recent study

conducted by a local NGO in March 2018 reported only 15% of the total readings taken for PM 2.5 within permissible standard. ⁴

7. Project Location and Components

The proposed projects are in Dehradun and Mussoorie. Dehradun and Mussoorie are known as twin cities due to their proximity (35 kms) and close institutional structures. The physical planning of both Dehradun and Mussoorie is undertaken by MDDA.

Component A: Upgradation of 11 Road Stretches as per Best-in-Class Standards

Component B: Provision of 100 Electric Public Transport Buses through Gross Cost Contract basis

Of the 11 road stretches identified under Component A, 10 roads are located within Dehradun and 1 road construction would be taken up in Mussoorie. The provision of 100 electric public transport bus is entirely for Dehradun city.

Smart City Transportation projects

DSCL in its smart city plan had incorporated some smart mobility and transport projects which would address the issues mentioned above. The main programmes in the transport sector are Smart Roads, introduction of 30 electric buses and a public bicycle sharing program. The transport component of the programme has focused on environment friendly movement of people for sustaining the mobility within the city and reducing the negative effects of pollution. The following are the transport projects taken up under the Smart City Programme:

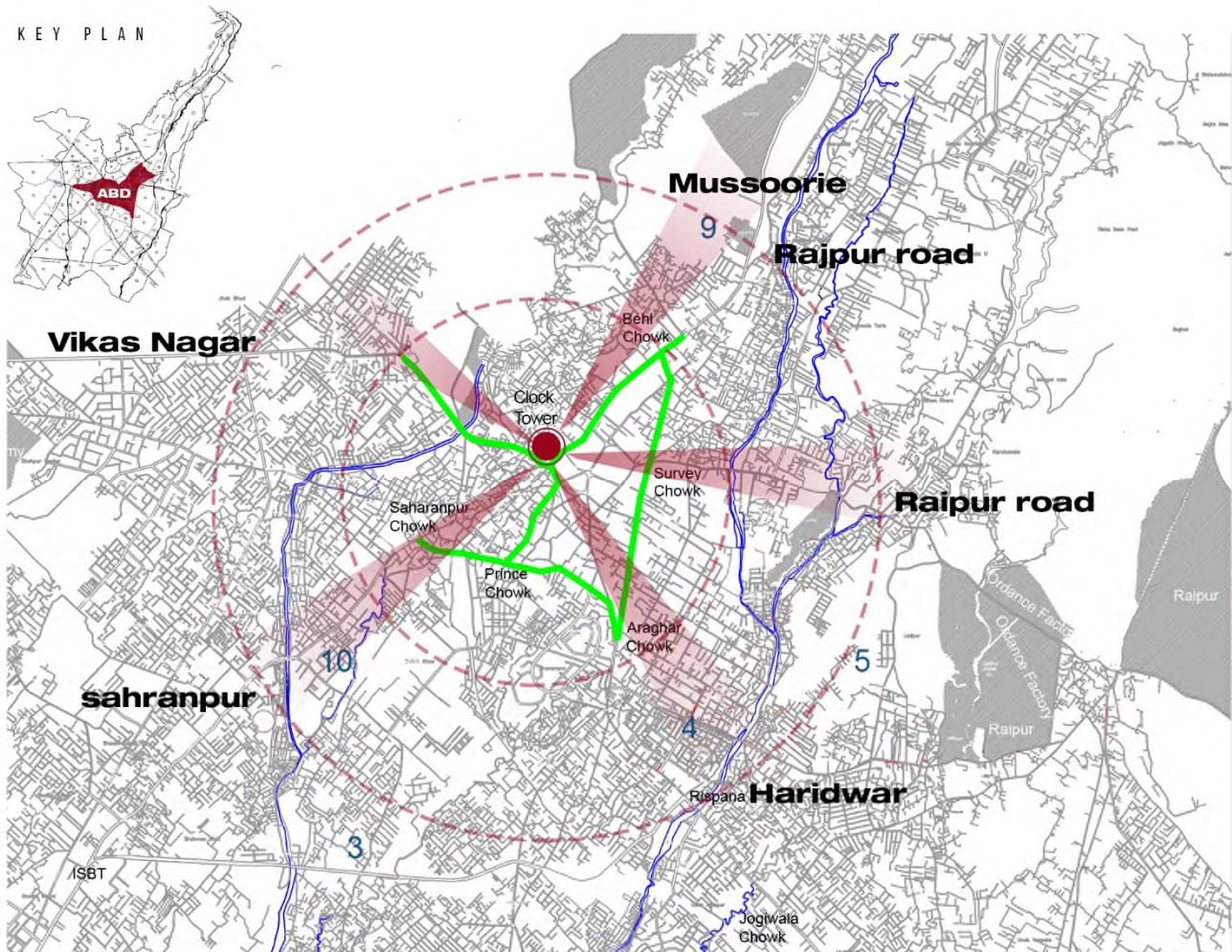
1) Smart Roads project

2) Electric Buses project

⁴ For details, please refer to 'Understanding the levels of Air Pollution in Dehradun' prepared by Gati Foundation (March, 2018)

1. Smart Roads:

One of the key features of the Smart Road Project is to encourage walking by provision of proper foot paths of uniform width and remove any obstacles on the way like Transformers, Data Boxes etc. At crossings a table top is provided to allow pedestrians to move freely without the necessity to go up and down at road crossings. This also allows wheel chair movement



on the foot paths. Visual feel for the user is also improved by bringing the clutter of power lines and data lines underground. As all services are planned and construction undertaken in one go – there will be no need to dig the roads at least for next decade. About 10 km of city road in the central area is proposed to be improved under the program.

Features of the Smart Roads

A Smart Road is conceived as a combination of appropriate road infrastructure and supporting IT components that assists all road users including vehicle users, pedestrians, cyclists and differently abled persons to move comfortably. In the case of Dehradun following features are proposed to be incorporated in smart roads.

Uniform Cross Section of Carriageway –

Carriageway is maintained in one uniform width so that vehicles move in organized manner without unnecessary merging/diversion resulting from varying widths.



Dedicated pedestrian pathway –

Footpaths of uniform widths with minimal interruptions to allow safe passage of pedestrians. Access to properties would be provided through table tops to allow pedestrians to walk at the same level, whereas vehicles will have to slow down while entering and exiting properties – increasing the safety of both pedestrians and motorists.



All services through underground ducts –

This avoids hurdles for pedestrians in the form of poles, transformers, telephone junction boxes etc. and provides better visual experience for the road users. This also avoids digging of the road for maintenance of the services and discourages power theft from overhead poles.

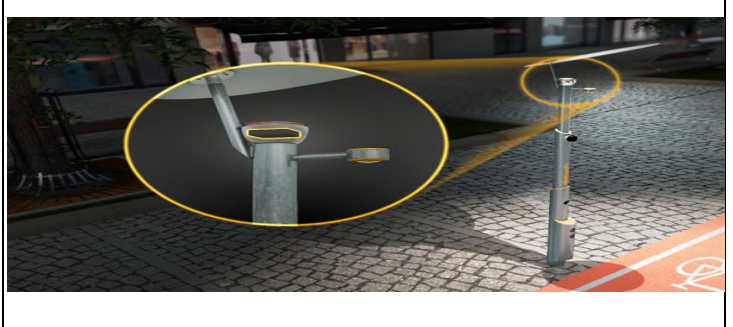


Pedestrian crossings in table top crossings –

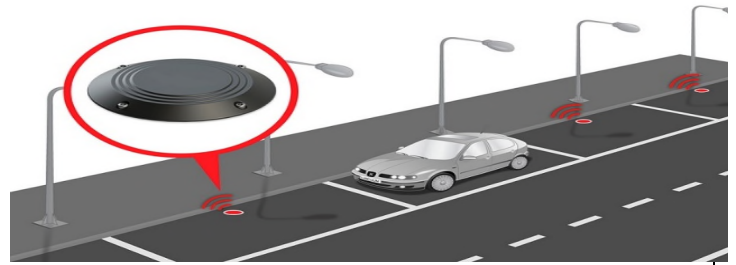
Pedestrians can walk at the same level without the need to walk down to the road surface.



Smart LED lighting with sensors – Lower consumption of electricity as lights “switch on” based on motion sensors



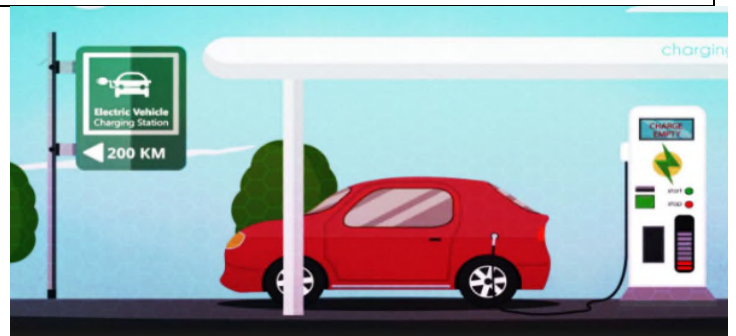
Designated parking lots with sensors – App based parking system that would provide information on parking availability through variable sign boards.



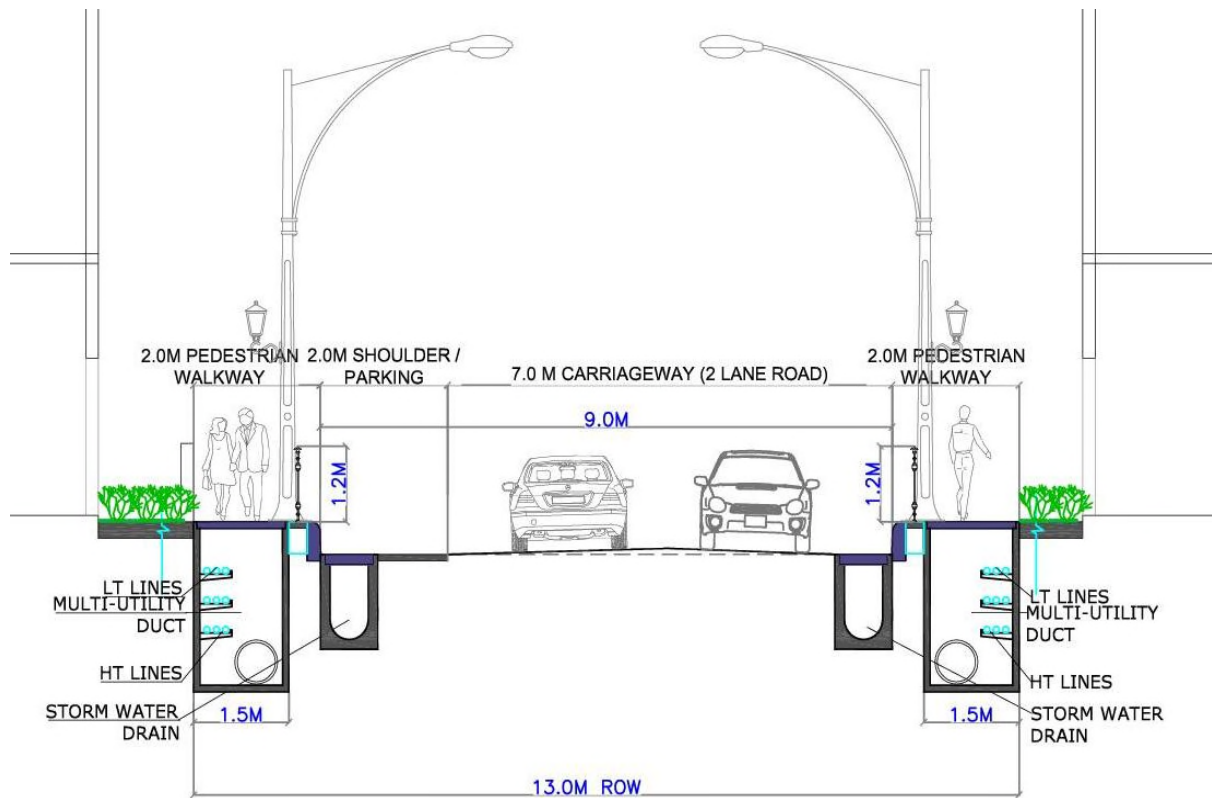
Smart bus stops – Real time information on timing and location of next bus, along with Wi-Fi hot spots.



Electric vehicle charging stations



A sample cross section of the road typically will have the following elements suited to the RoW available in the identified stretch.



- Carriageway** – As per IRC guidelines the width of a standard carriageway in India is 3.5 m. All carriageway is maintained at 3.5 m per lane to a minimum. In some of the urban roads in other cities in India – apart from a 3.5 m wide lane for cars and trucks an additional width of 1.5 m or 2.0 m lane is provided – which is mainly used by two wheelers. We have provided a 2.0 m lane in a few road stretches – which adds up to a 5.5 m wide one-way carriageway. This provides for a separate pathway for two wheelers in normal course. In case of a breakdown of a vehicle or an accident this extra width would come handy to provide an alternate path for through traffic to pass.
- Median** – Medians increase convenience and safety in roads by providing a separation between traffic in the opposite directions. Code recommends a 5.5m wide median to enhance safety and avoid lights from vehicles in the opposite direction to interfering with the vision of the driver. Roads that are covered in this report do not have the Right of Way (RoW) to provide a full 5.5m median – which is true with most roads in urban sections of cities. We have provided median of 0.6 m where width is available.
- Pedestrian Foot Path & Crossings** – A separate foot path with a height difference from the carriageway to ensure vehicles do not use the space is necessary to ensure safety of the pedestrians. IRC-103 2012 recommends a foot path width of 1.8m minimum for comfortable use by pedestrians. If such width is not available codes recommend provision of 1.8m wide spaces with 2.5m length at reasonable intervals to allow pedestrians or wheelchairs to pass. We have provided 2.0 m wide foot paths where width permits and 1.5m width in stretches with shorter RoW. Foot paths in many urban roads do not provide a continuous path for pedestrians to walk. Trees, electric poles, transformers and other equipment used for provision of services to developments on both sides are placed on the foot path obstructing the walkway.

Access to many of the properties on either side cross the foot path at a different level than the pedestrian path – forcing the pedestrians to climb up and down very frequently. These impediments make the pedestrian use the main carriageway for convenience leading to safety hazards on the road. As part of the project effort is made to prioritize movement of pedestrians over vehicles. Access to properties and road crossings are proposed at the same level as the foot path. Provisions for services such as power, data and other services are planned to be provided underground through multi utility ducts.

- **Lighting** –In two lane roads high mast lights are provided on either sides of the road on a staggered basis. In roads where divider is provided lights are provided in the median at 30 m distance. Separate lights are provided to illuminate the foot path. These lights can be designed as “motion activated” to save energy.
- **Drains** – Drains are generally provided under the foot path in urban roads. In this project all services are proposed to be provided under the foot path in a multi utility duct. As RoW available in the city are low – it is proposed to provide drains under the carriageway on both sides. The drains in this case must be designed as load bearing structures. Sizing and design of the drains are covered in another report – and are not detailed out in this report. The dimensions and sections of the drains shown in cross-section drawings in this report are indicative.
- **Multi Utility Ducts**–Provision of services in a separate multi utility duct underground is proposed. Power, Sewerage, Water Supply, data are all to be provided in the duct in an ideal situation. Design of such ducts provide a few challenges to consider the uniqueness of each of these services and codal provisions such as the recommendation to avoid water supply and sewerage lines being too near to each other to avoid mixing of sewerage with drinking water. Sizing and design of multi utility ducts are covered in another report – and are not detailed out in this report. The dimensions and sections of the drains shown in cross-section drawings in this report are indicative.

2. Electric Buses Project:

Air-conditioned electric buses that would ply based on schedule would provide an attractive alternative to the citizens who at present use the cars and two wheelers. Once the project is fully functional – it would reduce traffic on the roads, leading to less pollution and better safety. As the buses run on power, they not create any pollution. Under this programme, the plan is to operate 30 mini buses (9 m long with about 30 seats) – which would be a pilot programme that could be extended further once the facility becomes popular in the urban landscape. The routes and proposed fares for the buses are provided in Table 1.

Table 1: Bus Route Information

Sr. No	Route	Distance (Km)	Estimated time for one-way Trip (Min.)	Frequency (Services/ Hour)	Number of Buses Needed
1	Airport – ISBT – Railway Station - Clock Tower	38	110	2	8

2(A)	ISBT – Railway Station – Clock Tower – Jakhan	14	65	2	5
2(B)	ISBT – Railway Station – Clock Tower –IT Park	16.5	70	2	5
3	Sudhowala – Premnagar – Clock Tower - Raipur	22	80	4	10
	Spare Buses				2
	Total				30

It is suggested to have a minimum fare of Rs.10 for first 5 km and extra Rs. 2 for every additional km. This effectively translates to a fare of Rs. 2 per km – slabs going up by Rs. 5 for every 2.5 km. These are comparable with the present fares of mini buses being operated in Dehradun. For the Airport bus, the fare is proposed to be a fixed Rs. 200 per trip considering the premium segment of passengers the trip is catering to. This is much lower than Rs.1000 (approximately) being charged by a taxi at present for airport drop/pick up.

Department of Heavy Industry (DHI), Government of India had announced a programme “Faster Adaptation and Manufacturing of Electric Vehicles” (FAME) in the country to encourage the usage of electric vehicles in India and reduce pollution. The programme covers buses and private vehicles. Under the programme, a subsidy of approximately 40% of capital cost is given for buses if buses are provided through Gross Cost Contract (GCC) model. NITI Aayog had come up with a Model Concession Agreement to be entered between the state entity and the operator. Effectively the scheme envisages introduction of buses through a wet lease scheme where buses are provided by an operator for a fixed period (10 years in the case of Dehradun) who gets paid based on the distance run by the buses. Fare box collection is maintained by the authority – thus protecting the operator from any revenue risk. DHI had allotted subsidy for 30 buses to DSCL for operating the buses as a city service in Dehradun.

At present the scheme is under contracting and the buses are expected to start operation by April 2020.

Project Component A: Upgradation of 11 Road Stretches as per Best-in-Class Standards

Road programme under the Smart City Project is limited to the identified area where the Smart City Programme is focussed and would help in resolving traffic congestion in the inner ring of the core area. To enable the successful development in the nodes, it is important to keep the regional dialogue in mind, ensuring all roads emanating as radials from the core of the city are converted to smart roads which then would provide a uniform and seamless experience to the residents as well as visitors to the city.

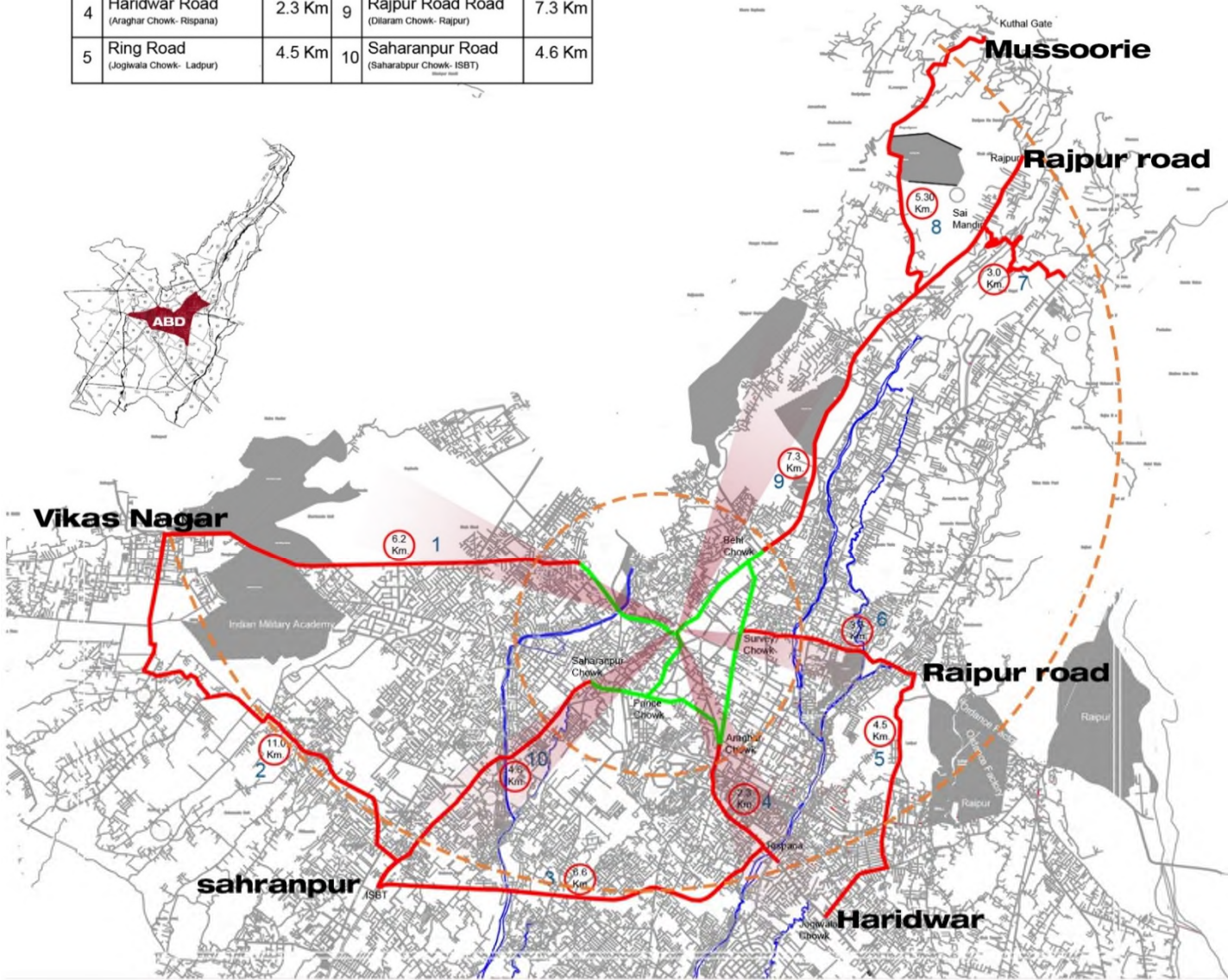
There are 11 stretches of roads in total with 10 identified in Dehradun city and one road stretch in Mussoorie. The list of the roads is presented below:

Sl. No.	Name of the Road	Location	Length (In kilometer)
1	Chakrata Road (Kishan Nagar Chowk- Prem Nagar)	Dehradun	6.20
2	Shimla Bypass- Prem Nagar	Dehradun	11.00
3	Haridwar Bypass (ISBT- Rispana)	Dehradun	6.60

Sl. No.	Name of the Road	Location	Length (In kilometer)
4	Haridwar Road (Araghar - Rispana)	Dehradun	2.30
5	Ring Road (Jogiwala Chowk-Ladpur)	Dehradun	4.50
6	Raipur Road (Survey Chowk-Ladpur)	Dehradun	3.30
7	Kirshali Chowk- Sai Mandir	Dehradun	3.00
8	Mussoorie Road (Mussoorie Divergence- Kuthal Gate)	Dehradun	5.30
9	Rajpur Road (Dilaram Chowk-Rajpur)	Dehradun	7.3
10	Saharanpur Road (Saharanpur Chowk- ISBT)	Dehradun	4.6
11	Mall road Mussoorie	Mussoorie	7.00
12	Total length		61.10

- Already Proposed Under Smart Road
- Road Carried for Smart Road

S.no	Road Name	Length	S.no	Road Name	Length
1	Chakrata Road (Kishannagar Chowk-Prem Nagar)	6.2 Km	6	Raipur Road (Survey Chowk- Ladpur)	3.3 Km
2	Shimla Bypass- Premnagar	11 Km	7	Kirshali Chowk- Sai Mandir	3.0 Km
3	Haridwar Bypass (ISBT- Rspana)	6.6 Km	8	Mussorie Road (Mussorie Divergence - kuthal gate)	5.3 Km
4	Haridwar Road (Araghar Chowk- Rspana)	2.3 Km	9	Rajpur Road Road (Ditaram Chowk- Raipur)	7.3 Km
5	Ring Road (Jogiwala Chowk- Ladpur)	4.5 Km	10	Saharanpur Road (Saharapur Chowk- ISBT)	4.6 Km



Project Component B: Provision of 100 Electric Public Transport Buses through Gross Cost Contract basis

As per research studies conducted by the World Bank, the number of buses needed to serve a city varies from 0.5 to 1.2 buses per 1000 population – the variation is due to different public transport share in different cities. Dehradun has a low public transport share of about 17%. Taking 0.5 buses per 1000 population Dehradun would need more than 250 buses to serve the whole city.

Introduction of first 30 buses can be viewed only as a pilot project, given the need of 250 buses for provision of good public transport connectivity. Some of the major areas in Dehradun are not served by the project. Public transport connectivity to following areas need to be addressed in the immediate future:

- Rispana Bridge and Secretariat
- Garhi Cantonment
- Nawada
- Sahastradhara
- Areas on the side of Ring Road
- Seemadwar
- Nalapaani
- Dalanwala

These are other areas of the city are witnessing densification as more houses get built and some of the older houses get converted to multi storied houses/flats. Provision of public transport connectivity to these areas is a must. Under the present programme it is proposed to provide an additional 100 buses through this program. The routes, frequency, patronage and provision of other allied infrastructure will need to be studied in detail. However, a set of 11 routes are identified based on the understanding of the city structure and its travel needs.

New Bus Routes:

1. ISBT –Prem Nagar (Via Tea Garden)
2. Doon University- Prince Chowk- Kishan Nagar Chowk– Garhi Cantt.
3. Nawada – Rispana Bridge- Aragharchowk- Dilaram Chowk- DL Road
4. Premnagar- Clock Tower- Sahastradhara.
5. ISBT- Rispana Bridge-Ring Road- Raipur.
6. Parade Ground- Rispana Bridge- Doiwala.
7. Parade Ground- Saharanpur Chowk-ISBT- Daat Kali Mandir
8. Parade Ground – Dilaram Chowk- Anarwala – Garhi Cantt.
9. Seemadwar- Prince Chowk- Clock Tower- Nalapani.
10. Baliwala- Raipur- Nathanpur- Dharampur- EC road- Parade Groung.
11. Baliwala- Miyawlal- Rispana Bridge - ISBT

These buses can be procured through Gross Cost Contract (GCC) model. If we follow same fare structure as in Smart City buses, concession period of 10 years and other parameters – the authority may have to bear about Rs.1,333 million for this project over a period of 10 years – if a subsidy similar to FAME II is made available under any scheme. Without a subsidy the effective capital cost will go up – which will translate to about an increase in Rs.500 million – assuming capital cost of Rs.12.5 million for a 9 m bus. At this stage it may be prudent to assume an expense of about Rs.1833 million for the authority to operate the buses over a 10-year period.

Impact on Traffic

The suggested improvement to public transport aims to achieve two objectives:

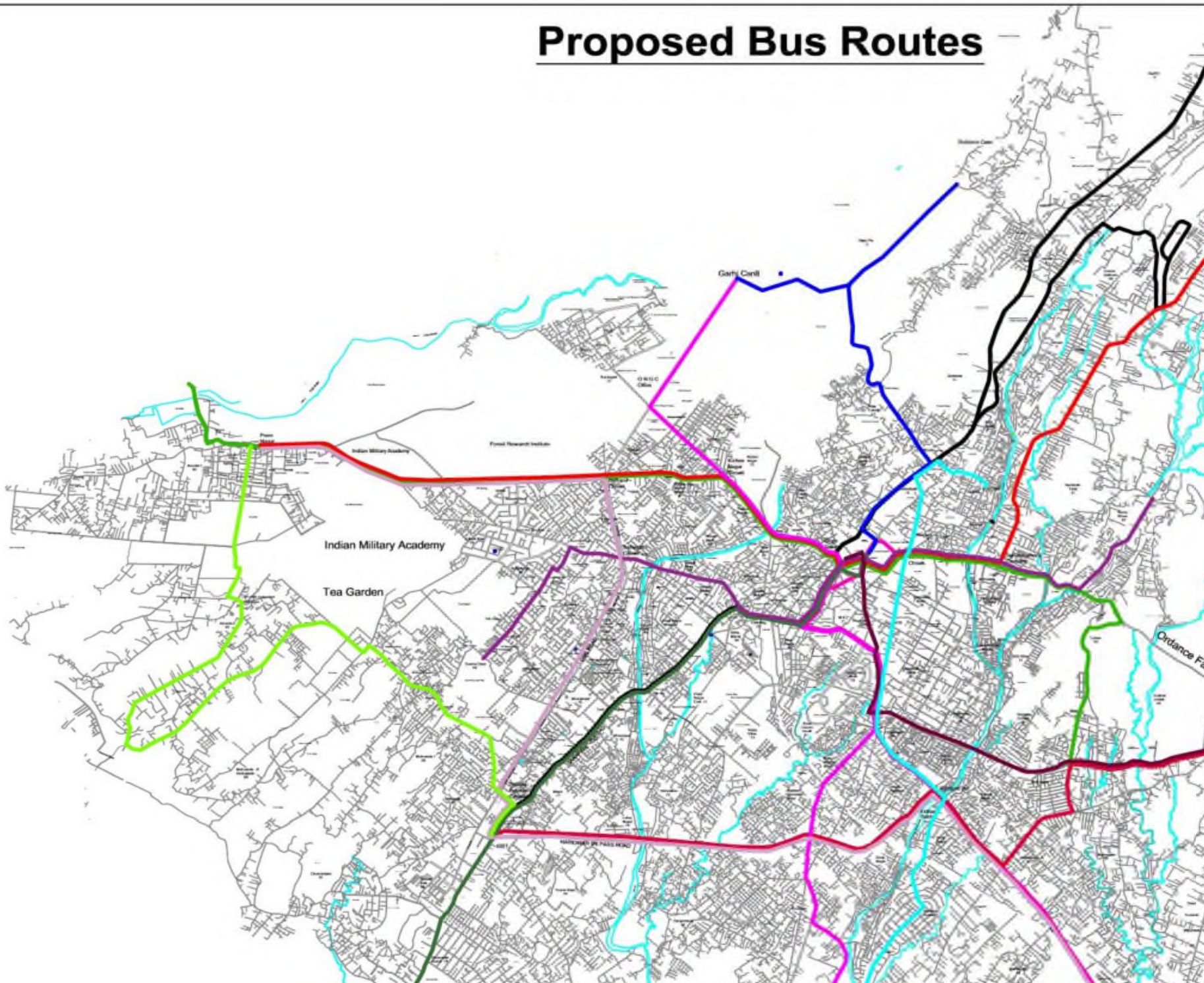
- Provision of a good public transport system in Dehradun with climate-controlled buses, proper schedules, real time tracking of buses and enhanced safety of passengers
- Attract private vehicle trips to public transport, thus reducing traffic on the roads. A shift from two-wheeler and cars to buses would help ease out traffic on the roads and have an impact on parking demand in the city.
- Detailed modelling exercise may need to be carried out to estimate impact. Such an exercise will need to be carried out at the feasibility /DPR stage to estimate the benefits in terms to traffic reduction in various corridors and in the overall city

Impact on Pollution and Other Intangible Benefits

Shift from private vehicles to electricity-based public transport will have a direct impact on air pollution. Such impact can be estimated through a detailed study of present-day travel patterns and through a user opinion survey on willingness to shift to the bus. This will need to be carried out at the Feasibility /DPR stage to estimate the benefits in terms of reduction in air pollution. Other intangible benefits would include:

- Reduction in noise pollution due to lower number of vehicles on the road
- Better health of citizens due to lower air and noise pollution
- Less stress and health improvement for the citizens as they spend less time driving a motor vehicle – which is a stressful activity in congested city roads
- Increased tourism revenues - city becomes more attractive for tourists – due to lower travel time and option to use cheaper modes of transport.

Proposed Bus Routes



8. Project Objectives, Outputs and Outcomes

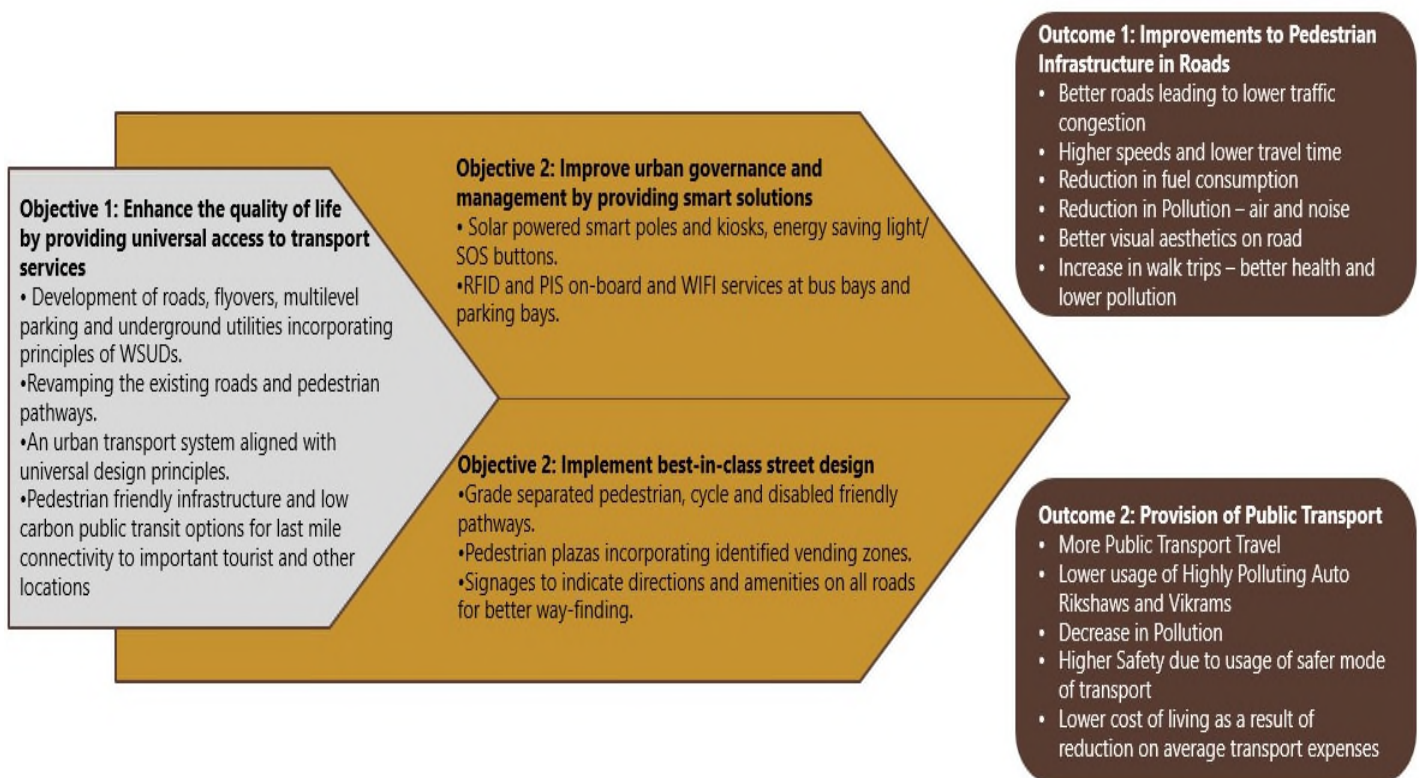
Project Objectives and Outcomes

The project aims to majorly enhance the road network in the city of Dehradun and improve the current traffic conditions for seamless movement by applying smart solutions such as Radio Frequency Identification (RFID) and Passenger Information System (PIS) services. Apart from providing access to safe and affordable transport systems, the city intends to encourage Non-Motorised Transport (NMT) and pedestrian friendly pathways. The broad objectives and outcomes of the project are provided in figure below:

Project Objectives

A. Enhance the quality of life by providing universal access to transport services

- Development of roads, flyovers, multilevel parking and underground utilities incorporating principles of WSUDs.
- Revamping the existing roads and pedestrian pathways.
- An urban transport system aligned with universal design principles.
- Pedestrian friendly infrastructure and low carbon public transit options for last mile connectivity to important tourist and other locations.



b. Improve the urban governance and management by providing intelligent solutions

- Solar powered smart poles and kiosks, energy saving light/SOS buttons.
- RFID and PIS on-board and WIFI services at bus bays and parking bays.

c. Implement best-in-class street design

- Grade separated pedestrian, cycle and disabled friendly pathways.
- Pedestrian plazas incorporating identified vending zones.
- Signages to indicate directions and amenities on all roads for better way-finding.

The project will result in greater economic accessibility and increased employment. It will have a positive impact on the overall environment and help re-brand Dehradun.

Project Outcomes

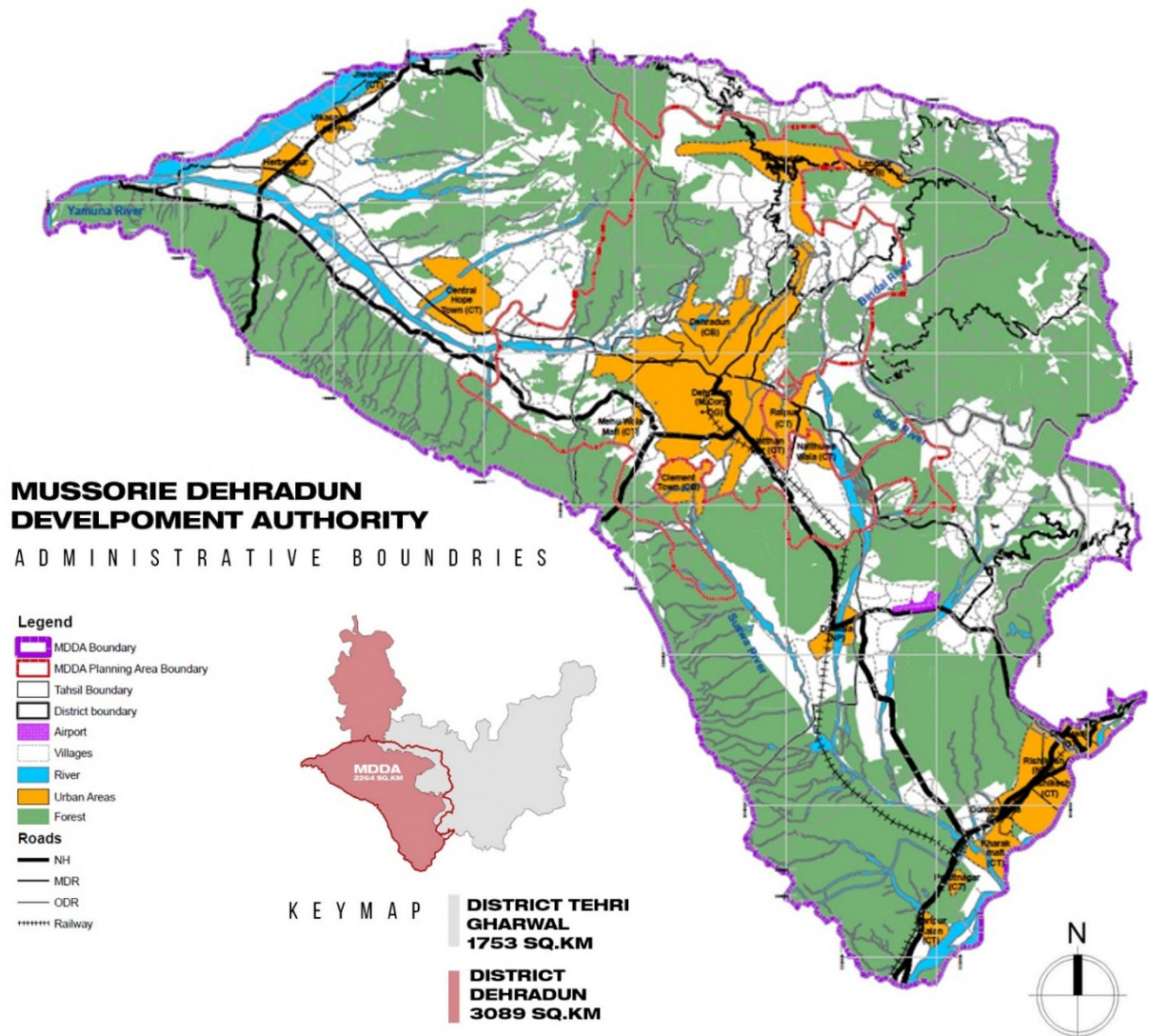
Project would lead to the following outcomes:

- **Improvements to Pedestrian Infrastructure in Roads and Introduction of Smart Features**
 - Better roads in the city of Dehradun leading to lower traffic congestion.
 - Higher speeds and lower travel time – reduction in fuel consumption.
 - Reduction in pollution – air and noise.
 - Better visual feel on roads due to shifting of power and data cables underground.
 - Increase in walk trips – better health and lower pollution.
- **Provision of Public Transport**
 - More public transport travel leading to lower usage of private vehicles – cars and two wheelers.
 - Lower usage of highly polluting auto rikshaws and Vikrams.
 - Decrease in pollution.
 - Higher safety due to usage of safer mode of transport.
 - Lower cost of living for citizens as average transport expenses reduce.

9. Summary of Project Analysis – Land-use, Demographic and Passenger and Vehicular Traffic and Utility Infrastructure

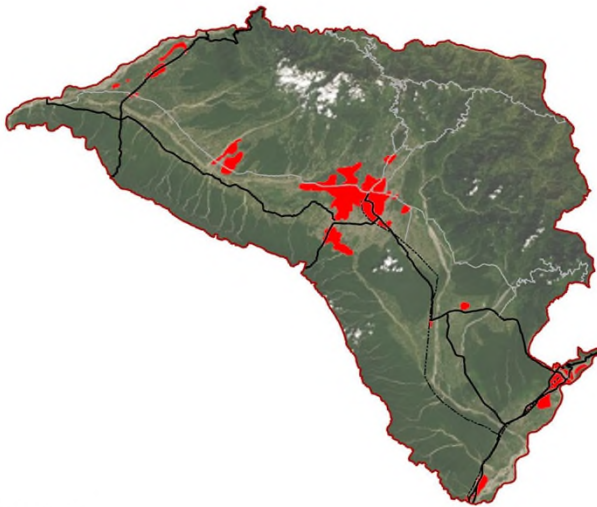
Review of the existing masterplans and understanding the growth pattern:

In October 1984, the state government notified Mussoorie-Dehradun Development Area” under the provision of UP Urban Planning and Development Act, 1973 including 185 revenue villages and surrounding Mussoorie and Dehradun Urban areas. Thus Mussoorie – Dehradun Development Authority (MDDA) was constituted for the planning and development of the aforesaid development areas.

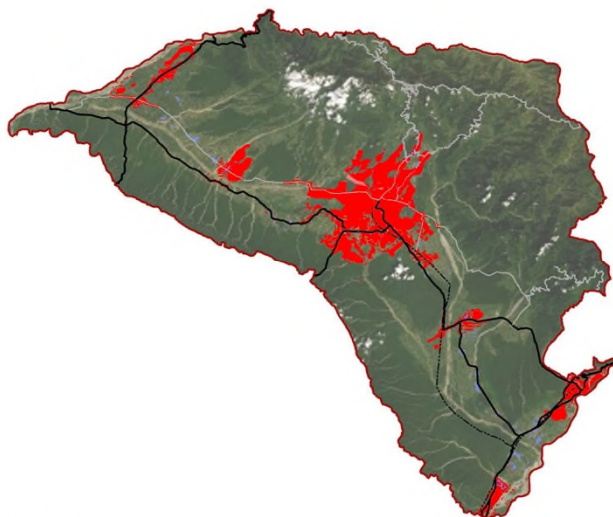


Dehradun has grown manifold after being declared as capital of Uttarakhand in 2000. The municipal corporation area had population of 0.42 million as per Census 2001 and has grown to 0.57 million in 2011.

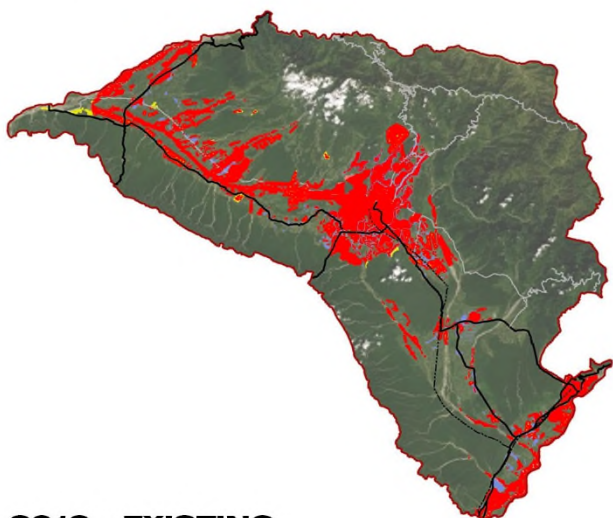
Considerable growth of the population and registered vehicles coupled with a marginal increase in the transport infrastructure apart from bus and truck terminals has been observed since inception of a new capital. Due to rapid ribbon development, along various corridors and concentration of activities in the core area, traffic has increased tremendously and become critical. This is increased due to unprecedented growth in number of registered vehicles and influx of vehicles on city roads from surrounding areas.



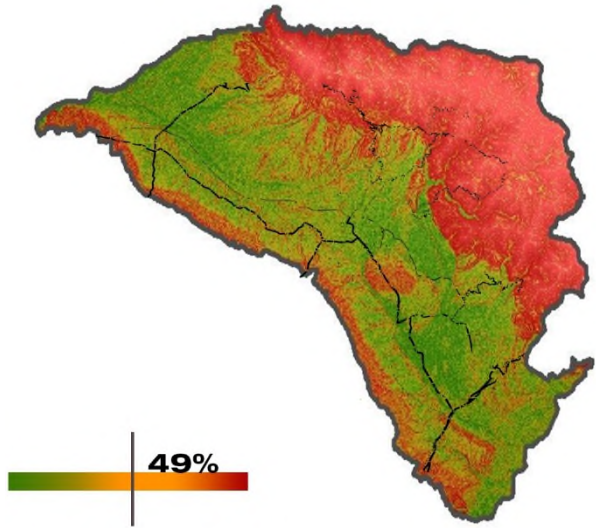
2001



2011



2019 - EXISTING



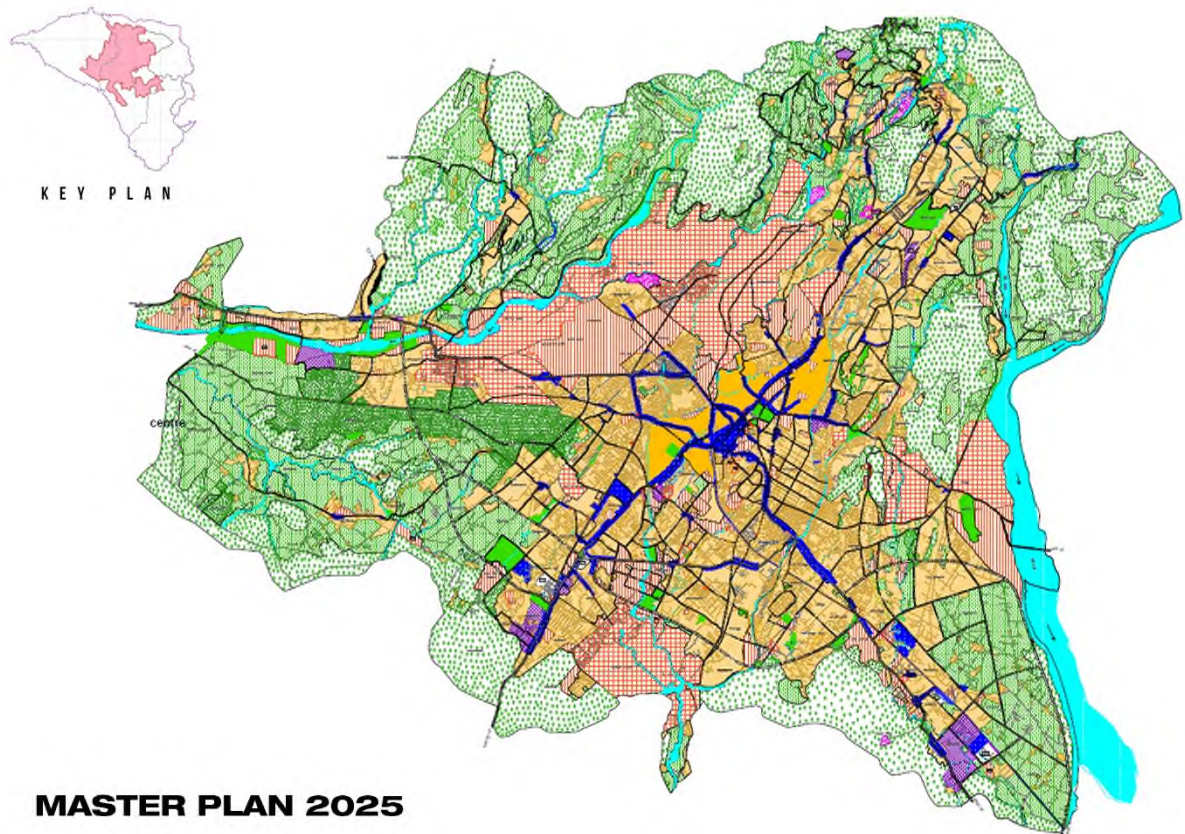
TERRAIN ANALYSIS

A terrain analysis also highlights the physiographical constraints in terms of growth in the urban centres. According to the URDPFI guidelines, areas having slope of above 45 degree are considered unadvisable for development.

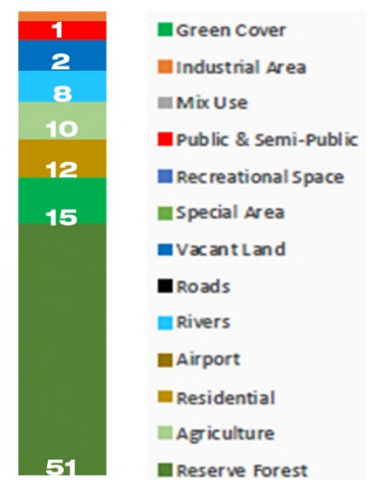
49% of the area in the MDDA region is under the undevelopable zone, hence making the development of areas restricted to the specific nodes or growth centres like Vikas Nagar, Clement Town and Doiwala. These towns are centralized hubs outside of the main city and work opportunities. They thrive on economic generation through regional linkages hence making transport system a significant aspect.

Master Plan 2025

The Master Plan for the city was prepared for 2025 with a vision to govern the development of the city based on an existing land use survey carried in 2003 -2004. The area reserved for various uses was around 35,867 hectares (CMP, 2013). This includes the area for the city development as well as area earmarked outside the municipal limits. This whole is termed as the 'planning area'. The proposed land use in planning area is given in following table.



Existing		
Land Use	Area(in sq.km)	Percentage
Green Cover	340.37	15.03
Industrial Area	3.60	0.16
Mix Use	9.97	0.44
Public & Semi-Public	22.23	0.98
Recreational Space	2.24	0.10
Special Area	5.33	0.24
Vacant Land	44.20	1.95
Roads	12.02	0.53
Rivers	174.58	7.71
Airport	1.69	0.07
Residential	264.63	11.69
Agriculture	221.67	9.79
Reserve Forest	1155.66	51.03
Railway Station	0.09	0.00
Commercial	6.25	0.28
Total	2264.54	100.00



In order to improve the efficiency of implementation of the land use under Dehradun Master Plan, there is a need to develop these small nodes with complete transport infrastructure. The transport infrastructure in the smaller nodes should substantiate the land use development and complement the proposed and upcoming development activities in these areas.

The development of a multi nodal transit concept will allow the city to grow in all the directions. Ghanta Ghar shall continue to be the city centre. However, the administrative centres and developments coming up within the Core Business District (CBD) needs to be shifted to the other areas of the city. Any further development near Clock Tower should be carried out in a controlled manner to develop the small nodes in a uniform manner around the city without congesting the CBD.

Based on the existing Master Plan, some of the areas can be identified having a potential of being developed as key activity node with mixed-use development. With Dehradun witnessing major growth towards Haridwar and Saharanpur Road, it was proposed that area near Badowala, Bharpur, East Hope town may be developed for new nodes of development, shifting activities from CBD area to outer areas of the city. At the same time, these nodes can develop a separate transport plan, which should also connect with the main public transport master plan, so that each node is well connected with other nodes through a dedicated mass transit system.

Dehradun has the potential to adopt TOD principles, with possibility of increase in population density by increasing FSI and promoting mixed-use development.

Status of Water Supply and Sewerage Infrastructure

Dehradun has a water supply network of about 700 kms. About 400 kms of new water supply network is planned for the city. The existing sewer network is approximately 404 kms and about 200 kms of new sewer network is planned. The total number of water connection is 0.1 million (about 78% of the total population is covered through water connection) and per capita supply of water is 155 litres per day.

The water demand for Dehradun city at various stages is projected in the table below:

Sl. No.	Water demand	Quantity	Quantum of Wastewater Generation @ 80%
1	Year 2021	162.05 MLD	129.64
2	Year 2026	188.71 MLD	150.96
3	Year 2031	216.80 MLD	173.44
4	Year 2041	279.11 MLD	223.28

The total water availability from ground as well as from surface sources is 210 MLD and the net present availability is about 147 MLD after considering distribution losses. The cost recovery of water supply services is about 52% and the city is in the process of 100% smart metering of all commercial and domestic connections that would enhance the cost recovery and reduce non-revenue water. *Uttarakhand Pay Jal Sansadhan* is currently preparing a Detailed Project Report (DPR) to convert the existing system into a continuous 24*7 water

supply system.⁵ The report would include a plan for water crisis management of Dehradun city with GIS technology and a strategy for reduction of non-revenue water (NRW).

The city has seven sewerage treatment plants with a total capacity of 115 MLD. Uttarakhand Urban Sector Development Investment Programme (UUSDIP) is constructing a 68 MLD Sewage Treatment Plant near *Haridwar Bypass*.

This would ensure technical and operational viability of the sewerage ducts proposed in the common utility ducts.

Storm water drainage

The coverage of storm water drainage in Dehradun is about 11% with at least four major incidents of water logging reported in a year especially during monsoon. While the topography of the city helps in carrying out the excess rainwater, unplanned and unregulated development in the city has contributed to water logging in many parts of the city. DMC (under the AMRUT mission) and UUSDA are constructing storm water drainage in other parts of the city.

⁵ *Uttarakhand Pay Jal Sansadhan* Vikas Evam Nirman Nigam – a Government of *Uttarakhand* undertaking is responsible for operation and maintenance of water and wastewater management in the State.

10. Summary of Project Analysis – Financial Aspects

Based on the detailed project reported for the smart roads prepared by DSCL under the smart cities mission project for the 10 kilometre of smart roads in the ABD area, we have prepared a preliminary cost estimate for the proposed 11 stretches of roads identified for this project. The cost per kilometre of length is as per the schedule of rates prepared by the Central Public Works Department and State Public Works Department.

Component A: Upgradation of 11 Road Stretches as per Best-in-Class Standards

Component B: Provision of 100 Electric Public Transport Buses through Gross Cost Contract basis

Sl. No.	Road name	Length	Road and lighting	Water supply	Drainage	Sewerage	Duct	Total
	Unit		Rs. 7.01 crore/Km	Rs. 1.22 crore/Km	Rs. 4.63 crore/Km	Rs. 1.2 crore/Km	Rs. 7.84 crore/Km	Rs. crore
1	Chakrata Road (Kishan Nagar Chowk- Prem Nagar)	6.20	43.462	7.564	28.706	7.44	48.608	135.78
2	Shimla Bypass- Prem Nagar	11.00	77.11	13.42	50.93	13.2	86.24	240.9
3	Haridwar Bypass (ISBT- Rispana)	6.60	46.266	8.052	30.558	7.92	51.744	144.54
4	Haridwar Road (Araghar -Rispana)	2.30	16.123	2.806	10.649	2.76	18.032	50.37
5	Ring Road (Jogiwala Chowk- Ladpur)	4.50	31.545	5.49	20.835	5.4	35.28	98.55
6	Raipur Road (Survey Chowk- Ladpur)	3.30	23.133	4.026	15.279	3.96	25.872	72.27
7	Kirshali Chowk- Sai Mandir	3.00	21.03	3.66	13.89	3.6	23.52	65.7
8	Mussoorie Road (Mussoorie Divergence- Kuthal Gate)	5.30	37.153	6.466	24.539	6.36	41.552	116.07
9	Rajpur Road (Dilaram Chowk- Rajpur)	7.3	51.173	8.906	33.799	8.76	57.232	159.87
10	Saharanpur Road (Saharanpur Chowk- ISBT)	4.6	32.246	5.612	21.298	5.52	36.064	100.74
11	Mall Road Mussoorie	7.00	49.07	8.54	32.41	8.4	54.88	153.3
	Total	61.10	428.31	74.54	282.89	73.32	479	1338.09
	Component B: Provision of 100 Electric Public Transport Buses through GCC							123
	Total							1461.09

These costs are provisional and would require further investigation and analysis through a detailed financial feasibility study.

10.1. Breakup of Investment Planning

Of the total amount estimated for the two components, 80% is sought as external funds in the form of loan and remaining 20% will be provided by the Government of Uttarakhand. The Government of Uttarakhand would be providing guarantee for the full loan amount. The period of loan sought is from 01.01.2020 to 31.12.2023, i.e., three years and 11 months.

Slice	Total External Assistance sought	Implementing Agency	State Government	Central Government	Other, if any	Total Cost
Amount in INR Crore						
Slice 1	1168.87	0	292.22	0	0	1461.09
Total	1168.87	0	292.22	0	0	1461.09
Percentage	80	0	20	0	0	100
Amount in USD Million; One USD = INR 70.000						
Slice 1	166.98	0	41.75	0	0	208.73
Total	166.98	0	41.75	0	0	208.73
Percentage	80	0	20	0	0	100

10.2 Potential sources of revenue:

For Component A i.e., smart roads with the integrated multi-utility ducts, the prime source of revenue would be from rental fee (on per kilometre of length basis) from governmental and private utility providers. Additionally, revenue would be generated from provision of on-site parking in roads that have the required right-of-way with peak time parking fee. DSCL has initiated 'Doon on-site parking system' with strict parking charges under the Smart Cities Mission. It has a capacity of 300 vehicles. Since 28.01.2019, DSCL has collected INR 49.89 lakhs through parking charges. DSCL would extend this approach to the new smart roads developed under this project.

DSCL would also explore the possibility of revenue from advertisements from the Variable Messaging System (VMS) that will be part of the bus shelters throughout the city.

For Component B i.e., 100 Electric Public Buses, revenue can be derived from the following sources:

Farebox: includes revenue received on account of sale of tickets, passes, and concession to the passengers i.e. the payment received from passengers for the journey performed is usually termed as farebox revenue. This has been considered for as a major source of revenue for deriving at the Gross Cost Model to procure the electric buses in the pilot e bus program of 30 buses.

Non-Farebox: includes revenue from non-ticket sales and includes revenue from advertisement, commercial development, tolls, congestion pricing, parking charges, land value capture, etc. Non-farebox revenue sources play an important role in improving the viability of public transport operations.

With the responsibility to operate and manage city bus services, DSCL may face the risk of excessive financial burden resulting in heavy losses. It is important for DSCL to recognise the potential behind the non-farebox revenue methods. Land banks can enable DSCL to utilize the land to improve operations and increase revenues through commercial integration and other schemes. In some cases, a reorganization of existing resources or better route rationalization has also resulted in the reduction of ineffective costs. All of this would be the integral components that would be taken into consideration while carrying out the feasibility assessments for the project components.

11. Reference best practices to be studied

The project team would study best – practices at international and national level in terms of project design, financial model, operative frameworks and sustainability aspects for the different project components. We have identified a preliminary set of case studies that would require in-depth assessment to gauge their adaptability and fitment to Dehradun in terms of topographical, institutional and governance framework and socio-economic parameters.

Common Utility Duct

With rapid urbanisation and growing population, there is an increasing need to expand and add new utility lines. In India, the most common adopted solution for placing the utility lines underground is trenching for separate utility ducts which results in damage by excavation to the road, cycle and pedestrian infrastructure and premature deterioration of paved surfaces; disrupts traffic often at the time of operation and maintenance; deleterious environmental effects, health and safety hazards; and major risks of damage to adjacent infrastructure including other congruent utilities. Utility location, maintenance, upgrading and expansion has become increasingly complex and the current method is becoming un-economical, socially disruptive and environmentally damaging.

A common utility duct or shared utility duct - defined as a structure, generally below ground, that carries multiple large-scale services infrastructure (gas, water, power, heat, steam, compressed air, telecommunications cable, etc.) offers a sustainable solution for housing all utilities together in one location underground. The advantages of common utility ducts are the reduction of maintenance manholes, less impediment to vehicular or pedestrian traffic above ground, onetime relocation and less excavation and repair when compared to separate cable ducts for each service.

This solution has been implemented since many decades in Europe (e.g. Berlin, Helsinki, Stockholm, Madrid and Barcelona), and more recently in North America and Asia including Japan, Taiwan, Malaysia and in small extent in India.

Incorporating Common Utility Duct within Xinyi and Sonshan MRT rapid transit lines in Taipei, Taiwan

The Taipei Metro Xinyi Line is an underground high-capacity rapid transit line currently operational in Taipei, Taiwan. The line spans 6.4 km and has 7 underground stations, running from Chiang Kai-shek Memorial Hall to Xiangshan. A common utility ducts was installed along MRT line during their construction using the shield tunnelling machine used for the metro line. The common duct had a total length of 5,026 m of 2-3 cell duct, composed of a 3,134 m shield tunnel and a 1,892 m open cut box culvert. The construction was completed in 7 years along with the Xinyi subway line. The estimated total cost was about NTD 5.2 billion (approximately USD 153 million)⁶.

One utilidor project cut typical construction time by six months, and saved NT \$44.64 million for the Taipei city government through its single, spatially efficient, coordinated construction⁷

Azabu-Hibiya Common Utility Duct in Tokyo, Japan⁸

⁶ <http://www2.maaconsultants.com/en/projects/detail.php?dpid=140>

⁷ PWC (2017). Report on Consultancy Study on Smart City Blueprint for Hong Kong

⁸ http://www.bigempire.com/sake/underground_tokyo.html

The Azabu-Hibiya Common Utility Duct is a public works venture under the Ministry of Land, Infrastructure and Transport that collects various utility lines into a single underground trunk tunnel with an intention to reduce the number of overhead wires and decrease damage due to earthquake susceptibility. The project extends from the Tokyo districts of Azabu to Hibiya. In the first phase of construction, which began in 1989, 2.8-kilometer segment between Azabu and Toranomon was completed and the second phase included additional 1.5 kilometres for the Hibiya segment. The overall project's budget is 42 billion yen.

TenderSure, Bangalore, India

To do away with frequent digging of roads, the "Tender S.U.R.E (Specifications for Urban Road Extension)" roads of Bengaluru mandates integration of networked services under the road – water, sewage, power, OFC, gas, and storm water drains through underground ducts for utility. The design of tender S.U.R.E roads prioritises the comfort and safety of pedestrians and cyclists as well as recognise the need of street vendors and hawkers. In the first phase, 12 roads including Residency Road, Richmond Road, St. Marks Road, Museum Road, Commissariat Road, Vittal Mallaya Road and Cunningham Road are considered. The Karnataka Government has allocated a sum of Rs. 200 crore for the execution of Urban Roads on the basis of tender S.U.R.E. The Tender S.U.R.E project had received the 'Commendable Initiative Award' for the best non-motorised transport (NMT) project from the Union Ministry of Housing and Urban Affairs, at the 11th Urban Mobility India conference in Mumbai on November 4, 2018.

(For picture: <https://www.janausp.org/portfolio/tender-sure/>)

Utility Tunnel in GIFT City, Gujarat, India

To achieve the vision of "DIGGING FREE CITY", the GIFT has placed all the utilities in a TUNNEL across the city including DTA and SEZ so that there is no need to further excavate the roads in future for repair/maintenance /renovation/up gradation of any utility. Total length of the Tunnel within GIFT City is approx. 16 km and includes facilities like separate WET and DRY section, ventilation system, Rodent Repellent System and Fire & Smoke Detection System for the purpose of safety.

The Utility Tunnel accommodates all the utilities including power cables, raw water supply pipe line to Water Treatment Plant (WTP) as well as treated water supply pipe line from WTP to various developments, chilled water supply from District Cooling Pipe (DCP) to various developments and return pipe line to DCP, ICT cables, automated waste collection pipe line, fire hydrant water pipe line, etc. It is envisaged that the tunnel will be able to carry 50 million litres per day of treated water, 200,000 tons of cooling water, 750 megawatts of power supply, and 280 million tons of solid waste. The overall budget for the project is estimated to be Rs. 3.15 billion. ⁹

(For pictures: <http://www.giftgujarat.in/utility-tunnel>)

⁹ https://www.bentley.com/en/project-profiles/gujarat-international-finance-tec-city_integration-of-urban-infrastructure-through-utility-tunnel

Road Safety

Case Study: Mission Zero Accidents, Kerala

KSTP is a project wing under the Kerala PWD that takes on road safety upgrade and maintenance activities in SH Kerala. They commissioned 3M Traffic Safety Systems to improve conditions, traffic flows and road safety on selected roads in Kerala with a focus on vulnerable road users. It was a massive undertaking that saw the entire project sectioned into 2 phases with the first phase having three components: road network upgrading and safety improvements, road safety management and institutional strengthening, and the second phase comprising upgrade packages to nine projects, an RMC project and the country's first Safe Corridor project.

Road Safety Challenges:

- High road and work zone accident rates in Kerala
- Narrow, undivided roads in an urbanised state
- Large vehicle population
- Motorists lack lane traffic discipline
- Undivided road

Solutions Offered:

- A safe corridor model project was demonstrated by 3M India, setting a road safety benchmark based on international standards in the country
- Accident data was analysed for root causes and solution discovery
- Stakeholders were addressed with 3M solutions being applied to road safety pain points
- 3M India went the extra mile to provide door-step support to customers in areas such as tender evaluations

Snapshots:



Raised Pavement Markers to enhance night-time visibility of speed regulating strips.



The same set of speed regulating strips in the day.

Multi-layered Sky-Wheel Bicycle Parking Garages

Since June 2019, multi-layered "sky-wheel" bicycle parking garages have been in operation near metro stations in Beijing. The first large volume rotating bicycle garage in China, these garages are located at each entrance and exit of the newly built road dedicated to bicycles for easy parking. Each 7.7 meters high sky-wheel parking garage occupies 220 square meters, with the ability to park 650 bicycles. This more than quadruples the number of cycles that a flat garage of the same land area can accommodate.



Designed and developed by Shougang Group, these rotating garages are accessible via a touch screen at the entrance. The entire process is automated and takes only 40 seconds for parking and taking out a bicycle. The garage is also equipped with safety and security measures such as infrared detection, alarm systems, remote monitoring, and automatic halt upon detection of accidental human or animal entrance while the machine is in operation.

12. Institutional Arrangements

The Dehradun Smart City Limited (DSCL) would be the Project Implementing Unit (PIU) for this project. DSCL has been incorporated under the Indian Companies Act 2013. DSCL is governed by a Board of Directors and is managed by a Chairman, a Chief Executive Officer (CEO) and Additional CEO, who are officers of the Indian Administrative Service (IAS). Commissioner, Dehradun Municipal Corporation is a member of the Board of DSCL. The external funds for the project would be channelised through the Finance Department, Government of Uttarakhand which in turn would channelise it to DSCL or a separate body set up to implement the project, if required. The model for external funds is 80:20 model in which 80% of the debt (principal) would be repaid by the Government of India and the remaining 20% of the debt (principal) would be borne by the Government of Uttarakhand. Further, the interest on total loan would be borne by the Government of Uttarakhand. The Urban Development Department, Government of Uttarakhand would closely oversee and monitor the project progress and milestones.

13. Need for Further Studies

As this is a conceptual study and the objective of this document is to only provide preliminary insights into the technical and commercial case of the project components, there is a need to undertake detailed technical, economic and financial studies to arrive at the project design,

sub-projects, implementation modalities, financial models etc. A list of further studies to be conducted is presented below:

1. Detailed Engineering Study of Roads covering topography, soil test, traffic survey, axle loads and geo-technical investigations
2. Detailed Traffic Survey of Dehradun and surrounding areas
3. Speed survey
4. Study to gauge user perception and willingness to shift and willingness to pay
5. Study on best practices on smart roads and Public Transport (EV Bus based) and Vehicular Quota System
6. Preparation of e-mobility plan for Dehradun¹⁰

¹⁰ A Comprehensive Mobility Plan for Dehradun-Rishikesh-Haridwar Metropolitan has been prepared in 2018. As per the CMP, Dehradun needs about buses to increase the share of public transport to about 45%. DSCL is in the process of procuring 30 electric bus under the SCM. Additional 100 electric buses are targeted under this proposal through GCC model. DSCL would prepare a comprehensive e-mobility plan for Dehradun that would congregate all initiatives by City Authorities and derive a plan for joint implementation for achievement of sustainable mobility in Dehradun. The plan would include preparation of an e-vehicle policy that would guide the city in adoption and smooth transition from present conventional vehicles to electrical vehicles in line with **Niti Aayog's Electric Mobility** by 2030 document. At the city level, it would cover (a) regulatory aspects e.g., amending bye-laws to reserve parking spaces with electric vehicle charging facilities in the parking spaces of commercial, residential and industrial buildings and integrate such parking / charging facilities with DSCL's Smart Parking Management System; (b) institutional i.e., designating a nodal agency for implementation of e-mobility plan; (c) intelligent systems e.g., helping e-vehicles users to navigate charging stations; (d) infrastructure e.g., ensuring multi-modal infrastructure facilities are conducive to e-vehicles and e-highways with overhead electricity networks for trucks and buses.