BAREILLY DEVELOPMENT AUTHORITY BDA

Vision, Implementation Strategy and Integrated Infrastructure Plan, Bareilly, 2071

DRAFT PRE-FEASIBILITY REPORT

D – 5: Final Report

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LIST OF ABBREVIATIONS

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
ASI	Archaeological Survey of India
BSCL	Bareilly Smart City Ltd.
BSNL	Bharat Sanchar Nigam Limited
BSUP	Basic Services to Urban Poor
BDA	Bareilly Development Authority
BMC	Bareilly Municipal Corporation
BSCL	Bareilly Smart City Ltd.
CISF	Central Industrial Security Force
CDP	Comprehensive Development Plan
CLS	Credit Linked Subsidy
CMP	Comprehensive Mobility Plan
CMSC	Central Sanctioning and Monitoring Committee
CREDAI	Confederation of Real Estate Developers' Associations of India
CSP	City Sanitation Plan
CWR	Clear Water Reservoir
DIC	District Industries Centre
DPR	Detailed Project Report
DUDA	District Urban Development Agency
EPA	Environment Protection Act
ETP	Effluent Treatment Plant
EPB	Export Promotion Bureau
EWS	Economically Weaker Section
FAR	Floor Area Ratio
FSI	Floor Space Index
GIS	Geographic Information System
GOI	Government of India
GOUP	Government of Uttar Pradesh
HA	Hectare
HH	Household
HIG	High Income Group
IIA	Indian Industries Association
IIT	Indian Institute of Technology
ITI	Industrial Training Institute
INR	Indian Rupee
ISBT	Inter-State Bus Terminal
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
KMS	Kilometers
KVA	Kilo Volt Ampere
LIG	Low Income Group
MGD	Million Gallons per day
MIG	Middle Income Group

ML	Million Liters
MLD	Million Liters per day
MoHUA	Ministry of Housing and Urban Affairs
MoUD	Ministry of Urban Development
MPS	Major Pumping Station
MRTS	Mass Rapid Transit System
MSME	Micro, Small and Medium Enterprises
MSW	Municipal Solid Waste
MW	Megawatt
MT	Million Ton
NH	National Highway
NHAI	National Highway Authority of India
NNB	Nagar Nigam Bareilly
NPV	Net Present Value
ODOP	One District One Product
OHT	Over Head Tank
PMAY-U	Pradhan Mantri Awas Yojana – Urban
PMGEP	Prime Minister's Employment Generation Programme
POP	Plaster of Paris
PPH	Persons Per Hectare
PPP	Public-Private Partnerships
PVC	Polyvinyl chloride
RITES	Rail India Technical and Economic Service
SLB	Service Level Benchmark
STP	Sewage Treatment Plants
SPV	Special Purpose Vehicle
SQM	Square Meter
SUDA	State Urban Development Body
SWM	Solid Waste Management
SWOC	Strengths, Weaknesses, Opportunities, and Challenges
TDR	Transferable Development Right
TERI	The Energy and Resources Institute
TPD	Ton Per Day
UNESCO	United Nations Educational, Scientific and Cultural Organization
ULB	Urban Local Bodies
UP	Uttar Pradesh
UPJN	Uttar Pradesh Jal Nigam
UPSIDA	Uttar Pradesh State Industrial Development Corporation
URDPFI	Urban and Regional Development Plans. Formulation and Implementation Guidelines
WTP	Water Treatment Plan

INTRODUCTION

1.1 City at a Glance

Bareilly is a city in North India tarai region and is classified as Class I town. It is the center for manufacturing of cane furniture and for trade in cereal, sugar, pulse and newly rice cultivation. The city administration is headquartered to Bareilly district and Bareilly division. Bareilly is the 4th city of Uttar Pradesh which has CNG fuel stations, after Lucknow, Kanpur and Agra.

According to National Capital Region Planning Board (NCRPB) 2041 plan Bareilly has been identified as Counter Magnet Area (CMA) for future development. It is equidistant from New Delhi with 250 kilometers and Lucknow with 252 kilometers. It is located as Eastern Dedicated Freight Corridor Node. It is famously known as the Zari Nagar for Zari zardozi handicrafts works on dress materials of Uttar Pradesh.

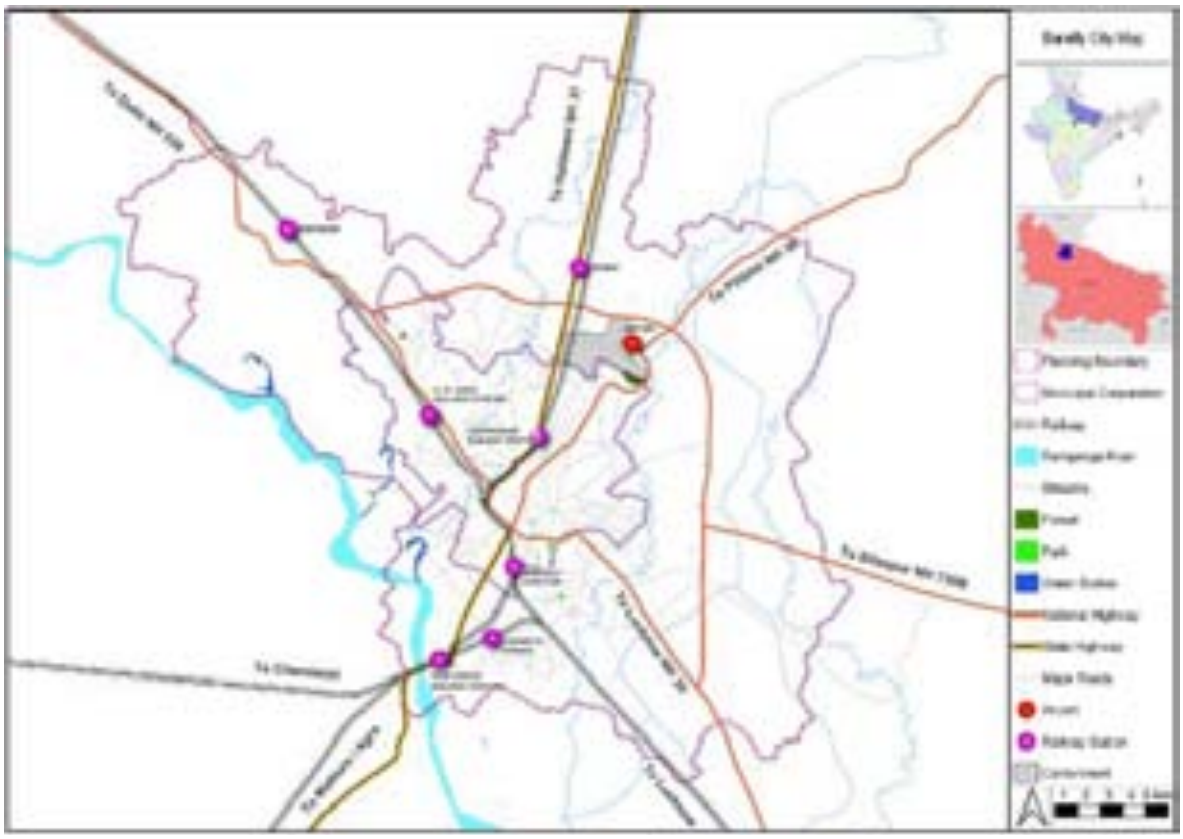


Figure 1 : Study Area Map

The district shares it boundary with Badaun to the south, Pilibhit and Shahjahanpur on the east, Udham Singh Nagar (Uttarakhand) to the north and Rampur on the west. City is gateway to Hill areas of Kumaon Himalaya region. The city is level and well-watered, sloping towards the south. Its soil is fertile, with groves of trees. The river Sharda or Goghra passes the eastern boundary and is the primary waterway. The Ramganga receives most of the drainage from the Kumaon Himalayan region. The Gomati (or Gumti) is also nearby Bareilly and lies 252 meters above sea level located off the left bank of Ramganga. The core city of Bareilly lies nearly 10 kilometers to the left of Ramganga river. Since the 19th century, the city has been expanding to the south, with neighborhoods like Civil Lines and Bareilly Cantt established during British rule; however, after the Independence of India, city has been growing towards north. During British period smaller industrial clusters have been established, like C.B. Ganj

and Izzat Nagar. The city has an urban area of 106 square kilometers, while together with its metropolitan area it covers 123 square kilometers. Bareilly is one of the 100 Smart Cities being developed in India. 10 percent ethanol- blending programme on a pilot basis has been initiated under Central scheme in Bareilly. Existing major industries like B. L. Agro Refinery at Parsakhera, IFFCO plant in Aonla. An airport is also developing at Bareilly – Pilibhit road. Bareilly Development Authority is developing Ramganga Nagar Housing scheme at Dohra and Bilaspur Road for around 259 Ha and main feature in this scheme are science and technology park and zonal park of 35000 sq. mt. area.

1.2 Geographical setting

1.2.1 Regional Setting

Bareilly is the fourth largest city located on the Ramganga River. District Udham Singh Nagar of Uttarakhand state lies in the north. It is a level landscape with various streams that flows through it, and it normally slopes to the south. Bareilly District serves as the capital of the Rohilkhand division. For administrative purposed, it is delineated into six tehsils and fifteen development blocks. Bareilly city is the administrative headquarter of the district.

1.2.2 Regional Ecological Features

The Ramganga is the district's primary river, which enters from the west and runs south-east. The Sidh Dejora, Bahgul, Sankha, Aril, Deoha, Deoanian, and Nakatia rivers, as well as their tributaries, all start in tarai and flow across the district in southern and south-eastern directions before joining it. In terms of geology, the district is alluvial. The district is separated into three sub-micro areas based on geology, soils, terrain, climate, and natural vegetation:

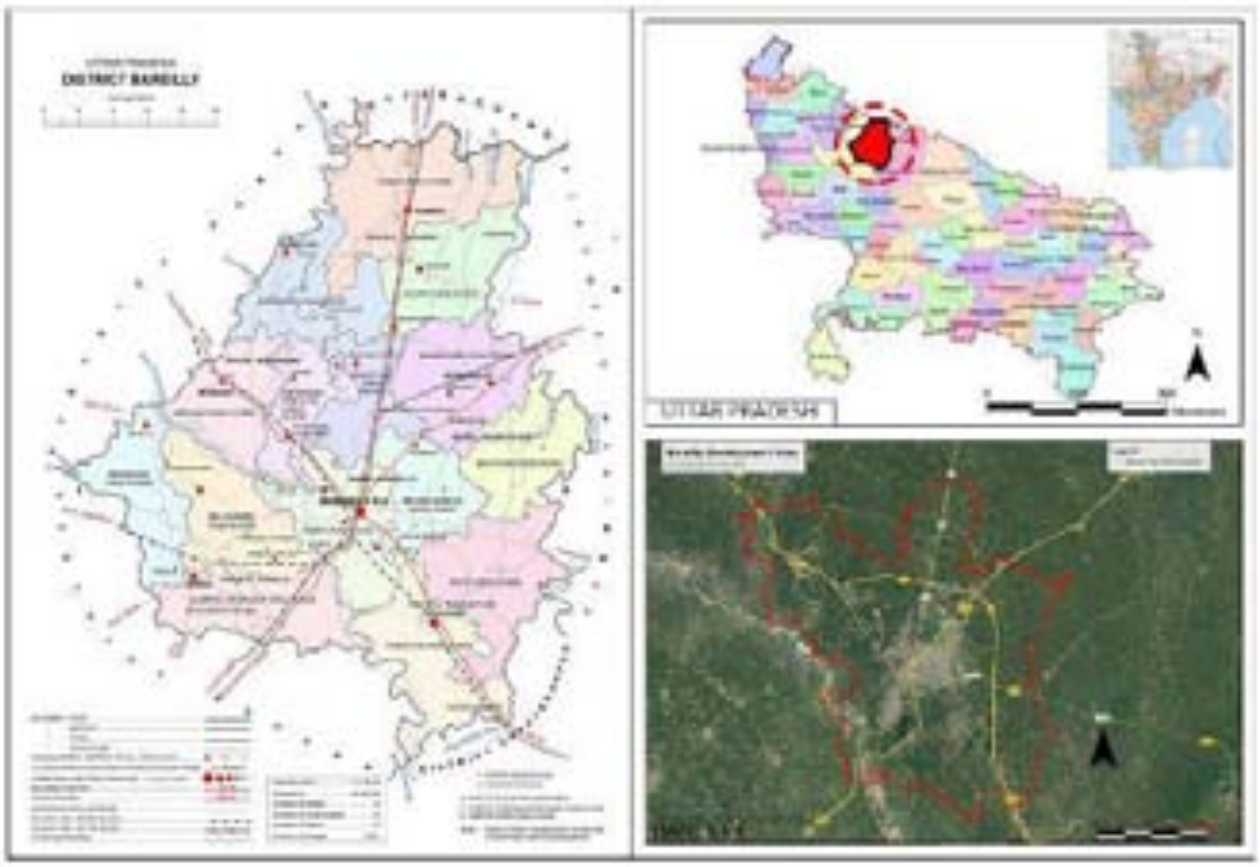


Figure 2: Regional Setting of Bareilly

I. Bareilly Tarai
II. Bareilly Plain
III. Ram Ganga

Bareilly Tarai: The region is located in the district's north-western corner, encompassing a small portion of *Baheri* tehsil. It is the Tarai tract, where various streams flow in a north-south direction. The majority of them are from the Nainital tarai belt. Although it is a rice-growing region, productivity is dependent on rains due to a lack of irrigation.

1.3 Report Structure

The report focuses on the selected project under Bareilly Vision Plan Project for the development of Bareilly. The bouquet of projects has been identified by analyzing the Existing Situation and assessing the demand of the city which caters the demand and development vision for Bareilly for all the sectors of the city. This vision will define the direction of growth and projects for the development and its phasing.

1.3.1 Why is the need of this project document?

Its focus is on providing a VISION, or a DIRECTIVE, for the aforementioned mission, which is to create a sustainable, resilient, and ideal city to live in. This project will serve as a development strategy and route navigator.

1.3.2 How will the objective be achieved?

This project consists of a collection of implementation strategies rather than a set of rules or regulations, which can later be turned into bylaws, government policies, or other documents by local or state authorities. The ideal city development will be followed by these implementation strategies.

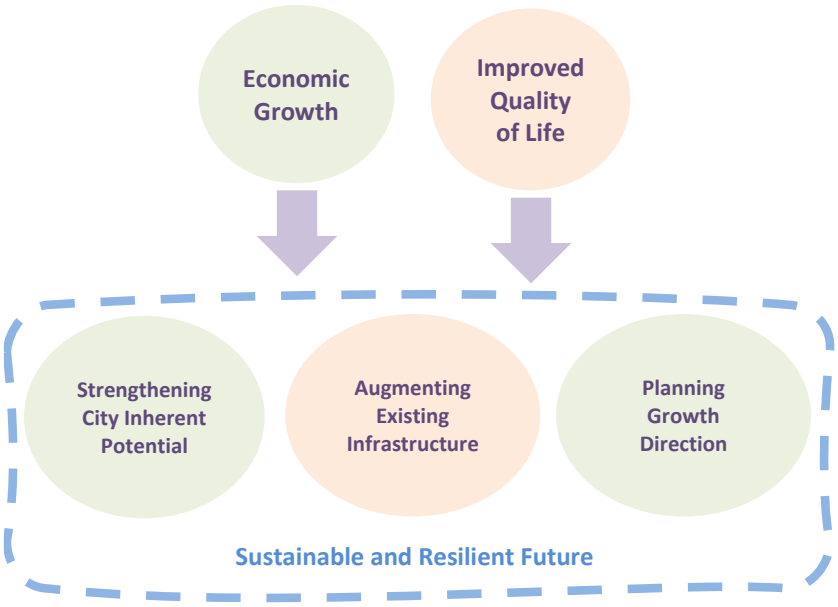
1.3.3 What are the measures or solutions?

The foundation for the direction of development will be the implementation plans, which will take the form of action plans and financial plans. Integration of physical and social infrastructure strategies will further improve things in that direction. The city's growth will be driven in the right direction by the integrated plans and strategies.

2. BOUQUET OF PROJECTS

2.1 Bouquet of Projects for Bareilly Vision Plan

In the previous Vision Planning Report, based on the existing situation analysis and demand analysis, a Vision Statement has been prepared which is in consonance with the Strengths, Weakness, Opportunities and Challenges of Bareilly, the vision statement for the city keeping in mind its key potentials, eradicating the weaknesses, and mitigating the challenges. It will also include the suggestions gathered from various stakeholders during the consultation workshops. A certain set of goals will be identified to fulfil the vision in the Vision Plan document to cater the analyzed demand of Bareilly.



"Drive economic growth, improve quality of life by strengthening city's inherent potentials, augmenting existing infrastructure and plan its growth which is sustainable and resilient in future."

In the previous stage of the project the bouquet of projects (22 nos) was finalized for the holistic development of Bareilly as mentioned in the RFP document i.e., Urban Planning, Transport, Heritage and Tourism, Urban Design, Economy, Infrastructure and Solar.
Out of these finalized projects 14 projects were shortlisted for Draft Pre-Feasibility Report.

Bareilly Vision Plan 2071			
Project list finalized and endorsed by Mandal Commissioner on 13th July 2022			
Sr. No.	**Project List under Bareilly City Vision Plan 2051**	**Domain**	**Nodal Department**
1	Residential Housing Node, a) Nekpur (Phase 1 - 2022-23) b) Gangora Pikariyam c) Kargaina d) Tehtajpur (Area - 100 Ha each)	**Urban Planning**	BDA / Awas vikas / Private Builders
2	Industrial Growth Centers, a) Rajau Paraspur Phase 1 (2022-23) b) Parsakheda (2025-30) c) Kurtara (2030-35) (Area - 100 Ha each)		BDA / UPSIDC / Private Builders
3	Integrated Freight Center, Faridpur 45 Ha		BDA / Private Builders

4	Multi-Modal Logistics Hub, Kurtara 45 Ha		BDA / Private Builders
5	City Level Plan for Vehicle Parking adequacy for Bareilly	**Transportation**	SP Traffic
6	Access to Ganga Expressway through Radial Road and Outer Ring Road		NHAI / PWD
7	Bareilly Lite Metro facility		BDA
8	Ahichchhatra Tourism Infrastructure upgradation	**Heritage and Tourism**	Tourism Department
9	Fist War of Independence (1857) museum: a) Bareilly College Campus / b) Cantonment Area		Tourism Department
10	Nath Temples facility improvement and beautification	**Urban Design**	Tourism Department
11	Ramganga River front development at Chowbari fair ground (Area 14 Acres + 500 Meter Ghats) (Nakatiya)		PWD / Irrigation Department / BDA
12	Aerocity integrated office complex near Airport development : Area - 30 Ha		BDA / Private Builders
13	Zari - Zardozi Shyam Ganj and Sailani market Façade Development and streetscape		BDA / Nagar Nigam
14	Demonstration of Solar Energy for streets and Gov. buildings.	**Solar**	UPNEDA
15	Development of new solid waste treatment plant for 2041, (Area -15 Ha)	**Infrastructure**	Nagar Nigam
16	City Plan for Water Logging / stagnant spots and flood prone areas		Jal Nigam / Nagar Nigam
17	Development of new Tertiary Sewage Treatment Plant (STP): Near Industrial Area.		Jal Nigam / Nagar Nigam

Project in wait-list			
18	"Medicity" – designated area with multiple health business and activities	**Economy**	
19	Development of Handicraft Cluster/ Common Facility Centre (CFC) – Zari & Bamboo		
20	Bareilly District Jail land parcel monetization through redevelopment.		
21	Developing trade cum business expo centers near transit nodes		
22	Streetscape from Qila to Shyamganj along with development of Dargah precinct	**Urban Design**	

2.2 Selected Project List for Pre-Feasibility Report

This Pre-feasibility report has details of the selected projects from Bouquet of projects under Civic Infrastructure Projects and Transport Infrastructure Projects. The projects were selected in coordination with Vice Chairman, Bareilly Development Authority, considering the holistic development of all the sectors of the city and as mentioned in RFP. Total 14 priority projects are selected as follow:

Selected Project List for PFR | Bareilly Vision Plan		
Sr. No.	**Project Name**	**Domain**
Civic Infrastructure Development Projects		
1	Residential Housing Node, a) Nekpur, b) Gangora Pikariyam, c) Kargaina, d) Tehtajpur	Urban Planning
2	Industrial Growth Centers, a) Rajau Paraspur Phase 1, b) Parsakheda (2025-30), c) Kurtara (2030-35)	Urban Planning
3	Ahichchhatra Tourism Infrastructure upgradation.	Heritage and Tourism
4	War of Independence (1857) museum	Heritage and Tourism
5	Urban Renewal of Nath Temple Circuit & infrastructure improvement of all Nath Temples precincts	Urban Design
6	River front development. a) Chowbari fairground (Ramganga River), b) Nakatiya River	Urban Design
7	Development of Aero city integrated complex near Airport	Urban Design
8	City Plan for Water Logging / stagnant spots and flood prone areas	Infrastructure
9	Development Of Working Shed for Zari Handicraft Artisans	Economy
10	"Medicity" – designated area with multiple health business and activities	Economy
11	Demonstration of Solar Energy for streets and Gov. buildings.	Solar
Transport Infrastructure Development Projects		
12	Development of Integrated Freight Center / Logistics Hub a) Kurtara, b) Faridpur	Urban Planning
13	Access to Ganga Expressway through Radial Road and Outer Ring Road	Transport
14	Bareilly Lite Metro Project	Transport

CIVIC INFRASTRUCTURE DEVELOPMENT PROJECTS

3. Project 1: Residential Housing Node

3.1 PROJECT 01: RESIDENTIAL HOUSING NODES

3.1.1 Introduction

Bareilly is one of largest metropolises in western Uttar Pradesh. Bareilly City is the administrative Centre of Bareilly division and district. It also serves as a hub to produce cane furniture and trading in grains, sugar, pulses, and newly cultivated rice.

According to National Capital Region Planning Board (NCRPB) 2041 plan Bareilly has been identified as Counter Magnet Area (CMA) for future development. It is equidistant from New Delhi with 250 kilometers and Lucknow with 252 kilometers. It is located as Eastern Dedicated Freight Corridor Node. It is famously known as the Zari Nagar for Zari zardozi handicrafts works on dress materials of Uttar Pradesh.

3.1.2 Spatial Growth of the City

Bareilly serves as the area's educational center, numerous prestigious educational institutions, as well as auxiliary buildings like apartments and hostels, can be found throughout the town's outlying areas, which is crucial for the growth of the metropolitan area. Locals from the villages nearby also move and reside in Bareilly to take advantage of the city's improved employment prospects, healthcare services, and educational resources. The geographic scope of a city expands as a result of inward migration, population growth, significant infrastructure development, and significant initiatives that have an impact on economic growth.

The city is anticipated to grow with the existing vision and proposed developments as mentioned in the Table below:

These locations of urban growth are based upon the past growth trends, proposed projects, and analysis of existing conditions.

Table 3-1: Urban Extent 2051 and 2071

Road Name	Urban Extent 2051 (Village Name)	As per Draft Master Plan 2031 Boundary	Urban Extent 2071 (Village Name)	As per Draft Master Plan 2031 Boundary
Nainital Road	Bhojipura	(Inside the Boundary)	Semi Khera	(Outside the Boundary)
Pilibhit Road	Labhera	(Outside the Boundary)	Khai Khera	(Outside the Boundary)
Lucknow Road	Jerh	(Outside the Boundary)	Naugawan	(Outside the Boundary)
Badaun Road	Anguri	(Inside the Boundary)	Sardarnagar	(Outside the Boundary)
Delhi Road	Dhaneta	(Outside the Boundary)	Mirganj	(Outside the Boundary)

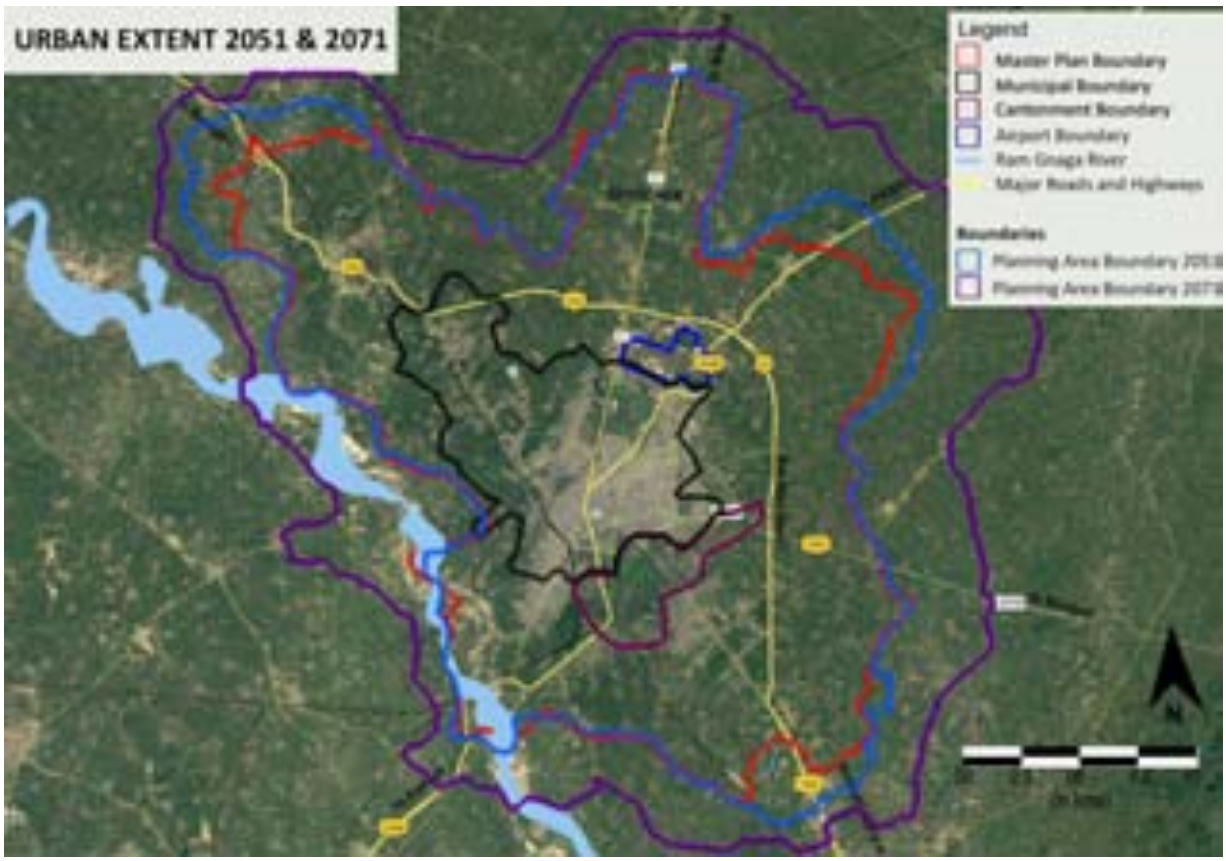


Figure 3-1: Urban Extent 2051 and 2071

3.1.3 Estimated Household Size

The household size of Bareilly city has dropped in the past 3 decades. It was 6.43 in the year 1991 which in the last census of 2011 declined to 5.42. The decline in household size can be attributed to the nuclear family being more in existence now as compared to the joint family. Household size of 5.0 is proposed for Bareilly city which is also the national average.

3.1.4 Proposed Density

Decongestion of the core area is necessary to provide infrastructural equity and address traffic issues. This is also to admit that low dense low rise infrastructure development demands large investment. So, to reduce costs and provide long-lasting suitable infrastructure, medium-density compact development with a density of 250pph is proposed.

3.1.5 Need to residential Housing Nodes

Bareilly is a rapidly urbanizing largest metropolis in the western Uttar Pradesh. Strategic geographic location and connectivity within the region, career possibilities, higher education prospects, and a safer living environment are among the many things that draw people to the city.

It is also one of the major service providers in the region. Major determinants of the growth in Bareilly will be:

- Bareilly is identified as one of the nine magnets to the National Capital Region.
- Existing Industrial base potential can be developed as Agro-based industries because of the availability of raw materials. The projected industrial growth hubs are intended to create employment opportunities and attract investment to the city because industries are the engine of economic progress.

- The inhabitants of the surrounding area will be drawn to proposed residential zones, which are meant to be planned neighbourhood zones since they would offer better living conditions and amenities.
- Connectivity via road and rail to the state capital of Lucknow, the national capital New Delhi, and the popular tourist resort Nainital.

Bareilly is facing the stress of urbanization on account of high concentration of economic activities within city limits and a physical limitation to its expansion. A rise in population, both permanent and floating that is well above its natural capacity to support and nurture has put further strain on its infrastructure, resources, and places.

As per the estimated population projection the additional requirement for housing alone in 2071 will be approximately 7,43,403 households. At present the population of Bareilly Planning area is around 15.56 lakhs and as per the estimated population of 2071 the population of Bareilly Planning area will be increased up to 37.02 Lakhs. Therefore, an urgent need for decentralization of activities within the city and for the creation of new residential housing nodes so that organic future development of the city can take place.

3.1.6 Site Selection

Total 12 different pockets are identified in the preliminary stage and out of them 04 pockets are finalized. The locations are based on their connectivity, proximity to the existing development, continuity, close to bus terminal and railway stations and far from industrial developments

New residential housing nodes are suggested to handle the population growth and improve living conditions. The proposed residential nodes will be an integrated neighbourhood with convenient access to social services and facilities like healthcare, education, retail, leisure, entertainment and sports.

Four residential zones or nodes are proposed to be developed following the study and demand evaluation. Out of these 2 residential zones are proposed on Aligarh Road near village Nekpur and Kargana. Other residential zones are proposed on Lucknow Road near Tehtajpur and near Village Ghaghoria Piparia on Nainital Road.

Residential Housing nodes at Nekpur & Kargana villages

The residential Housing nodes Nekpur and Kargana are the extension of the existing residential development of the Bareilly City. These nodes are well connected with Bareilly Badaun Road and internal roads. The Kargana residential housing node is laying between the railway line passing close to the site and Aligarh Road.

Residential Housing nodes at Tehtajpur and Ghaghoria villages

This residential Housing node is proposed along the Nainital road strategically so that it will cater the future spatial growth of the city towards the Nainital road. It will help to growth of the city in this direction in a planed manner. These types of planned townships and residential developments will motivate the developers to think beyond the city limits.

Similarly, due to bypass road and NH 24 the development possibilities in and around the bypass is growing tremendously in past few years. In view of this a residential housing node at Ghaghoria village is proposed to restrict the haphazard and unplanned residential growth.

3.1.7 Area requirements

Each residential node is expected to be developed on 100 hectares each. The household size of 5 is assumed for the proposed residential housing nodes. With a density of 175 PPH approx. 3500 Households will be accommodated in the housing nodes. Additionally, it is anticipated that by 2051, the population will have spread out past the boundary of the Draft Master Plan 2031 and settled in various areas throughout the city.

3.1.8 Product Mix

Type of residential category as per economic status	Type of residential category as per economic status
EWS	15
LIG	35
MIG	35
HIG	15
Total	100

The composition of residential housing node will be around 60:40 ratio. The Housing units will be divided into 04 different categories i.e EWS, LIG, MIG & HIG and distributed as per the government guidelines. To self-sustained and planned development including neighborhood concept dedicated support physical and social infrastructure is also provided like Retail shops, Social infrastructure (education, health and other community facilities), Basic Utilities/ Services, Park & Playground and Transportation facilities.

3.1.9 Benefits of Proposed Residential Housing Nodes

- The residential housing nodes will be created using advanced planned urbanization principles.
- These cities offer independent healthcare, offices, and educational facilities, so residents are not dependent on the congested core part of the Bareilly city for these services.
- The citizens and businesses functioning within these cities are completely safe.
- The residential housing nodes will have their own self-sufficient transportation systems and are situated close to the typical residential and businesses.
- Compact and robust
- Low power consumption

The scientific balance between the population and the resources needed to support them are one of a major component of the proposed residential housing nodes. This enables the developers to offer the residents a responsive and sustainable environment along with higher air quality, lesser environmental effect and improves the use of resources like water and power.

3.1.10 Project Timeline & Broad Project Cost

The project can be developed as short-term intervention within five-year project horizon. For the broad cost estimation of the residential housing nodes the land rate is assumed to be four times the actual rate of the land. The broad project cost for the proposed residential housing node is given below:

Table 3-2 Nekpur Residential Housing Node Broad costing

S.no	Components	%	Development Cost (in INR)
1	Plumbing sewerage STP and all	30	7,413,150
2	Electricity ESS and all	30	7,413,150

S.no	Components	%	Development Cost (in INR)
3	Roads and landscaping	40	9,884,200
	Sub Total	**100**	**24,710,500**
4	Land Cost	100 Ha	8,000,000,000
	Total		**8,024,710,500**

Table 3-3 Kargaina Residential Housing Node Broad costing

S.no	Components	%	Development Cost (in INR)
1	Plumbing sewerage STP and all	30	7,413,150
2	Electricity ESS and all	30	7,413,150
3	Roads and landscaping	40	9,884,200
	Sub Total	**100**	**24,710,500**
4	Land Cost	100 Ha	8,000,000,000
	Total		**8,024,710,500**

Table 3-4 Tehtajpur Residential Housing Node Broad costing

S.no	Components	%	Development Cost (in INR)
1	Plumbing sewerage STP and all	30	7,413,150
2	Electricity ESS and all	30	7,413,150
3	Roads and landscaping	40	9,884,200
	Sub Total	**100**	**24,710,500**
4	Land Cost	100 Ha	4,800,000,000
	Total		**4,824,710,500**

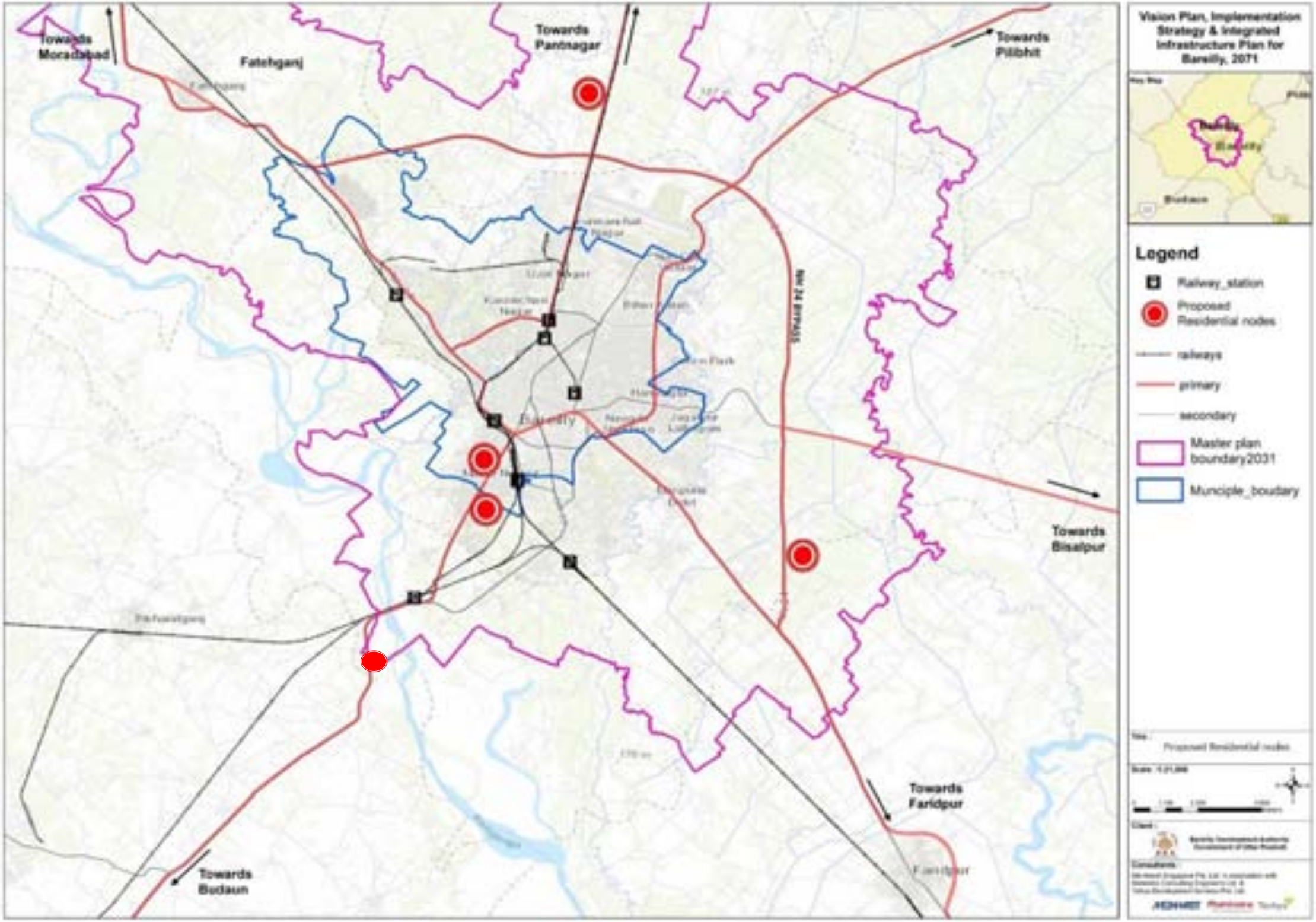
Table 3-5 Ghaghoria Residential Housing Node Broad costing

S.no	Components	%	Development Cost (in INR)
1	Plumbing sewerage STP and all	30	7,413,150
2	Electricity ESS and all	30	7,413,150
3	Roads and landscaping	40	9,884,200
	Sub Total	**100**	**24,710,500**
4	Land Cost	100 Ha	8,800,000,000
	Total		**8,824,710,500**

3.1.11 Requisite Approval

For the development of these residential housing nodes involvement of multi-disciplinary agencies will be required and no objection certificates will be required for free flow and unerupted development. The following approval is necessary:

1. Land Revenue Department for change of land use. If required.
2. Bareilly Development Authority for land use change from agriculture to residential.
3. There is no Environmental sensitive location around the periphery, so no clearance is required, and no environmental screening is requisite for the development.
4. Local people from Nekpur, Kargana, Tehtajpur and Ghaghoria Piparia as No objection certificate.


Towards Moradabad
Fatehganj
Towards Pantnagar
Towards Pilibhit
NH 24 BYPASS
Towards Bisalpur
Towards Faridpur
Towards Budaun
Vision Plan, Implementation Strategy & Integrated Infrastructure Plan for Bareilly, 2071
Legend
Railway_station
Proposed Residential nodes
railways
primary
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Vision Plan, Implementation Strategy & Integrated Infrastructure Plan for Bareilly, 2071
Key Map
Bareilly
Legend
National Highway
State Highway
MDR
Other Roads
Railway Line
Municipal Boundary
Planning Area Boundary (BDA)
Water Bodies
Map Title :
Proposed Residential Area
Bareilly Development Authority
Government of Uttar Pradesh
Consultants :
Mott MacDonald Singapore Pte. Ltd.
In association with
EY,
Mahindra Consulting Engineers Ltd. &
Sathya Development Services Pvt. Ltd.


Vision Plan, Implementation Strategy & Integrated Infrastructure Plan for Bareilly, 2071
Key Map
Bareilly
Legend
National Highway
State Highway
MDR
Other Roads
Railway Line
Municipal Boundary
Planning Area Boundary (BDA)
Water Bodies
Map Title :
Proposed Residential Area
Client :
Bareilly Development Authority, Government of Uttar Pradesh
Consultants :
Meinhardt Singapore Pte. Ltd.
In association with
Mahendra Consulting Engineers Ltd. &
Techun Development Services Pvt. Ltd.


Vision Plan, Implementation Strategy & Integrated Infrastructure Plan for Bareilly, 2071
Bareilly
National Highway
State Highway
MDR
Other Roads
Railway Line
Municipal Boundary
Planning Area Boundary (SDA)
Water Bodies
Proposed Residential Area

Vision Plan, Implementation Strategy & Integrated Infrastructure Plan for Bareilly, 2071
Bareilly
Legend
National Highway
State Highway
MDR
Other Roads
Railway Line
Municipal Boundary
Planning Area Boundary (BDA)
Water Bodies
Map Title :
Proposed Residential Area
Client :
Bareilly Development Authority, Government of Uttar Pradesh
Consultants :
Meinhardt Singapore Pte. Ltd.
In association with
Mahindra Consulting Engineers Ltd. &
Tetra Development Services Pvt. Ltd.

4. Project 2: Industrial Growth Centers,

4.1 INDUSTRIAL GROWTH CENTRE

4.1.1 Introduction

Originally the city's identity was based on its small-scale bamboo craft and zari zardozi industries, but these are now quickly fading. Small and medium-sized firms that manufacture products using materials like plastics, chemicals, and other materials are the most prevalent in Bareilly. The small and medium-sized enterprises of Bareilly are the key economic forces. It is therefore recommended to support small and medium-sized businesses, for which space is set aside in the Draft Master Plan 2031 and the required infrastructure is anticipated to be installed throughout the project's medium-term time frame.

4.1.2 Existing Industrial Areas

Paraskhera Industrial Area

Paraskhera Industrial area which is a major industrial area in Bareilly was established by Uttar Pradesh State Industrial Development Authority (UPSIDA) in 1980. The industrial area covers an area of 367.00 acres with 286 plots. No. of Industrial plots which are occupied and are producing goods or products are 286. Major Industries such as Coco Cola, Bharat Petroleum LPG Bottling Plant, Vadilal Ice Creams have their large scale industries in this area only.

Figure 5: Industrial Area in Bareilly

Table 4-1 Main Industrial Zones

S. No.	Name of Industrial Area	Land acquired (In Acre)	Land developed (In Acre)	No. of Plots	No. of Vacant Plots	No. of Units in Production
1	Paraskhera	367.00	367.00	286	00	**286**
2	CB Ganj	16.9	16.9	73	00	**37**
3	**Bhojpura**	**38.3**	**38.3**	**89**	**00**	**28**

CB Ganj Industrial Area

Starting in 1920's, a number of industries were established here, including the Indian Turpentine & Rosin Company (established in 1926) and the Western Indian Match Company (WIMCO; established in 1937), resulting in C.B. Ganj being a key industrial centre of the city. Following India's independence in 1947, the UP State Industrial Development Corporation (UPSIDC) constructed an industrial estate in CB Ganj in 1958. The Indian Turpentine & Rosin Facility, on the other hand, stopped producing in April 1998, while the WIMCO factory, which used to provide matches across the country, closed in

2014. Area covered by CB Ganj Industrial area is 16.9 Acres with 37 units in production as per MSME Report. BL Agro is one of the major agro based industry in this area.

Bhojpura Industrial Area

Bahojipura Industrial Area is one of the important industrial areas in Bareilly with 89 plots flourishing in an area of 38.3 acres. This area has industrial mix which produce a wide range of products such as Agro based spice industries to stone cutting and furnishing industries.

Lucknow Road Industrial Area

This is an industrial area which is not covered under any government scheme but is thriving on its own because of the private players. This area has industries which produce chemicals, construction bricks and agro based products.

4.1.3 Relevant Industrial Development Schemes

4.1.3.1 One District One Product (ODOP)

The Ministry of Food Processing Industries launched the 'One District, One Product' (ODOP) programme to assist districts in reaching their full potential, fostering economic and socio-cultural progress, and creating employment possibilities.

The Government of India defined various objectives of the One District One Product Programme of Uttar Pradesh that are given below:

- Preservation and development of local crafts/skills and promotion of the art.
- Increase in the incomes and local employment (resulting in a decline in migration for employment).
- Improvement in product quality and skill development.
- Transforming the products in an artistic way (through packaging, branding).
- To connect the production with tourism (Live demo and sales outlet – gifts and souvenir).
- To resolve the issues of economic difference and regional imbalance.
- To take the concept of ODOP to the national and international level after successful implementation at the State level.

From Bareilly Zari-Zardozi and Bamboo Craft was selected under this scheme.

4.1.3.2 Prime Minister’s Employment Generation Programme (PMGEP)

The Indian government has launched the Prime Minister's Employment Generation Programme (PMEGP), a new credit-linked subsidy programme aimed at creating jobs through the formation of micro firms in both rural and urban areas.

The different objectives to develop the industrial sector of India are as follows:

- To generate employment opportunities in rural as well as urban areas of the country through setting up of new self-employment ventures/projects/micro enterprises
- To bring together widely dispersed traditional artisans/ rural and urban unemployed youth and give them self-employment opportunities to the extent possible, at their place

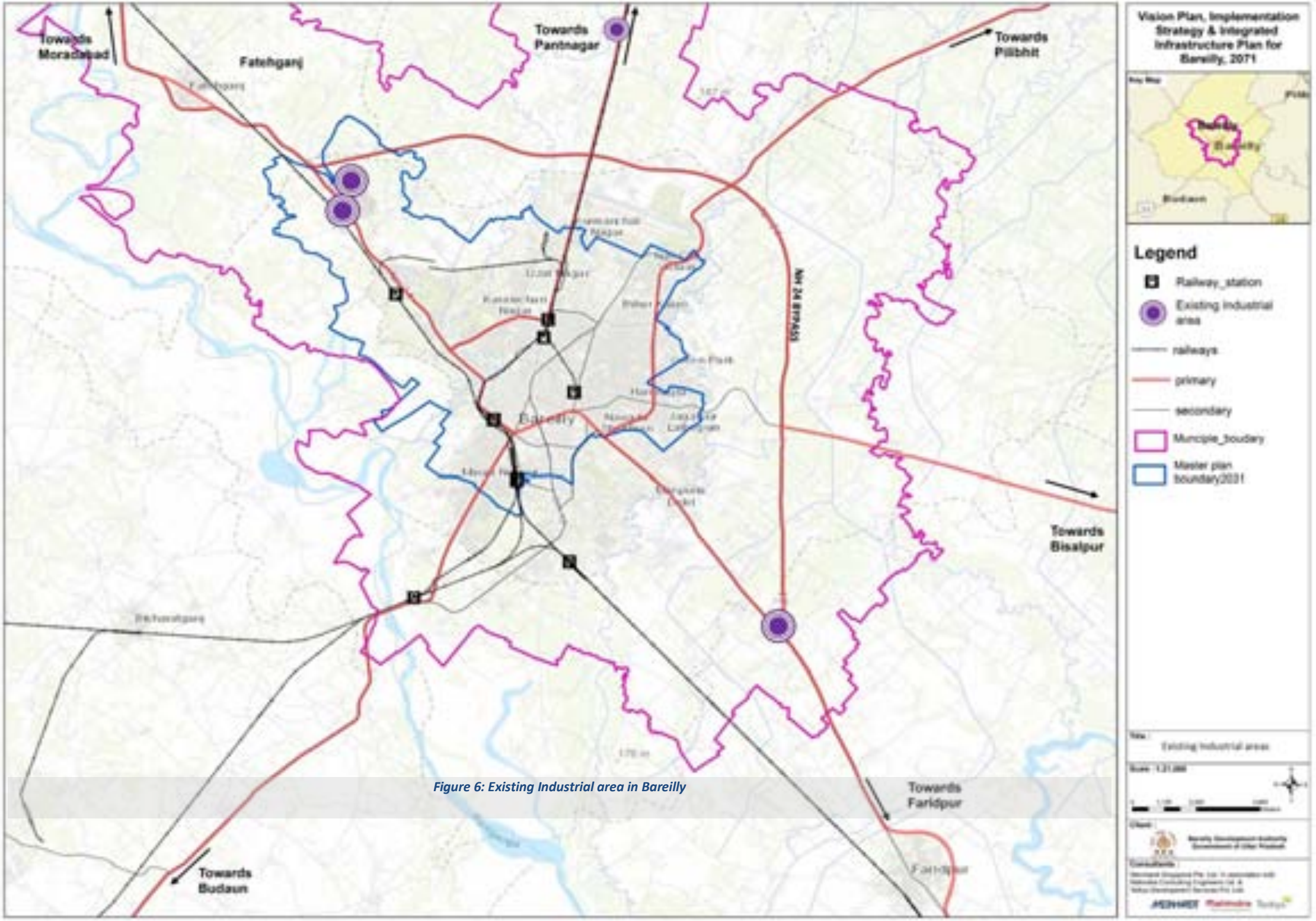


Figure 6: Existing Industrial area in Bareilly

- To provide continuous and sustainable employment to a large segment of traditional and prospective artisans and rural and urban unemployed youth in the country, to help arrest migration of rural youth to urban areas
- To increase the wage-earning capacity of artisans and contribute to an increase in the growth rate of rural and urban employment

4.1.3.3 Mukhyamantri Yuva Swarojgar Yojana, U.P

This scheme focuses on self-employment to the youth, by providing a loan of amount up to 25 lakhs per case. Young people native of the state will be able to take loans at low interest and start their own employment.

4.1.3.4 District Skill Development Plan for Bareilly

A plan for skill gap assessment & action plan for Bareilly was prepared by Industrial training institute in partnership with Uttar Pradesh Government which mapped existing infrastructure and analyzed aggregate demand in employment sector.

4.1.4 Main Industrial products

1. Agro Based Products
2. Chemicals
3. Cotton Textile (Zari Zardozi)
4. Rice
5. Mentha
6. Manjha
7. Surma

4.1.5 Need for Industrial Growth Centres

- Bareilly is the seventh-largest metropolitan area in Uttar Pradesh and the 50th largest metropolitan area nationwide.
- Due to its large bamboo market and also known as Bans-Bareilly.
- Already established bamboo, zari and agro based industries.
- Close proximity to EDFC corridor. Potential to develop as industrial and logistic centres.
- Bareilly is also referred to as the "counter-magnet city" because it is situated halfway between New Delhi and Lucknow has a lot of potential for developing industries that will draw people to stay there.
- Well connected with major cities of Uttar Pradesh through rail and road networks.
- Gate to Kumaon region.

4.1.6 Proposed Industrial Typology

The city's identity originally rested on its small-scale industries of bamboo craft and zari zardozi, but these are now fast disappearing. Therefore, it is suggested that MSME households be increased. In Bareilly, small and medium-sized businesses that produce goods based on agriculture, chemicals, plastics, and other materials predominate. The main drivers of the economy in Bareilly are small and medium-sized businesses. Therefore, it is suggested to support small and medium-sized companies, for which space is designated under the Draft Master Plan 2031 and the necessary infrastructure is anticipated to be put in place during the project's medium-term time frame.

4.1.7 Industrial Growth Centers

The proposed growth centres will help in flourishing economic activities of Bareilly and also assist local products & services in reaching the domestic and global markets. This will support in creating income-producing opportunities and lowering youth out-migration, which is now a significant problem for the state. The Growth Center Scheme will concentrate on identifying top goods & services, promoting local goods, closing crucial infrastructural gaps, and expanding certain locations through the implementation of economic activities.

The Ministry of Micro and Small Enterprises (MSMEs), Government of India, which aims to connect common physical infrastructure facilities for businesses manufacturing the complementary products & services to enable them handle their shared difficulties. The establishment of export-oriented units for the large-scale production of a number of agri-products, fruits, vegetables, bamboo, textile and food processing facilities will be supported by the surrounding communities. Such clusters will have enormous economic potential because they will capitalize on the comparative advantages of the state, such as its natural resources, its ingrained talents, and its inherent spirit of entrepreneurship.

The growth centres aim to provide access to new designs, technology and knowledge that will enable entrepreneurs, farmers, and craftsmen/artisans to successfully run micro and small businesses. This will enable them to engage in product-specific value chains, upscale their products, and improve productivity. Strengthened connections between rural and urban areas will also allow growth centres in and around the most affected and vulnerable districts act as accelerators for rural employment and public-private partnerships.

4.1.8 Common Facility Centers

The industrial growth centres will also have the dedicated common facility center for Bamboo products and one for readymade garments has been set up in Bareilly recently to provide skill development and required infrastructure. As per the policy, CFC should provide the following facilities:

- Testing Lab
- Design Development and Training Center
- Technology Research and Development Center
- Product Demonstration cum Sale Center
- Raw-Material Banks/Common Resources Center
- Common Production/Processing Center
- Common Logistics Center
- Information collection, analysis, and broadcasting Center
- Packaging, Labelling, and Barcoding Facilities

4.1.9 Area Requirements for Proposed Industrial Growth Centers

Bareilly city has three UPSIDA industrial areas and one private industrial area which is near Invertis University on Lucknow road. As per the demand assessment, three industrial areas are proposed. The industrial area proposed of area 50 hectares as an extension of the already existing Paraskhera Industrial area which is currently the major industrial area of Bareilly city.

The industrial area on Rampur/Delhi road and lies near village Kurtara is proposed to cover 100 hectares of area.

The industrial area proposed as an up-gradation and extension of the already existing private industrial area on Lucknow road on an area of 100 hectares.

In addition to these industrial zones, potential sites for industrial growth are also analyzed. It is anticipated that these areas would expand as an addition to the current or prospective industrial areas.

4.1.10 Project Timeline & Broad Project Cost

Paraskhera industrial growth center is proposed in short term, Rajau Paraspur in the medium-term, and Kurtara in the long term time frame. For the broad cost estimation of the proposed industrial growth centre's the land rate is assumed to be four times the actual rate of the land. The broad project cost for the development of proposed industrial growth centre's are given below.

Table 4-2 Broad costing of Kurtara Industrial Growth Centre

S.no	Components	%	Development Cost (in INR)
1	Plumbing sewerage STP and all	30	7,410,000
2	Electricity ESS and all	30	7,410,000
3	Roads and landscaping	40	9,880,000
	Sub Total	**100**	**24,700,000**
4	Land Cost	100 Ha	9,600,000,000
	Total		**9,624,700,000**

Table 4-3 Broad costing of Rajau Paraspur Industrial Growth Centre

S.no	Components	%	Development Cost (in INR)
1	Plumbing sewerage STP and all	30	7,410,000
2	Electricity ESS and all	30	7,410,000
3	Roads and landscaping	40	9,880,000
	Sub Total	**100**	**24,700,000**
4	Land Cost	100 Ha	4,800,000,000
	Total		**4,824,700,000**

Table 4-4 Broad Costing Paraskhera Industrial Growth Centre

S.no	Components	%	Development Cost (in INR)
1	Plumbing sewerage STP and all	30	7,410,000
2	Electricity ESS and all	30	7,410,000
3	Roads and landscaping	40	9,880,000
	Sub Total	**100**	**24,700,000**
4	Land Cost	100 Ha	12,000,000,000
	Total		**12,024,700,000**

4.1.11 Benefits of Industrial Growth Centres

- Increasing collaboration and commercialization
- Improving international opportunities and market access
- Enhancing management and workforce skills
- Identifying opportunities for regulatory reform.
- Enabling them to engage in product-specific value chains, upscale their products, and improve productivity.

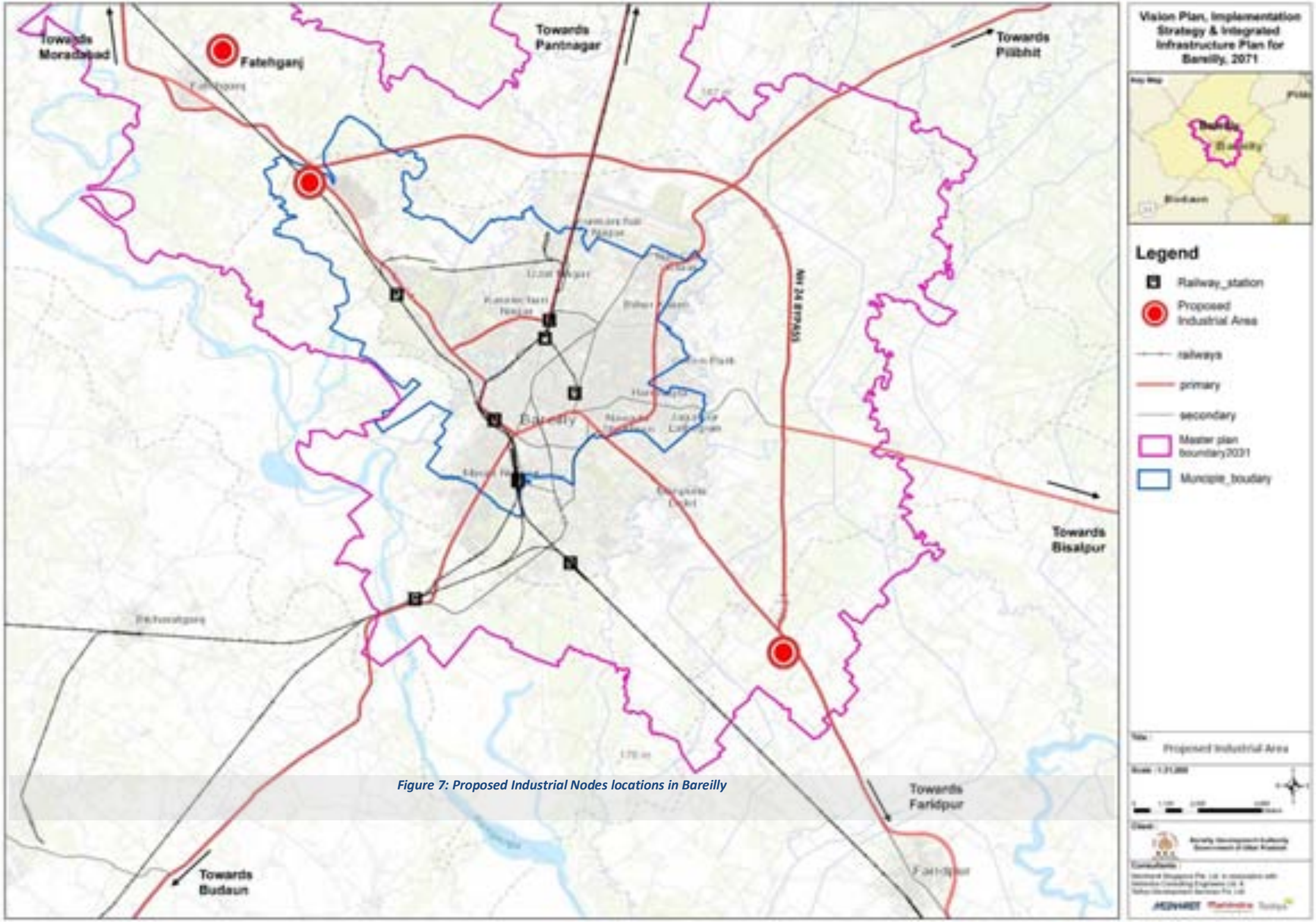


Figure 7: Proposed Industrial Nodes locations in Bareilly

Map 1 Broad Conceptual proposed Paraspur Industrial growth centre Layout

Map 2 Broad Conceptual proposed Kurtara Industrial growth centre Layout

Map 3 Broad Conceptual proposed Parsakheda Industrial growth centre Layout

5. Project 3: Ahichchhatra Tourism Infrastructure upgradation

5.1 Background of the study:

From archaeological point of view the district of Bareilly is very rich. The extensive remains of Ahichchhatra, the Capital town of Northern Panchala have been discovered near Ramnagar village of Aonla Tehsil in the district. The site of Ahichchhatra Garh was briefly explored by Sir Alexander Cunningham in 1871, and then excavated by the ASI from 1940 for "about five years". The excavations found brick fortifications and continuity of occupation from a period before 600 BCE to 1100 CE. It was during the first excavations at Ahichchhatra (1940–44) that the painted grey ware, associated with the advent of the Aryans in the Ganges–Yamuna Valley, was recognised for the first time in the earliest levels of the site. Nearly five thousand coins belonging to periods earlier than that of Guptas have been yielded from Ahichchhatra. It has also been one of the richest sites in India from the point of view of the total yield of terracotta. Based on the existing material, the archaeology of the region helps us to get an idea of the cultural sequence from the beginning of the 2nd millennium BC up to the 11th century AD. Near Ahichchhatra, 2 km to its west there is a big pond which is said to trace its ancestry to the time of Mahabharata. The pond, located in the village of Jagannathpur is said to have been made by the pandavas at the time of their forest dwell.

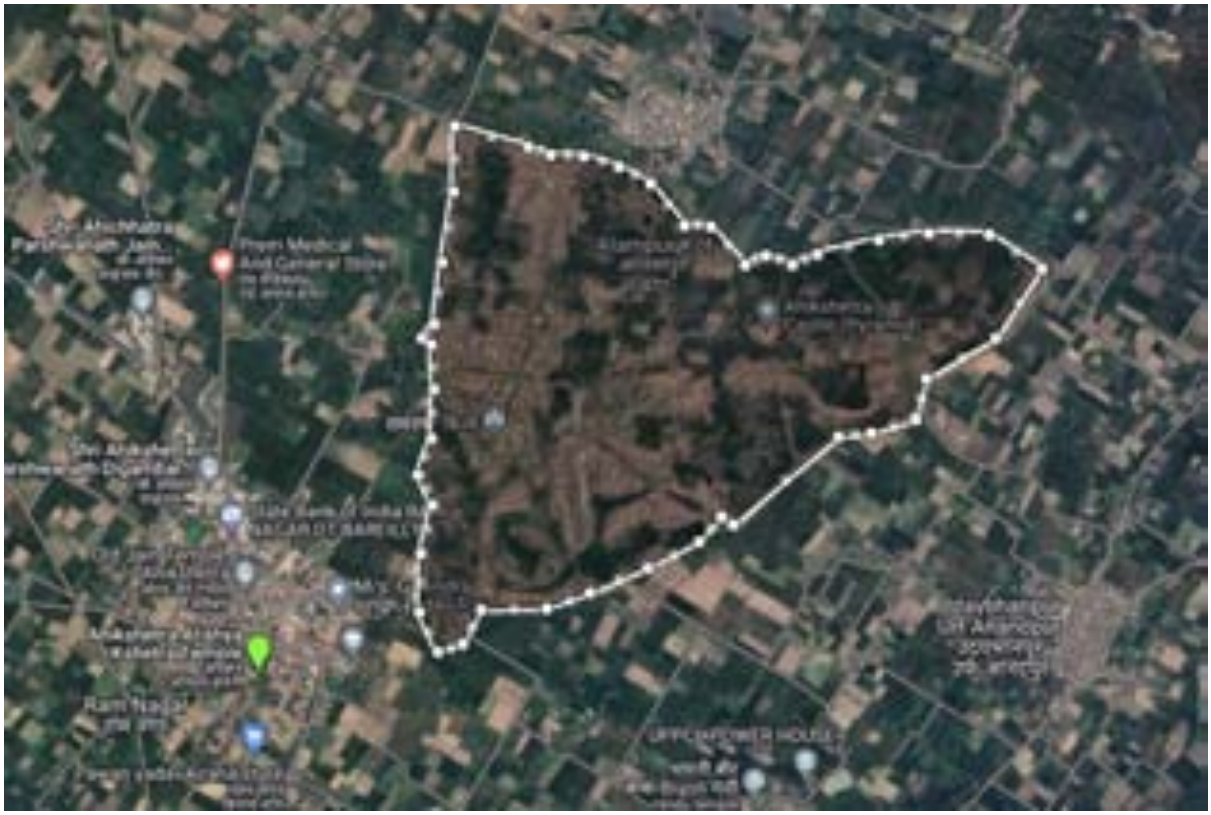


Figure 8: Site of Ahichchhatra.

Figure 9: Ahichhatra from Ramnagar which is the closest settlement and access to the site

Figure 10: Samarth Chandragupta fort and ahichchhatra fort within the complex of Ahichchhetra

Figure 11: Current condition of the site

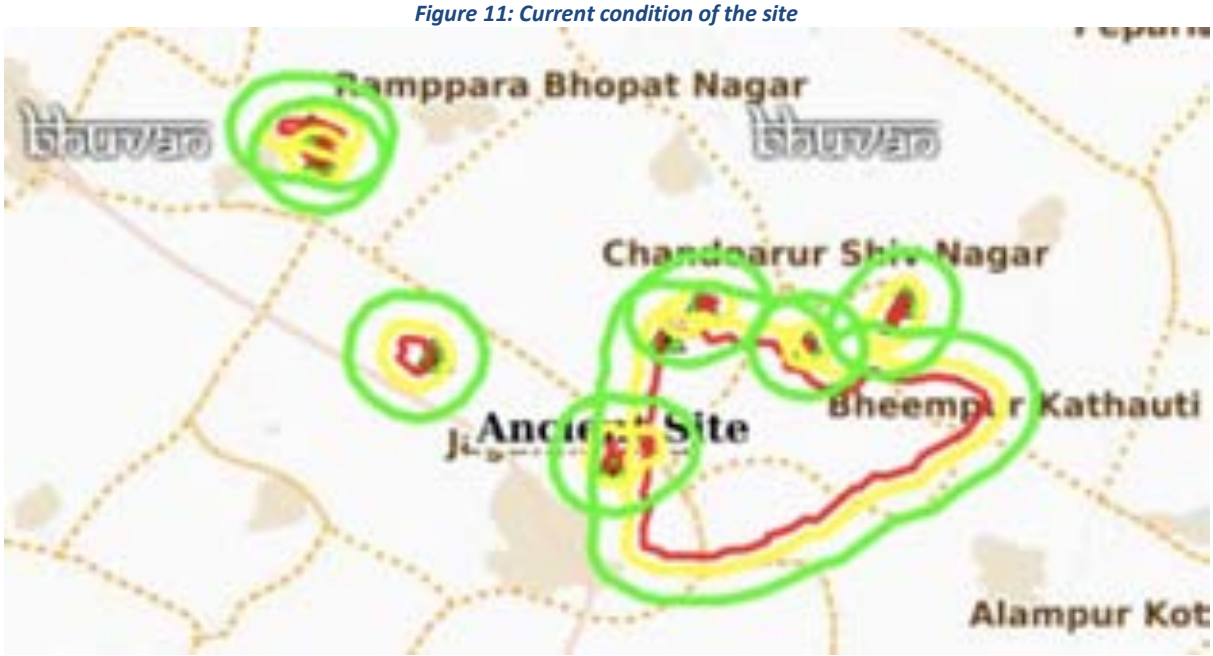


Figure 12: Map showing protected, regulated and restricted areas of the site of Ahichchhatra

5.1.1 Objective:

- To make the site accessible at regional and local level b providing access as well as outreach for the significance of the site of Ahichchhatra.

- Improved visitor experience of the site by provision of amenities for tourist and visitors in order to create a comfortable experience on site.

5.1.2 Brief Description of the project

As mentioned in the objectives, the project undertaken to make the monument accessible and to increase the outreach of the site. These are to be undertaken by making the monument site visitor friendly. The provision of proper visitor amenities, support infrastructure facilities and improved last mile connectivity will enhance the tourist footfall to the site is proposed to be undertaken. The site interpretation would help to generate interest of different categories of tourists. Hence the outreach would enhance. This is proposed to be done by undertaking the interpretation and audio-video centres. To make the monument accessible to differently-abled people and by providing a museum for the visitors.

5.1.3 Key issues

- The site is not well connected with the major towns. It is 53 kms from Bareilly and road connectivity is poor.
- There is lack of information and outreach of the site. Site has signage boards of protection and beyond that there is no informational, directional and instructional signage on site. There is no outreach on major tourist spots around the site in cities in proximity.
- There is lack of visitor facility Within the site.

Figure 13: Signage on site

Figure 14: Signage on site

Figure 15: Location identified for amenities on site (left) Condition of dirt track with in the site (right)

5.1.4 Key activities, tasks, interventions involved:

1. Provision of visitor parking, toilets and drinking water
2. Provision of permeable boundary wall
3. Provision of monument lighting
4. Research for Interpretative material and Signages
5. Identification of area for development of Museum.

6. Connectivity enhancement to the identified sites located in close proximity.
7. Site Development & Landscape Improvement.
8. Providing wayfinding and interpretative signages in and around the sites.

Figure 16: Proposed plan for the provision of amenities

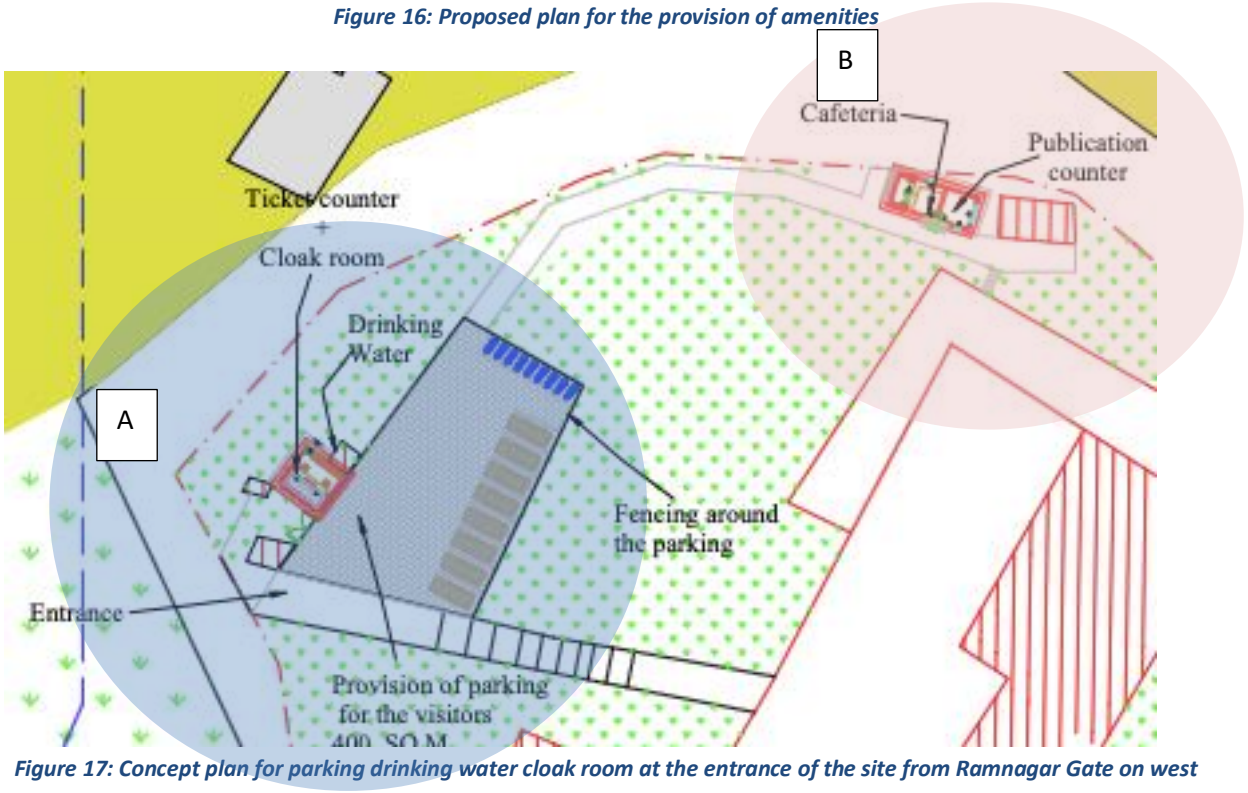


Figure 17: Concept plan for parking drinking water cloak room at the entrance of the site from Ramnagar Gate on west

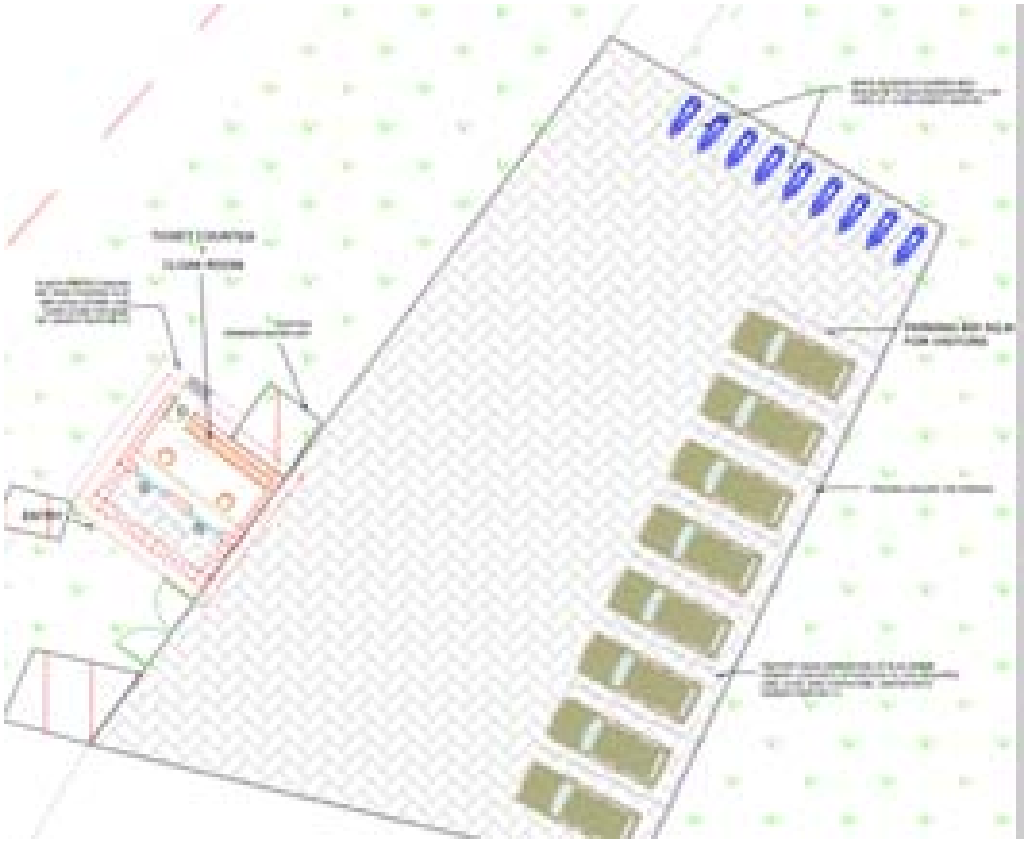


Figure 18: Concept of parking and ticket counter at A on the above plan

Figure 19: concept plan for the cafeteria and publication counter: as on location B of above map

Figure 20: Concept for the entrance gate and boundary wall for protected site

Figure 21: provision of brick on edge flooring to access the monuments.

1.	Provision of visitor parking, pathways toilets and drinking water	Site survey and identification of number of visitors and requirements
		Identification of location of provision for toilets and drinking water

		Preparation of DPR for the toilet block and drinking water facility. (brick and lime structure)
2.	Provision of permeable boundary wall , security room, ticket counter and pathways	Brick boundary wall to be provided : 3' toe wall and metal grills upto 8'
		Identification of entrances for provision of gated entrances
		Provision of metal entrance gates with security guard room
3.	Provision of monument lighting	Provision of monument lighting ensuring there is no surface getting intruded damaged or impacted on the site which has high historic and archaeological value.
		Provision of site lighting along approach roads and boundary wall and entrance gates
4.	Research for Interpretative material and Signages including Providing wayfinding and interpretative signages in and around the sites.	Research on history and significance of site to create story board and interpretative materials and interpretation techniques
		Preparation of design of signages and DPR for execution of signages
		Preparation of Digital Media platforms : QR codes, Websites , App , Audio content and graphics for the information on site
		Preparation of signages and material for outreach at regional level :
5.	Identification of area for development of Museum.	Identification of location for the museum and interpretation center
		Preparation of design and DPR for the museum
		Preparation of Working drawings and Estimates
6.	Connectivity enhancement to the identified sites located in close proximity.	Road improvements on patches as mentioned below:
7.	Site Development & Landscape Improvement.	Parking and street lights and pavement including the landscaping along the boundary wall and around the site.

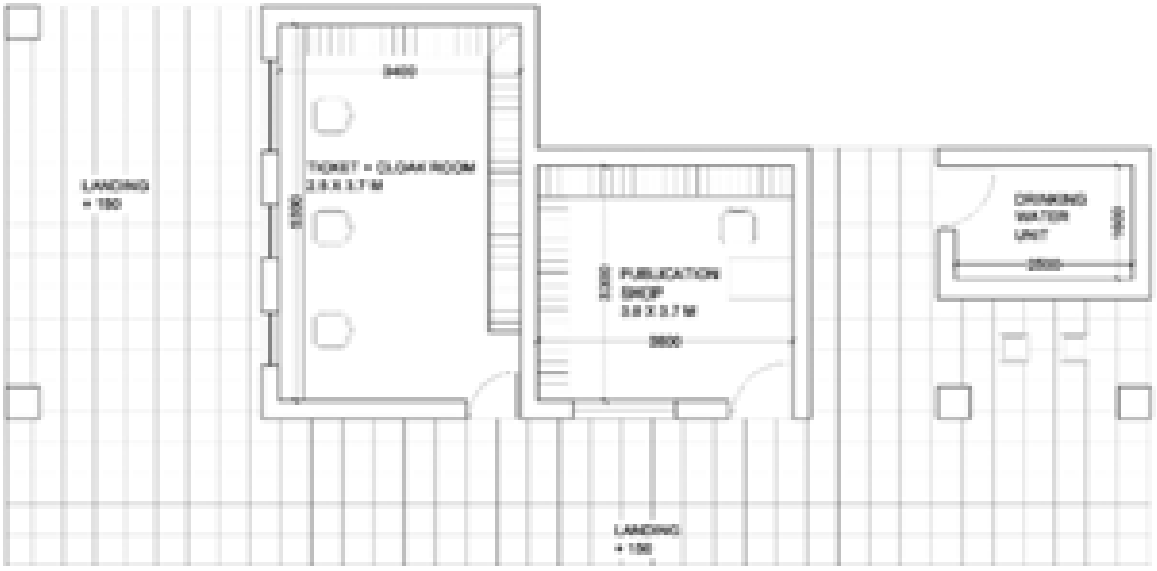


Figure 22: Concept layout for ticket room, cloak room , publication shop and drinking water.

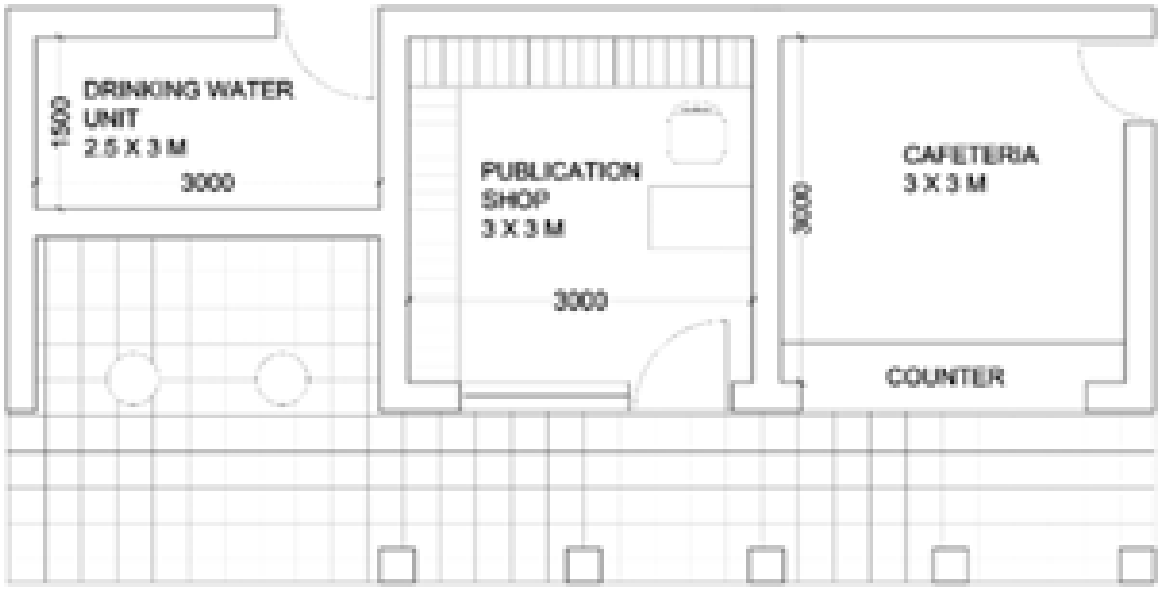


Figure 23: Concept for drinking facility, Publication shop and Cafeteria

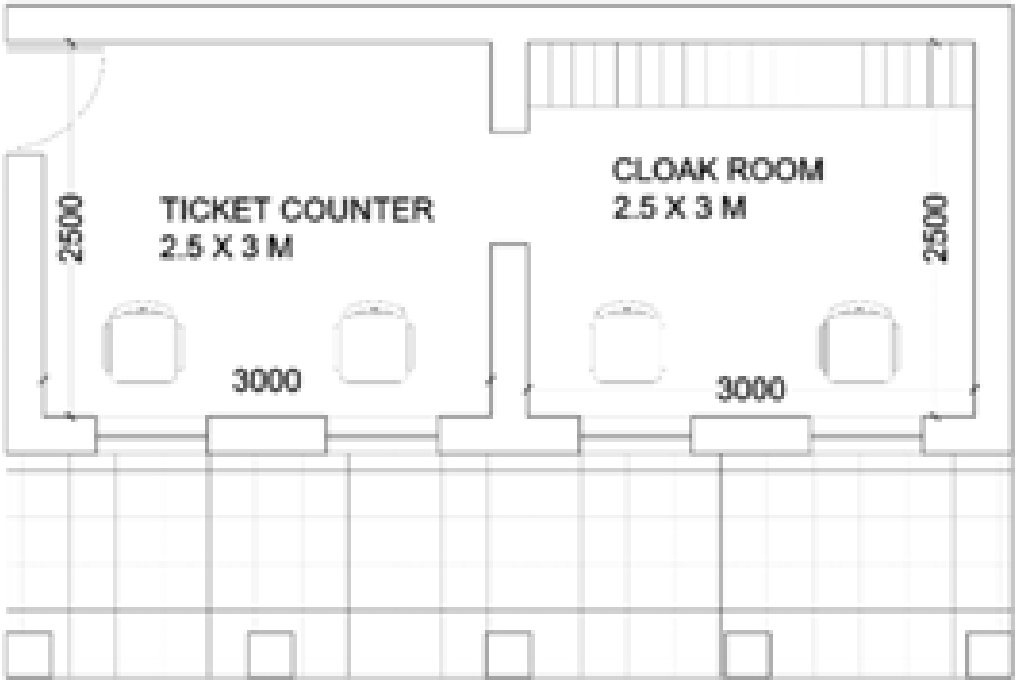


Figure 24: Concept for ticket counter and cloak room

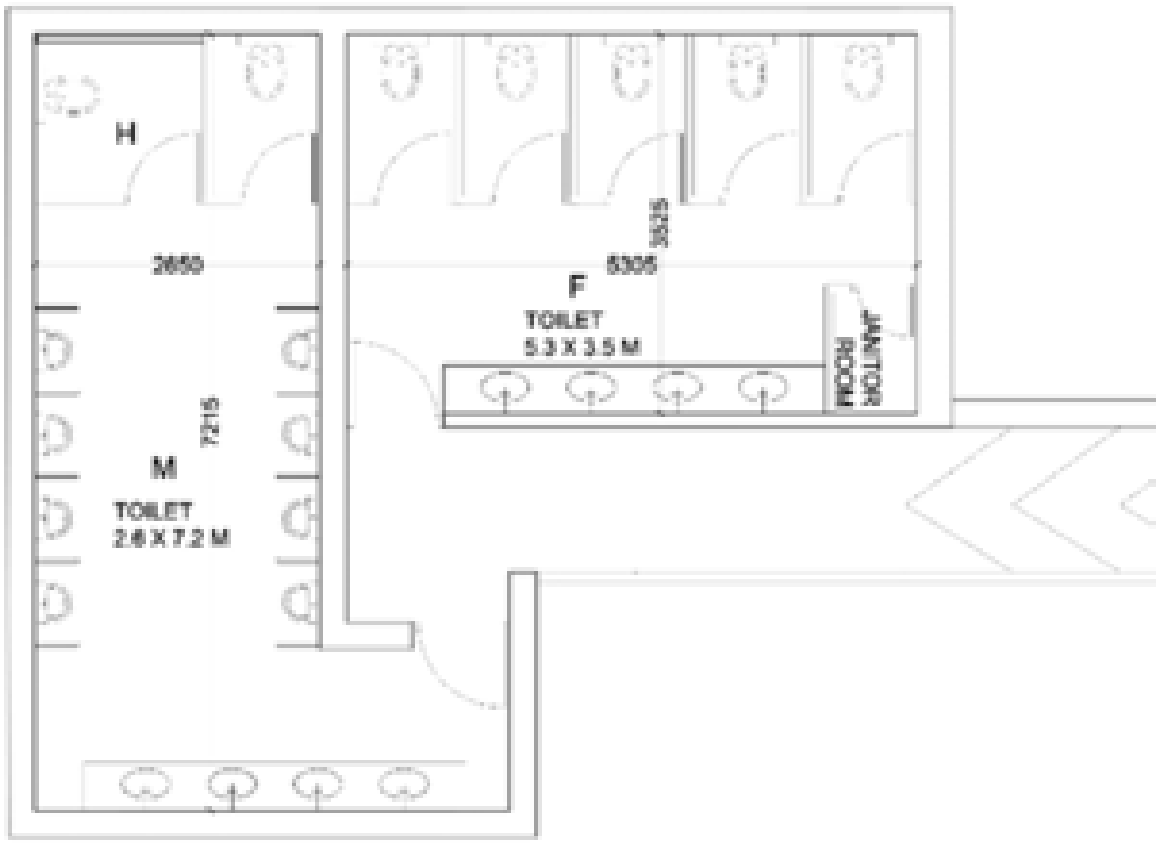


Figure 25: Proposed toilet layout for the toilet block

Figure 26: proposed option for toilet block

Figure 27: conceptual view of the toilet block

Figure 28: conceptual view of the toilet block

Figure 29: proposed view for toilet block

Figure 30:conceptual view for ticket counter cloak room and drinking unit

Figure 31: concept view for ticket counters

5.2 Financial Estimates for the works to be undertaken

a.	Amenities (toilet, ticket counters, security guard room, cloak room, publication shop and cafeteria) and site development works including parking and monument lighting	Toilet blocks 3 in nos.	55 Sq Mts	300 Lakhs
		Publication shop and cafeteria 1 in nos.	70 Sq mt	
		Ticket counter and cloak room - 2 in nos	75 Sq Mt	
		Drinking water – 5 in nos	20 Sq Mt	
b.	Signages (consultancy and execution) – on site and Providing wayfinding and interpretative signages in and around the sites.			1000 lakhs
c.	World Heritage nomination Dossier			200 Lakhs
d.	Museum and office building on site			500 lakhs
e.	Construction of roads to the fort structures within the site. The road needs not to be a metal road and tar concrete road. This is to be done for vehicular movement of BOVs with in the complex			1000 Lakhs
				3000 Lakhs

5.3 List of Stakeholders

1. Archaeological Survey of India – Ministry of Culture. (Active)
2. Department of Tourism (Potential)
3. Bareilly District Administration.
4. Gram Panchayat / Tehsil.

5.4 Project Time-line

1. The Development of amenities and infrastructure facilities – 1-2 years
2. Provision of museum and interpretative material – 2-3 years
3. Preparation of world heritage site nomination dossier – 3-4 years

6. Project 4: War of Independence (1857) museum

6.1 Upgradation of college complex and provision of War of Independence (1857) museum : a) Bareilly College Campus

6.1.1 Background of the study:

During 1857, Bareilly became a major centre of revolt under the leadership of Khan Bahadur Khan while maintaining the communal harmony despite the efforts by Company officers to create trouble by inciting Rajputs against Khan Bahadur Khan. Bareilly was the last to fall (May 1858). British order was restored on 13 May 1858 by an expeditionary force lent by Commander Colin Campbell of 9th Regiment of Foot with the help of Captain William George Drummond Stewart of 93rd Regiment of Foot, after winning the Bareilly battle. Some of the mutineers were captured and sentenced to death. When the Indian Rebellion of 1857 failed Bareilly, too, was subjugated. Khan Bahadur Khan was sentenced to death and hanged in the Kotwali on 24 February 1860.

Figure 32: Image of site within the college premises of pathways, boundary railings, softscape enclosures

Figure 33: Image of magnificent colonial structure run as college within the city

6.1.2 Objective:

- To infuse sense of pride among community and Reviving the memory of the War of Independence.

6.1.3 Brief Description of the project

Based on stakeholder consultation, the possibility of developing the theme-based museum in some parts of the Bareilly College is being explored. The college is a historic building which is in use currently. Representative of an important period in the growth and evolution of Bareilly City. It is proposed as one of the oldest heritage site and 1st Colonial schools in India.

6.1.4 Key issues

Upkeep and maintenance of the structures, lack of site upkeep, irregulated parking, potential of utilizing college as potential site for public inclusion.

6.1.5 Key activities, tasks, interventions involved:

- Development of Theme based Museum.
- Interpretative displays of the history of the region and associated personalities, role of Bareilly.
- Research and content development on the narratives and local stories of
- Visitor Management Plan.
- Development of visitor amenities.
- Site improvement.
- Building Conservation for Adaptive Reuse.
- Signages and way finding.

Figure 34: Map showing the college complex and land proposed for new museum block

Figure 35: Map showing the components with int he college complex

6.2 Proposal 1: Conservation of Historic structures with in the complex

There are historic structures within the complex which require conservation and upgradation. These structures include all the academic blocks such as botany department, chemistry department, physics department , zoology department. Other than academic blocks there are structures such as history museum, auditorium, library which need conservation and upgradation. The issues such as water rise, loss of masonry, repair of roof works if not addressed and maintained shall lead to being not fit for use further.

1	Phase one : site analysis and priority identification and conservation preliminary reports for each structure.	Total Station Surveys	100 lakhs
		Site analysis and identification of structural distress and structural analysis	
		Identification of phasing and priority works	
2	Identification and structural stability of emergency works for the buildings with in the complex	Propping strutting of structures	2000 Lakhs
		Water management and consolidation of roofs	
		Addressing major structural issues for stabilization of buildings	
3	Phase I : Identification and upgradation of structures for improvement and upgradation works	There are approximately 27 structures with in the complex. Conservation DPR preparation for structures in phase 1 (approximately 13 structures) : including upgradation, repairs, electrical, plumbing, finishes, interiors etc (1500 Per SQM)	5000 Lakhs
4	Phase II : Facade upgradation and Consolidation and conservation works for priority 2 sites	Preparation of DPR for the conservation upgradation and façade improvement of sites in better condition. Re-establishing the circulation, spatial planning , area diagrams if required for each structures with in the current use. (1250 Per SQM)	3000 Lakhs
			10,100 Lakhs

Figure 36: Image showing current condition of the library building

Figure 37: proposed image of Library structure post conservation

Figure 38: Current condition of chemistry department block

Figure 39: Chemistry department block conserved and upgradated

6.3 Proposal 2: Site development and Upgradation: including pathways and road upgradation , entrance gate upgradation and provision of adequate parking

	Upgradation of boundary walls and entrance gates	Documentation of existing boundary wall and entrances Design development for the interventions in boundary wall and upgradation of the gates Design consultancy for the new design f the gateways and conservation - Repair and consolidation works for the boundary walls	The proposed boundary wall is brick toe wall of height 3-3.5'with stone coping and metal grills upto height of 5' above the toe wall. Total length of proposed boundary wall is approximately 1.9 Kms	**300 Lakhs**
	Road improvement Provision of parking and upgradation of existing parkings	The road upgradation of the site is to be undertaken by providing adequate drains , slopes		**500 Lakhs**
	Upgradation of sports areas : hockey ground, tennis court			**500 Lakhs**
	Upgradation and upkeep of green areas			**200 Lakhs**
				1500 Lakhs

6.4 Proposal 3: Proposal for new structure of 1857 museum within the complex

Site identified for 1857 museum is towards the west gate of the college which has view from main district road. Bareilly has been an important site for 1857 mutiny and the freedom fighters an narratives of local community of the mutiny are not documented and not available as a resource to generate pride within people of Bareilly. this has been lost over time. The College complex is an educational institute and has footfall of youth. This site is identified for the museum as the iste is located in center of the city, the land parcel and ownership is feasible for the construction of government owned structure, its well-connected and site identified also looks over a main road of city and more over the landuse is institutional and therefore completely in sync with the proposed museum,

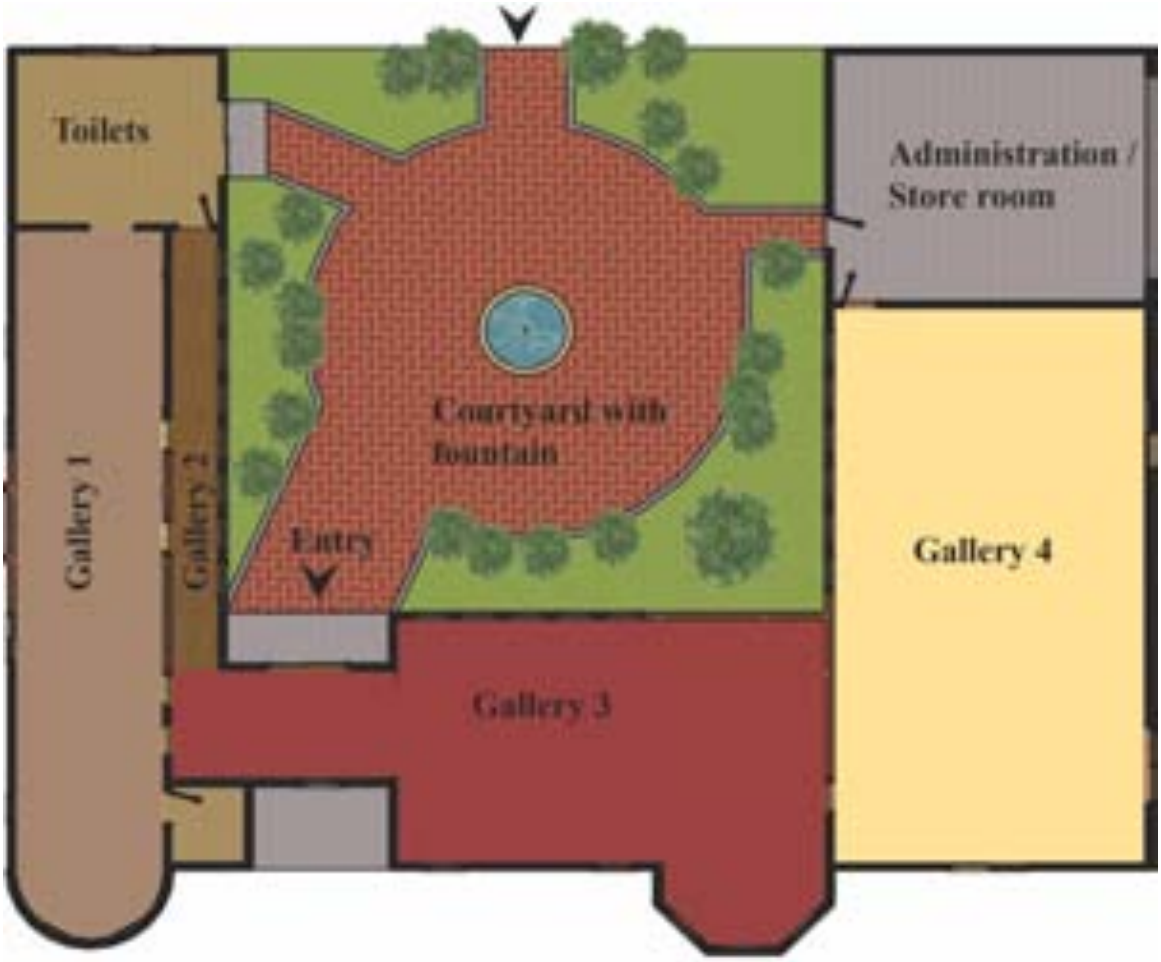


Figure 40: Concept for planning within in the museum block

Figure 41: Concept for view of museum block

Figure 42: Concept for view of museum block

Figure 43: Concept view of courtyard building in exposed brick work for the museum

	Development of Theme based Museum.	Identification and demarcation of site boundaries
		Design Development of Museum
		Construction of museum building
		Operation and maintenance of the building
	Interpretative displays of the history of the region and associated personalities, role of Bareilly.	Consultancy works for the research and content development of 1857 narratives and local stories
		Interpretative methods and installation designs

6.5 Financial Estimates for the works to be undertaken

	Item	Qty	Rate	Amount
	RCC frame structure	7200	9150	6,58,80,000/-
	Water Proofing works	3000	225	6,75,000/-
	Finishing works	7200	1750	1,26,00,000/-
	Landscaping courtyard and surrounding	6500	915	59,47,500/-
	Interior Furniture, installations and museum furniture	7200	1800 /-	1,29,60,000/-
				9,80,62,000/-
	Electrical works		12.5%	1,17,67,440/-
	Plumbing		7.5%	73,54,650/-
	HVAC		2.5%	24,51,550/-
	Signages		2.0%	19,61,240/-
	Contingencies		3%	3,88,800/-
				12,19,85,680/-

	Conservation and upgradation works	100,10,00,000/-
	Site development and upgradation	15,00,00,000/-
	Provision of New museum	12,19,85,680/-

6.6 List of Stakeholders

- Bareilly Municipal Corporation
- UP Tourism
- Education Department

6.7 Project Time-line

- The Development of theme-based museum including the preparation of interpretative material – 2-3 years
- Site upgradation and visitor amenities – 2-3 years

7. Project 5: Urban Renewal of Nath Temple Circuit & infrastructure improvement of all Nath Temples precincts

7.1 Vision – Developing Nath Temple Circuit

Project – Urban Renewal of Nath Temple circuit & Infrastructure improvement of all Seven Nath Temples

7.2 Introduction

The Bareilly city, which is known as the Nath Nagri because of the seven Nath temples that are situated at its seven access points via various cities, has a strong religious identity. The city has a very deep spiritual heritage, which draws tourists to the Nath temples from many other towns. The Saavan month and Maha Shivratri see the largest influx of people to these Nath temples. Numerous thousands of pilgrims also travel to the city for the parikrama of the Seven Nath temple, which contributes to the city's religious uniqueness.

A - Tapeshwar Nath
B - Madi Nath
C - Alakh Nath
D - Trivati Nath
E - Bankhandi Nath
F - Pashupati Nath
G - Dhopeshwar Nath

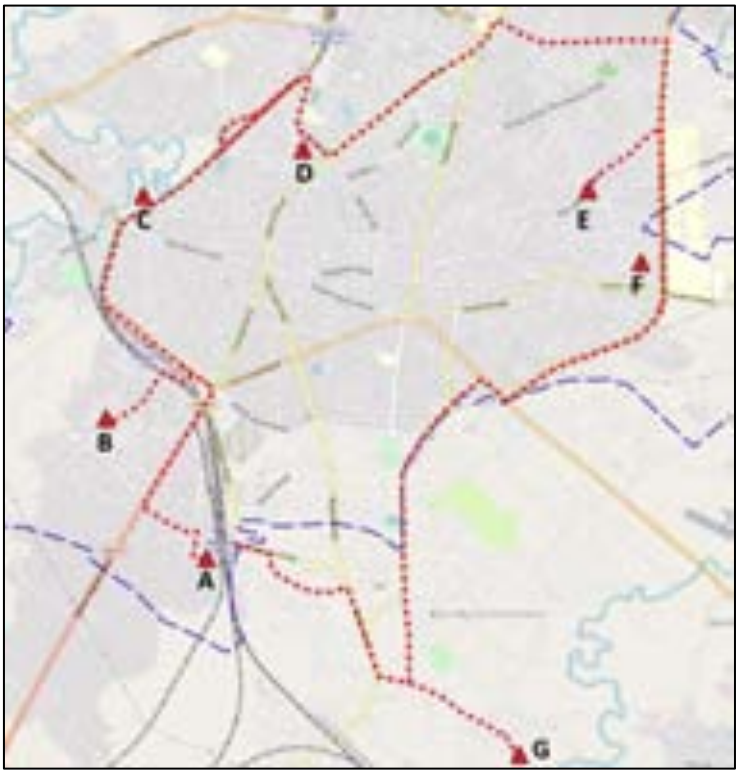


Figure 44: Nath Nagri Circuit and Temples Location

7.3 Condition Assessment

Since the seven Nath temples are situated on different routes which are entrance gateways to the city from other cities, they can be accessed from any of these routes. These seven routes formed the base of city's connectivity to major cities like Nainital (Trivatinath Temple), Delhi (Alakhnath Temple), Chandausi (Madinath Temple), Badaun (Tapeshwar Nath Temple), Lucknow (Dopeshwar Nath Temple), Bilaspur (Pashupatinath Temple) and Pilibhit (Vankhandinath temple).

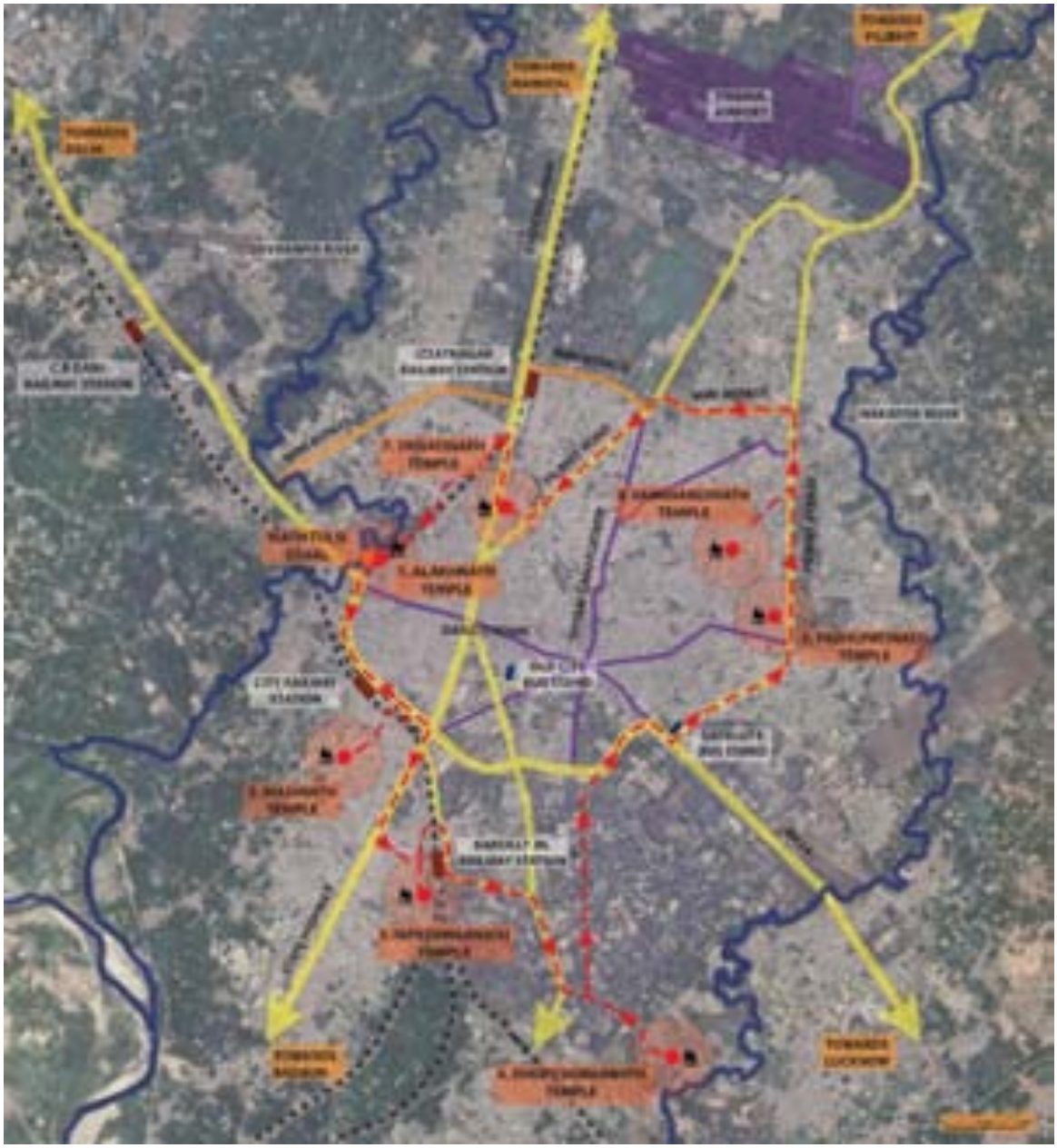
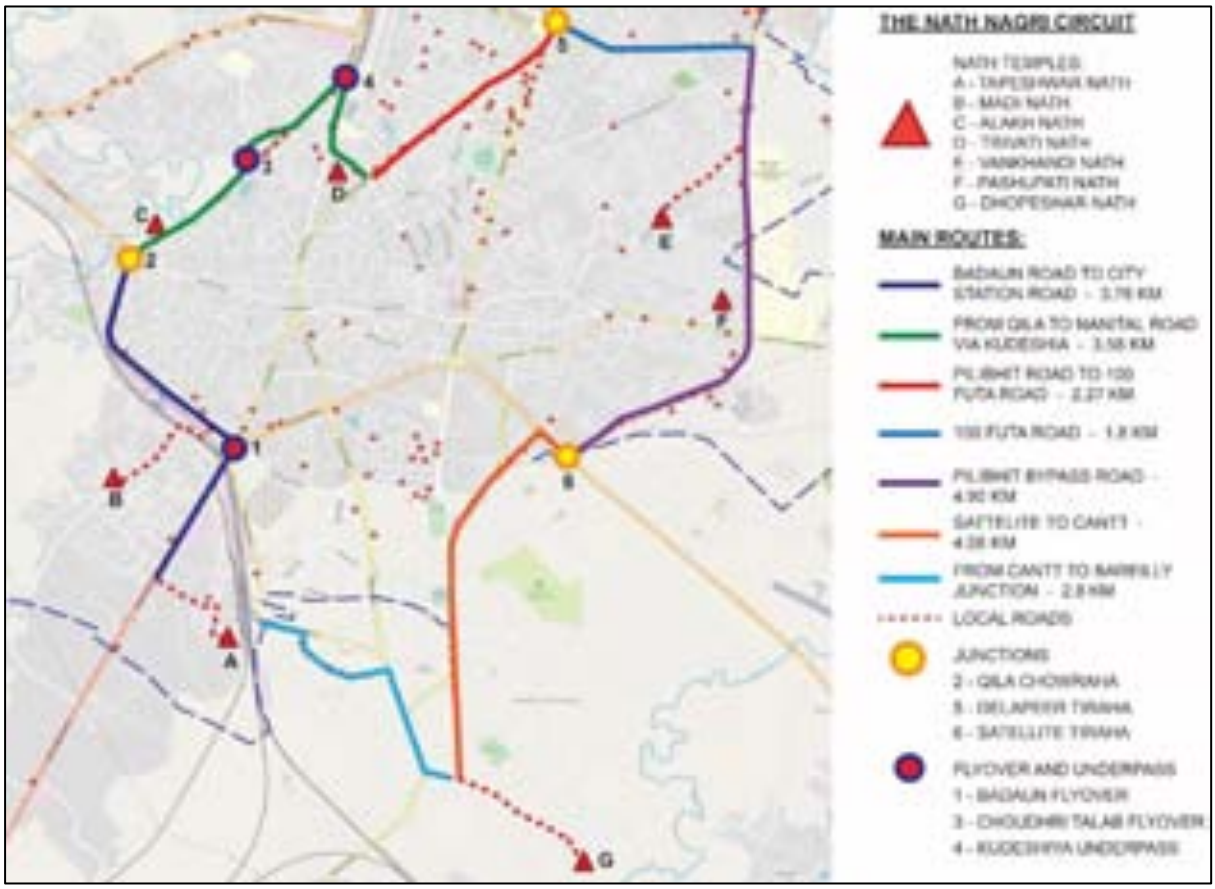


Figure 45: Nath Temple Complex

(Source: Urban Design Team)

Since the establishment of Nath temples at the city's outskirts to serve as its entrances, the city has grown significantly on all sides, enveloping all seven Nath temples and erasing their distinction as city gateways. The overall circuit that connects all Nath temples has disappeared as a result of the city's growth as well as the precincts of all Nath temples losing its imageability over time. There are

no formal, legible entrances or paths that highlight their uniqueness and reinforce their presence in the city.

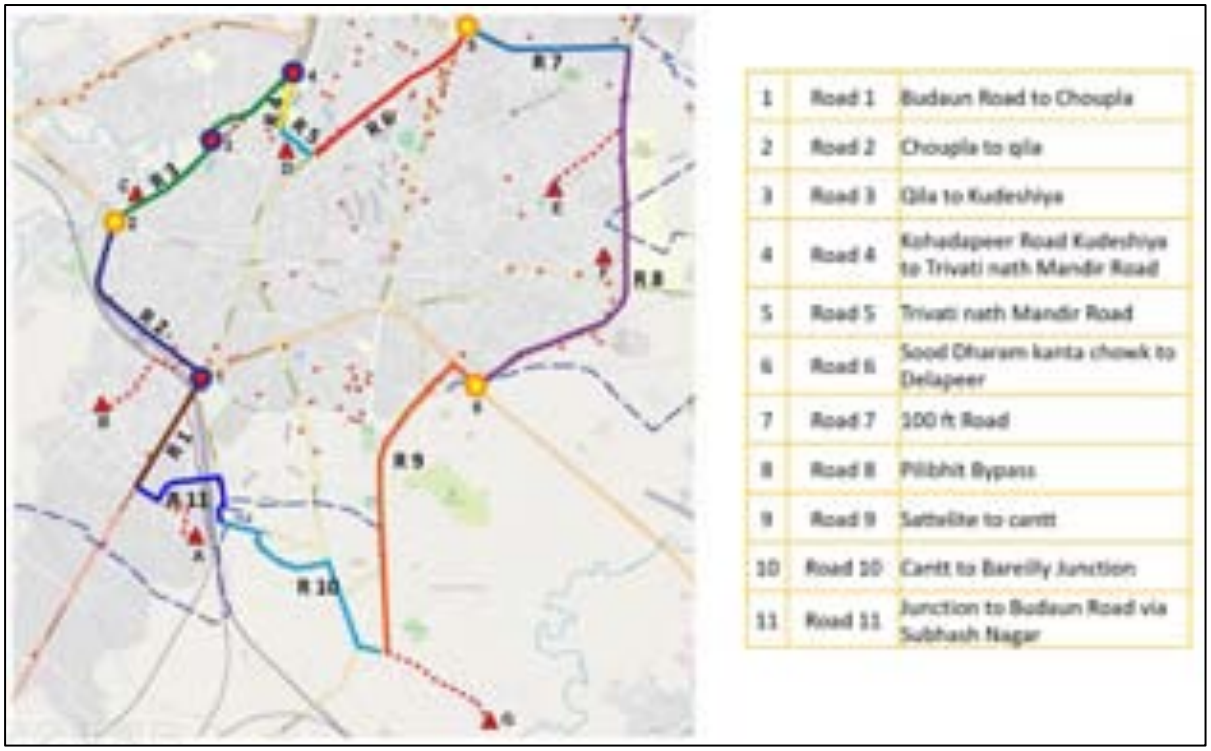


Distances of Temples

- Alakh Nath Temple to Trivati Nath Temple : 3.2 Km
- Trivati Nath Temple to Bankhandi Nath Temple : 6.3 Km
- Bankhandi Nath Temple to Pashupati Nath Temple : 3.0 Km
- Pashupati Nath Temple to Dhopeshwar Nath Temple : 8.2 Km
- Dhopeshwar Nath Temple to Tapeshwar Nath Temple : 5.8 Km
- Tapeshwar Nath Temple to Madi Nath Temple : 2.5 Km
- Madi Nath Temple to Alakh Nath Temple : 3.5 Km

Total Length of the Circuit: 32.5 Km

7.4 Route details



1	Road 1	Budaun Road to Choupla
2	Road 2	Choupla to qila
3	Road 3	Qila to Kudeshiya
4	Road 4	Kohadapeer Road Kudeshiya to Trivati nath Mandir Road
5	Road 5	Trivati nath Mandir Road
6	Road 6	Sood Dharam kanta chowk to Delapeer
7	Road 7	100 ft Road
8	Road 8	Pilibhit Bypass
9	Road 9	Sattelite to cantt
10	Road 10	Cantt to Bareilly Junction
11	Road 11	Junction to Budaun Road via Subhash Nagar

NATH NAGRI CIRCUIT - Bareilly								
S. No	**Temple**	**Name of road section**	**Road ownership**	**Length (km)**	**Starting point**	**End point**	**Existing ROW**	**Proposal for new infrastructure**
1	**Alakh Nath Temple to Trivati Nath Temple**	Road 3 : Qila to Kudeshiya	Nagar Nigam	2.56 km	Alakhnath Temple	Kudeshiya Underpass	11 - 15 m	
		Road 4 : Kohadapeer Road Kudeshiya to Trivati nath Mandir Road	Nagar Nigam	0.6 km	Kudeshiya Underpass	Tibrinath Mandir Road	22 - 24 m	
		Road 5 : Trivati Nath Mandir Road	Nagar Nigam	0.5 km	Tibrinath Mandir Road	Sood dharamkanta chowk	15 - 18 m	
2	**Trivati Nath Temple to Vankhandi Nath Temple**	Road 5 : Trivati Nath Mandir Road	Nagar Nigam	0.5 km	Tibrinath Mandir Road	Sood dharamkanta chowk	15 - 18 m	
		Road 6 : Sood Dharam kanta chowk to Delapeer	Nagar Nigam	2.25 km	Sood dharamkanta chowk	Delapeer	26 - 28 m	
		Road 7 : 100 ft Road	Nagar Nigam	1.76 km	Delapeer	Pilibhit Bypass T point	16 - 20 m	
		Road 8 : Pilibhit Bypass Road	Nagar Nigam	5 km	100 futa T point	Jogi Nawada	42 - 45 m	Near Bankhandi Nath Temple
		Jogi Nawada Internal Road	Nagar Nigam	1 km	Road 8	Vankhandi Nath Temple	9 - 12 m	

NATH NAGRI CIRCUIT - Bareilly								
S. No	**Temple**	**Name of road section**	**Road ownership**	**Length (km)**	**Starting point**	**End point**	**Existing ROW**	**Proposal for new infrastructure**
3	**Bankhandi Nath Temple to Pashupati Nath Temple**	Road 8 : Pilibhit Bypass Road	Nagar Nigam	5 km	Jogi Nawada	Pashupati Nath Temple	42 - 45 m	Near Bankhandi Nath Temple Near Pashupati Nath Temple
4	**Pashupati Nath Temple to Dhopeshwar Nath Temple**	Road 8 : Pilibhit Bypass Road	Nagar Nigam	5 km	Jogi Nawada	Satellite chowraha	42 - 45 m	Near Pashupati Nath Temple
		Road 9 : Satellite to Cantt	Nagar Nigam	4 km	Satellite chowraha	St Stephen Church	9 - 12 m	
		Cantt Internal Road	Cantt	1.5 km	St Stephen Church	Dhopeshwar Nath Temple	9 - 12 m	
5	**Dhopeshwar Nath Temple to Tapeshwar Nath Temple**	Road 10 : Cantt to Bareilly Junction	Cantt	2.8 km	St Stephen Church	Bareilly Junction Station	14 - 20 m	
		Road 11 : Junction to Budaun Road via Subhash Nagar	Nagar Nigam	1.6 km	Bareilly Junction Station	Tapeshwar Nath Temple	9 - 12 m	
6	**Tapeshwar Nath Temple to Madi Nath Temple**	Shubash nagar Internal Road	Nagar Nigam	1 km	Tapeshar Nath Temple	Chungi Road	9 m	
		Road 1 : Badaun road to Choupla	Nagar Nigam	1.6 km	Chungi Road	Choupla	24 - 28 m	
		Road 2 : Coupla to Qila	Nagar Nigam	2.5 km	Choupla	Qila	20 - 22 m	
		Madinath Internal Road	Nagar Nigam	1.5 km	Road 2	Madinath Temple	9 m	
7	**Madi Nath Temple to Alakh Nath Temple**	Road 2 : Coupla to Qila	Nagar Nigam	2.5 km	Choupla	Qila	20 - 22 m	
		Road 3 : Qila to Kudeshiya	Nagar Nigam	2.56 km	Road 2	Alakhnath Temple	11 - 15 m	

Based on the discussion with Temple priest and other stakeholders, the Nath Nagri circuit starts from Alakh Nath Temple as first temple of the route to Trivati Nath Temple than Bankhandi Nath Temple than Pashupati Nath Temple than Dhopeshwar Nath Temple than Tapeshwar Nath Temple than Madi Nath Temple and ends back to Alakh Nath Temple.

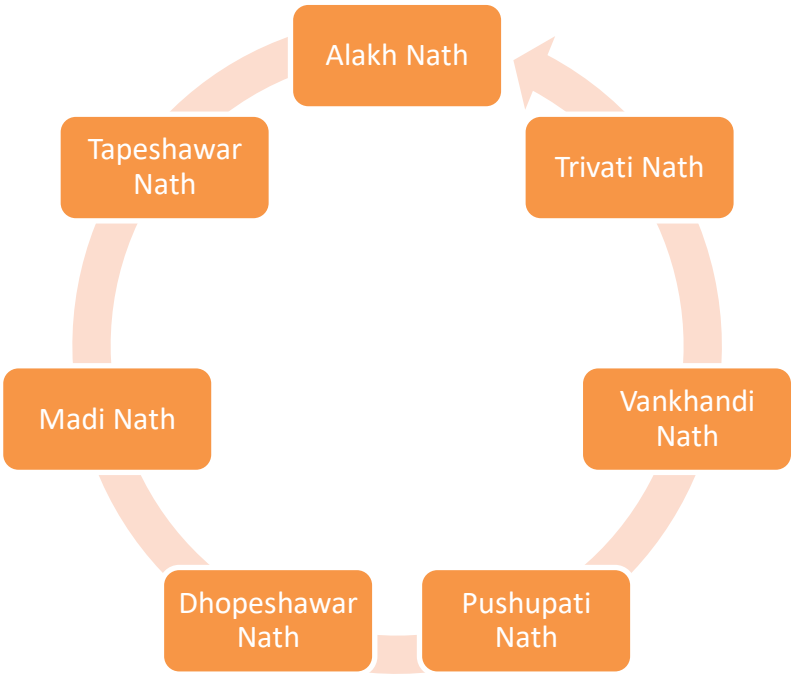
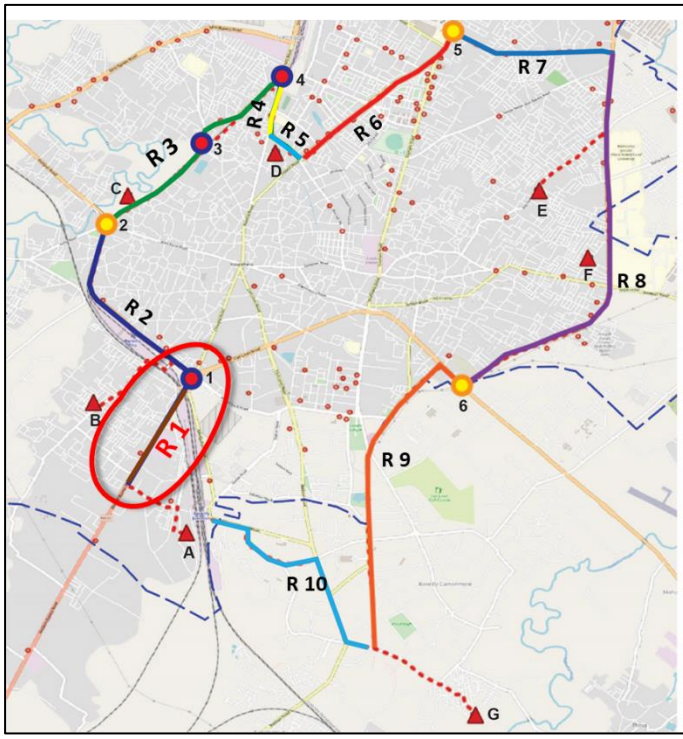


Figure 46: Nath Circuit Cycle

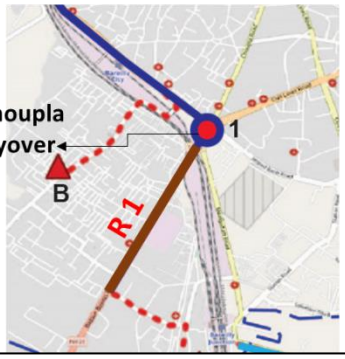
7.5 Road wise details

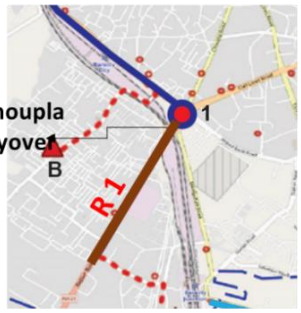
7.5.1 Road 1: Budaun Road to Choupla



Road 1 : Budaun Road to Choupla

Length :	1.6 km
Road Width :	24 – 28 m wide
Type of Road :	4 Lane (Divider)
Pedestrian Facility:	No Footpath
Public Transport :	Autorickshaw E-Rickshaw City Bus
NMV Lane :	Not available





Road 1 Choupla Flyover Entry

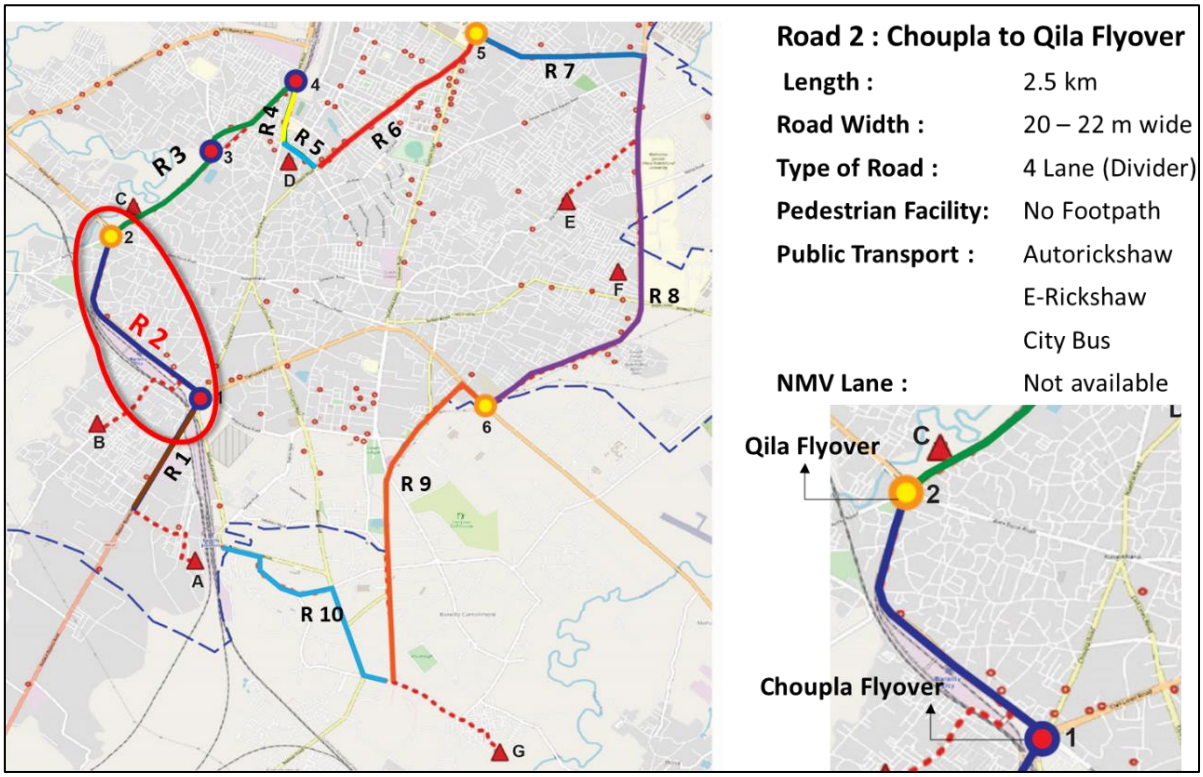
Road Condition

Road Condition

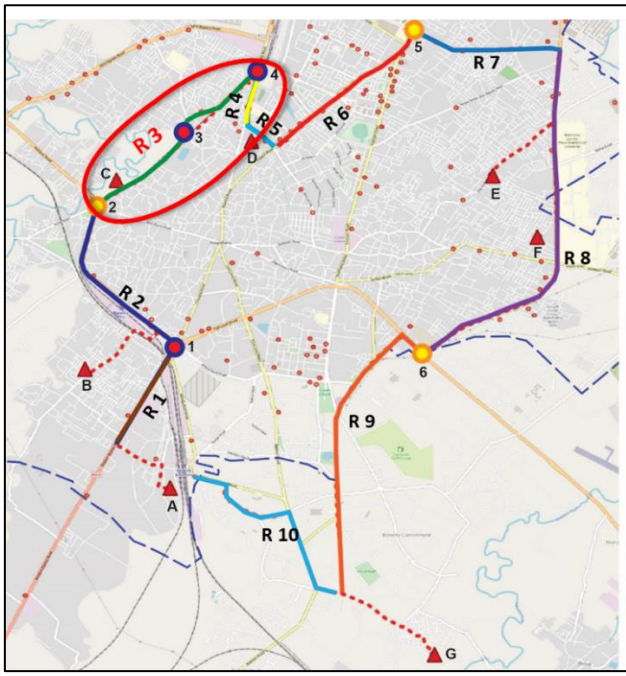
Road Condition

Road Condition

7.5.2 Road 2 : Choupla to Qila Flyover

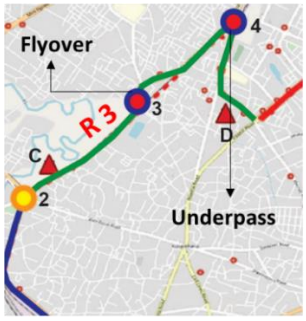


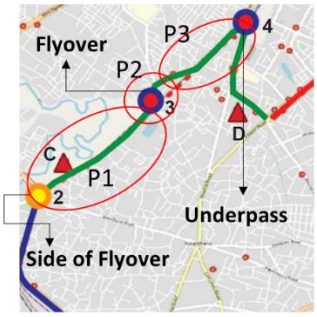
7.5.3 Road 3 : Qila to Kudeshiya Under Pass



Road 3 : Qila to Kudeshiya Under Pass

Road Length :	2.56 km
Road Width :	11 – 15 m wide
Type of Road :	2 Lane (No Divider)
Pedestrian Facility:	No Footpath
Public Transport :	Autorickshaw E-Rickshaw
NMV Lane :	Not available





P1 – Qila Flyover to Chowdhri Talab Flyover – 11 to 15 m wide

P2 – Chowdhri Talab Flyover – 8.5 m wide

P3 – Chowdhri Talab Fly over to Qudeshiya Under pass – 15 m wide

P1 Road Condition

P1 Road Condition

P1 Road Condition

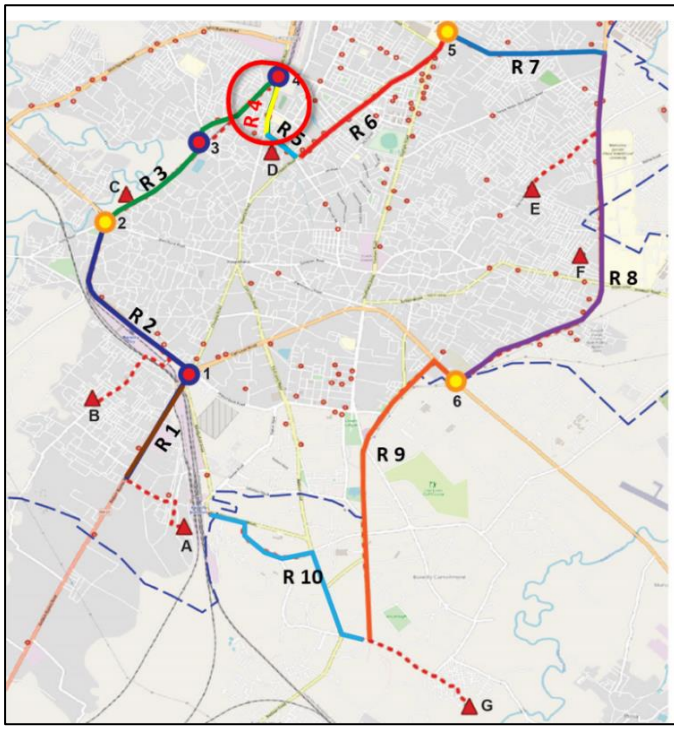
P1 Flyover Entry

P2 Fly over

P3 Road

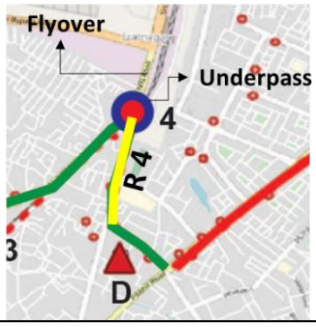
P3 Road

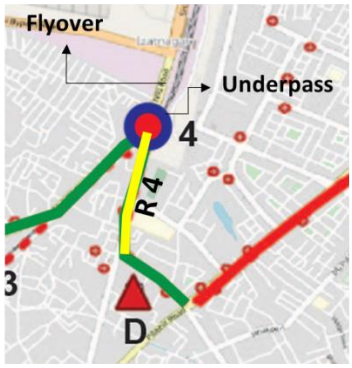
7.5.4 Road 4 : Kudeshiya to Trivati Nath Mandir Road



Road 4 : Kudeshiya to Trivati nath Mandir Road

Road Length :	600 m
Road Width :	22 – 24 m wide
Type of Road :	2 Lane (No Divider)
Pedestrian Facility:	No Footpath
Public Transport :	Autorickshaw E-Rickshaw
NMV Lane :	Not available





Road Condition

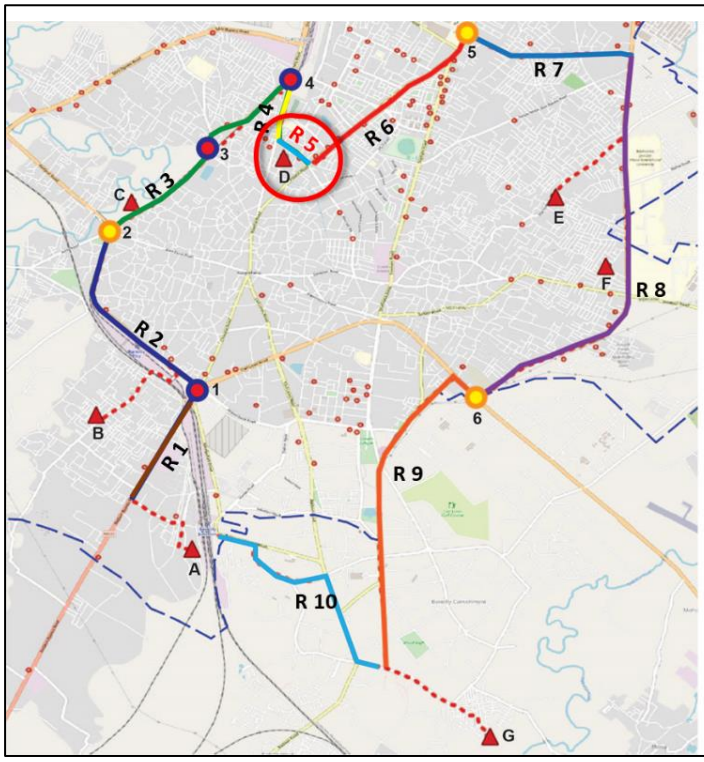
Road Condition

Road Condition

Road below Flyover

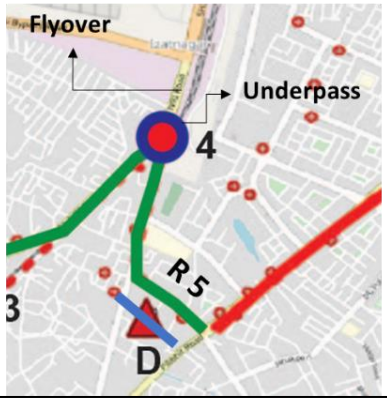
Underpass Entrance

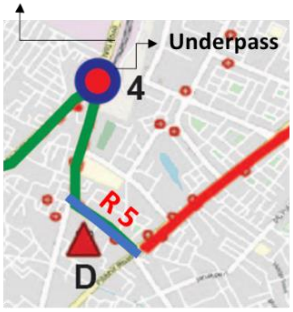
7.5.5 Road 5 : Trivati Nath Mandir Road



Road 5 : Trivati Nath Mandir Road

Road Length :	500 m
Road Width :	15 – 18 m wide
Type of Road :	2 Lane (No Divider)
Pedestrian Facility:	No Footpath
Public Transport :	Autorickshaw
	E-Rickshaw
NMV Lane :	Not available





Mandir Gate

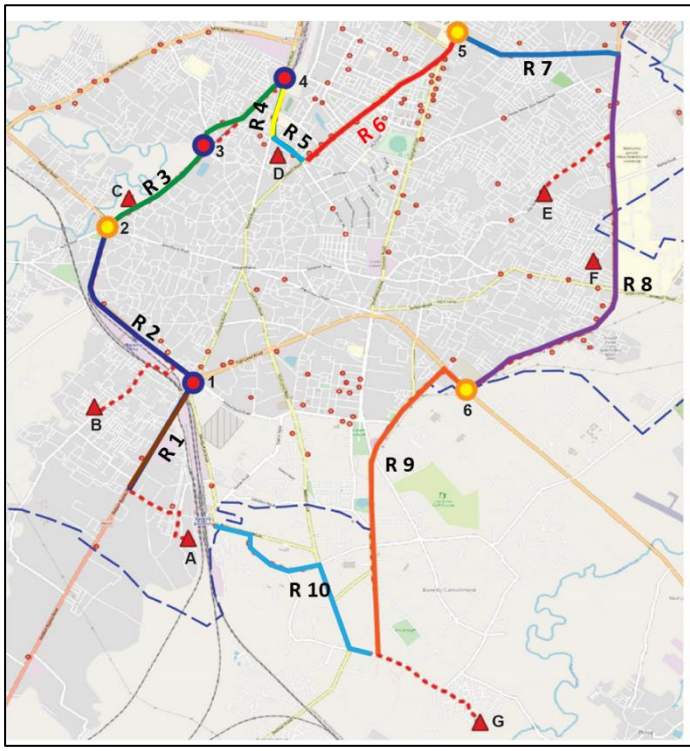
Mandir Gate

Road Condition

Road Condition

Road Condition

7.5.6 Road 6 : Trivati Nath Mandir Road

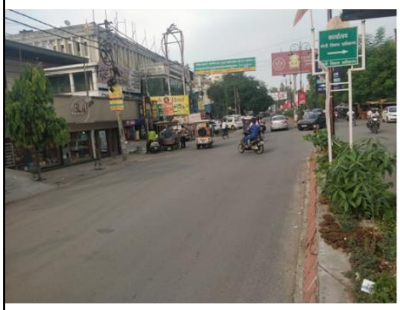


Road 6 : Sood Dharam kanta chowk to Delapeer

Road Length :	2.25 km
Road Width :	26 – 28 m wide
Type of Road :	4 Lane (Divider)
Pedestrian Facility:	No Footpath
Public Transport :	Autorickshaw E-Rickshaw
NMV Lane :	Not available

Road Condition

Road Condition

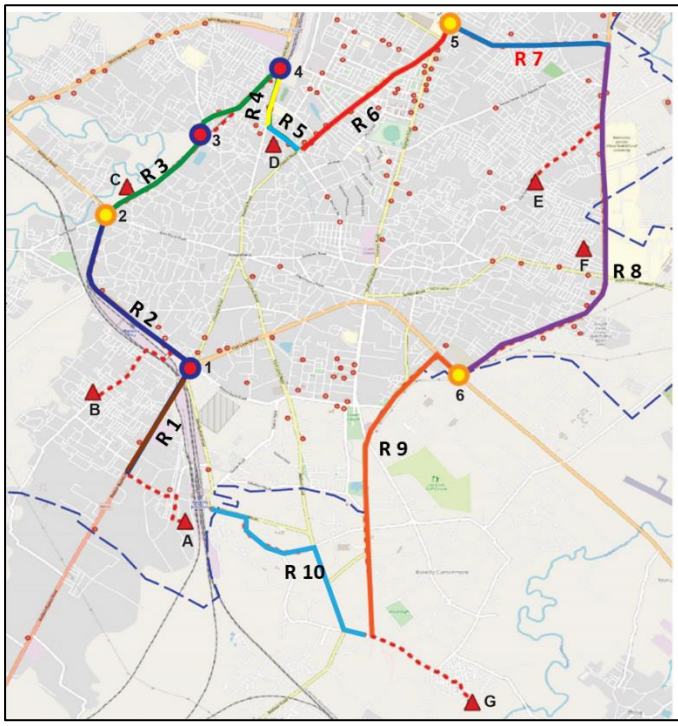


Road Condition

Road Condition

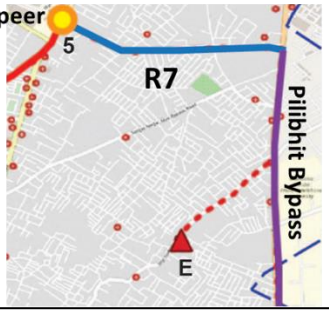
Road Condition

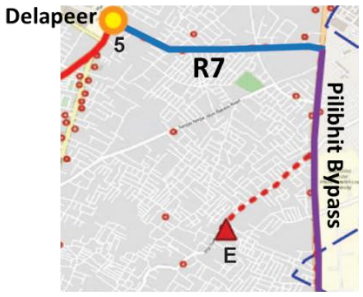
7.5.7 Road 7 : Pilibhit Bypass Road



Road 7 : 100 ft Road

Road Length :	1.76 km
Road Width :	16 – 20 m wide
Type of Road :	4 Lane (Divider)
Pedestrian Facility:	No Footpath
Public Transport :	Autorickshaw E-Rickshaw
NMV Lane :	Not available





R 7 Exit to R 8

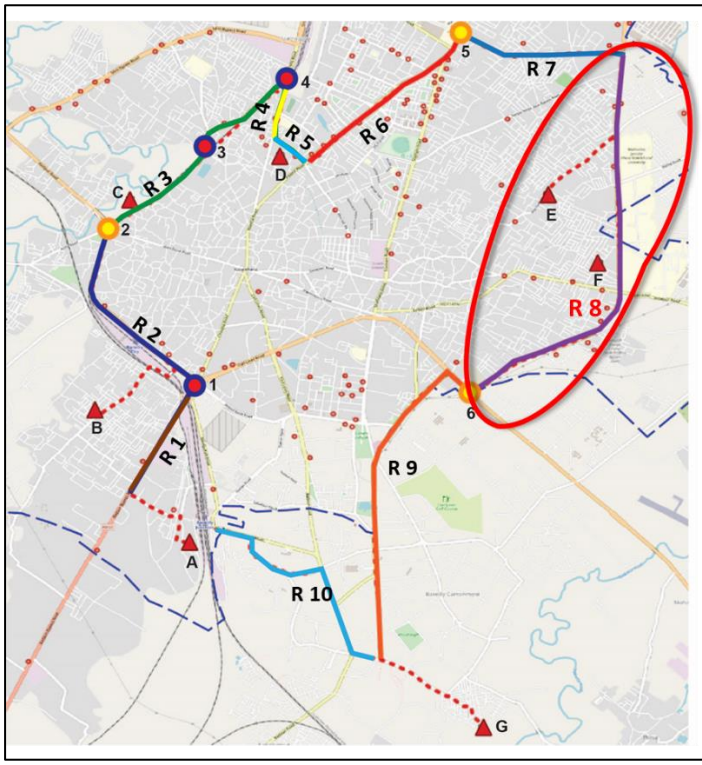
Road Condition

Road Condition

Road Condition

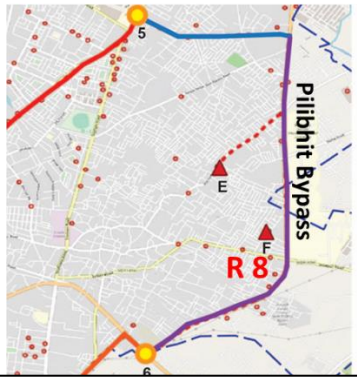
Road Condition

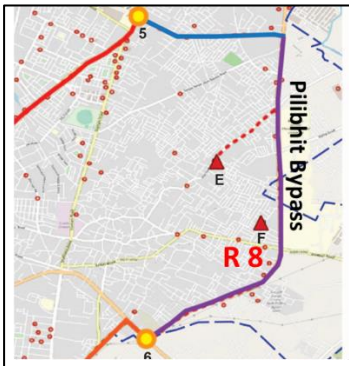
7.5.8 Road 8 : Pilibhit Bypass Road



Road 8 : Pilibhit Bypass Road

Road Length :	5 km
Road Width :	42 – 45 m wide
Type of Road :	4 Lane (Divider)
Pedestrian Facility:	No Footpath
Public Transport :	Autorickshaw
	E-Rickshaw
	City Bus
NMV Lane :	Not available





R 7 Exit to R 8

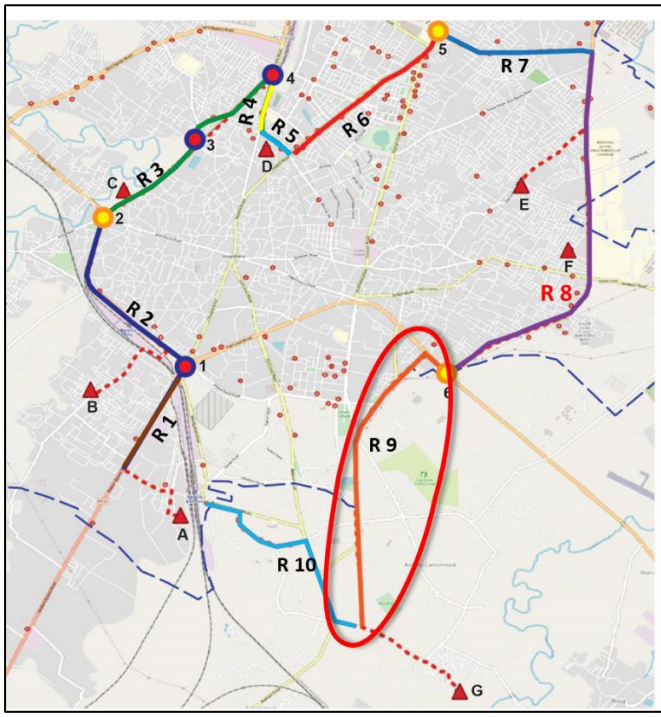
Road Condition

Road Condition

Road Condition

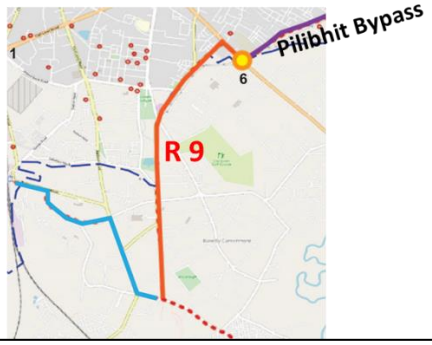
Road Condition

7.5.9 Road 9 : Satellite to Cantt

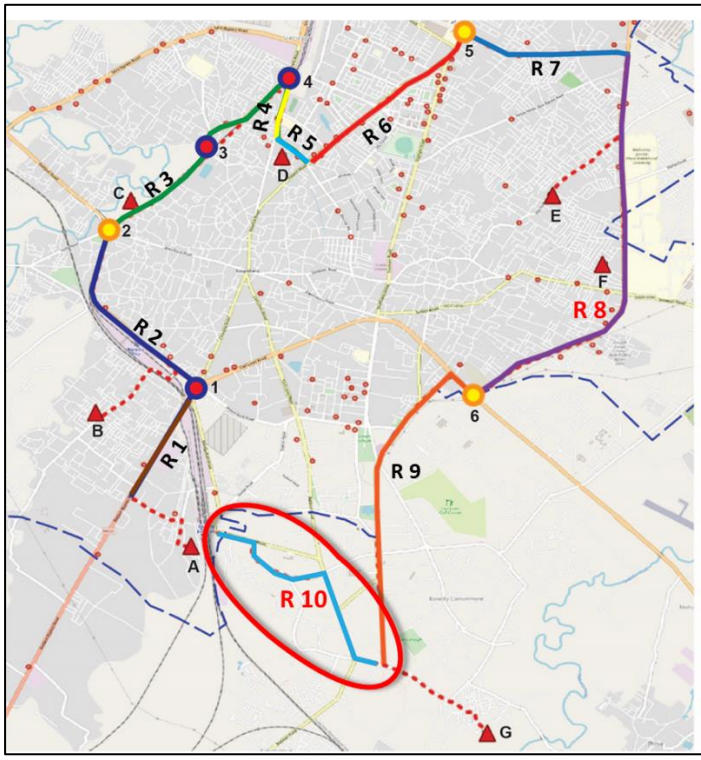


Road 9 : Satellite to Cantt

Road Length :	4 km
Road Width :	8 – 12 m wide
Type of Road :	2 Lane (No Divder)
	4 Lane (Divider)
Pedestrian Facility:	No Footpath
Public Transport :	Autorickshaw
	E-Rickshaw
NMV Lane :	Not available

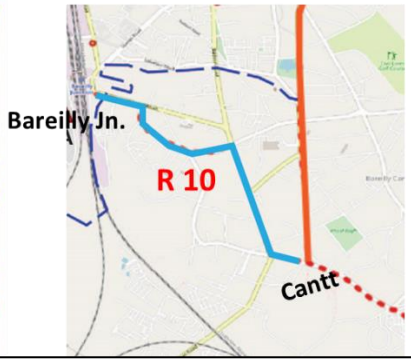


7.5.10 Road 10 : Cantt to Bareilly Junction



Road 10 : Cantt to Bareilly Junction

Road Length :	2.8 km
Road Width :	13 - 20 m wide
Type of Road :	4 Lane (Divider)
Pedestrian Facility:	No Footpath
Public Transport :	Autorickshaw
	E-Rickshaw
NMV Lane :	Not available



The Nath Temples are visited by the people throughout the year but majorly crowded in the month of Saavan and Maha Shivratri. The popularity of the temples is very much among the people of city and the state. The Nath Nagari Circuit has the potential of attracting the new visitors and enhances the tourism in the city. The roads identified for the circuit needs to be improvise for better connectivity and facilities of visitors.

7.6 Proposal

The enhance the feeling of the Nath Temple Circuit of Bareilly the proposal are to ease the travelling from one Nath temple to other and provide safe and proper facilities throughout the circuit. The main proposals are as follows

- Adding IPT, NMT, and other public transit nodes to the circuit to improve connectivity and accessibility
- Provision of Foot over Bridges on the roads with wide span to facilitate the pedestrian movement for the Temples.
- Provision of parking area for the visitors.
- Using signs and other visual markers to improve the city's chowks, chaurahas, and market streets' readability and identity.

7.7 Connectivity improvement

The circuit needs to have a proper connectivity to provide seamless movement among the Nath temples. As mentioned in the map below the roads with existing Bus service and IPT service in the circuit. The two main proposals are:

- Provision of IPT on the circuit
- Provision of Nath Circuit specific E-carts

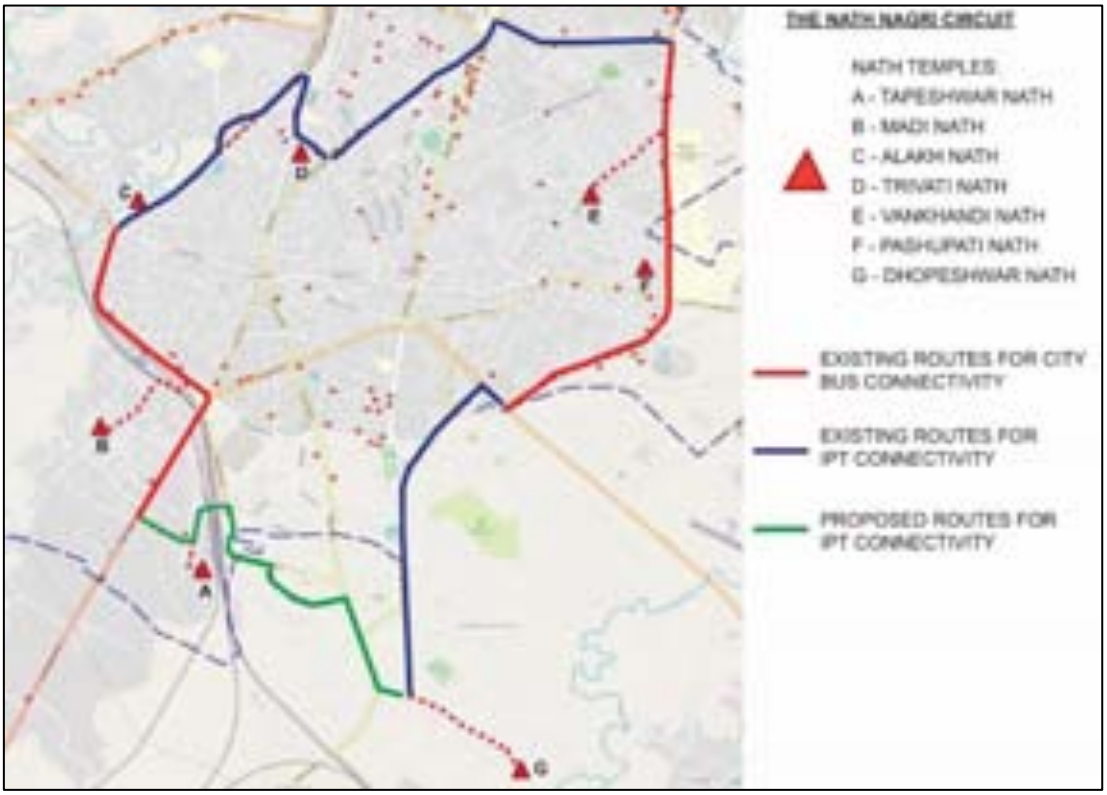


Figure 47: Existing and proposed Public Transport Routes

7.8 Nath Nagri E-Rickshaws:

The proposal is to provide continuous connectivity to the route by providing E-Rickshaws specifically for Nath Circuit movement. These E-Rickshaws will be managed by the Nagar Nigam and visitors can use this facility by buying ticket from any Nath temple.

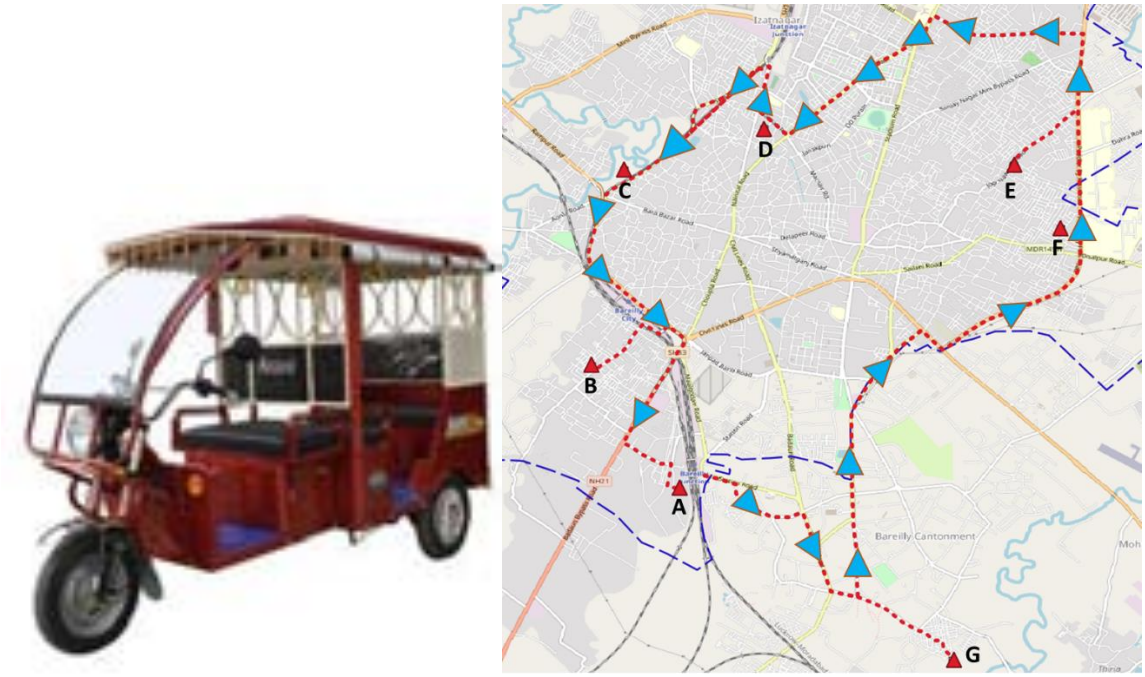


Figure 48: E-Rickshaw Routes

Features of Nath Nagri E-Rickshaws

- Availability on all 7 Nath temples
- No repetitive activity of finding transport after each temple.
- One ticket will work for whole route
- Employment generation for city people.
- Managed by Nagar Nigam

7.9 Foot Over Bridges

Foot-over Bridges are provided on the roads with wide span to facilitate the pedestrian movement for the Temples.

Location of Foot Over Bridges:

- Pilibhit Bypass Road
  - Near Bankhandi Nath Temple
  - Near Pashupati Nath Temple
- Bareilly Station to connect Tapeshawar Nath Temple

7.10 Existing MLCP in Bareilly

Location of MLCP:

1. DD Puram
2. Gandhi Udhyan
3. Ghanta Ghar

7.11 Design Component

NATH NAGRI CIRCUIT - Bareilly							
S.No	Temple	Name of road section	Length (km)	Component	Description	Total Amount	Total Cost
1	Alakh Nath Temple to Trivati Nath Temple	Road 4 : Kohadapeer Road Kudeshiya to Trivati nath Mandir Road	0.6 km	Footpath	1 Side	11,41,200	15,57,700
				Signages	1 Side	8,000	
				Electrical Works	1 Side (LED)	30,000	
				Dustbins	SS Twin Bins	16,000	
				Bollard	900 mm Concrete bollard on 1 side	1,40,000	
				Vending Kiosk	Fixed Vending kiosk (2x3 m size)	2,00,000	
				Cat Eye	Solar LED Road Studs, 12 V	22,500	
		Road 5 : Trivati Nath Mandir Road	0.5 km	Footpath	1 Side	9,51,000	11,77,500
				Signages	1 Side	8,000	
				Electrical Works	1 Side (LED)	30,000	
				Dustbins	SS Twin Bins	16,000	
				Bollard	900 mm Concrete bollard on 1 side	1,40,000	
				Cat Eye	Solar LED Road Studs, 12 V	22,500	
				Variable Display Boards	Wall & Pole mounted (72 x 48 inch)	10,000	
		Road 6 : Sood Dharam kanta chowk to Delapeer	2.25 km	Dismantling portion		1,00,000	70,34,500
				Civil Works	Not Required	0	
				Footpath	1 Side	42,79,500	
				Signages	1 Side	40,000	
				Electrical Works	1 Side (LED)	1,50,000	
				Dustbins	SS Twin Bins	1,20,000	
				Bollard	900 mm Concrete bollard on 1 side	7,00,000	
				Vending Kiosk	Fixed Vending kiosk (2x3 m size)	8,00,000	
				Cat Eye	Solar LED Road Studs, 12 V	3,15,000	
				Variable Display Boards	Wall & Pole mounted (72 x 48 inch)	30,000	
				Public conveniences	Male & Female toilet unit	5,00,000	
		Road 7 : 100 ft Road	1.76 km	Dismantling portion		1,00,000	57,82,520
				Civil Works	Not Required	0	
				Footpath	1 Side	33,47,520	
				Signages	1 Side	20,000	
				Electrical Works	1 Side (LED)	1,00,000	
				Dustbins	SS Twin Bins	80,000	
				Bollard	900 mm Concrete bollard on 1 side	4,90,000	
				Vending Kiosk	Fixed Vending kiosk (2x3 m size)	4,00,000	
				Cat Eye	Solar LED Road Studs, 12 V	2,25,000	
				Variable Display Boards	Wall & Pole mounted (72 x 48 inch)	20,000	
				Public conveniences	Male & Female toilet unit	10,00,000	
3	Bankhandi Nath	Road 8 : Pilibhit	5 km	Dismantling portion		3,00,000	5,50,50,000

NATH NAGRI CIRCUIT - Bareilly							
S.No	Temple	Name of road section	Length (km)	Component	Description	Total Amount	Total Cost
	Temple to Pashupati Nath Temple	Bypass Road		Civil Works	Not Required	0	
				Footpath	1 Side	95,10,000	
				Signages	1 Side	80,000	
				Electrical Works	1 Side (LED)	2,50,000	
				Dustbins	SS Twin Bins	2,00,000	
				Bollard	900 mm Concrete bollard on 1 side	14,00,000	
				Vending Kiosk	Fixed Vending kiosk (2x3 m size)	8,00,000	
				Cat Eye	Solar LED Road Studs, 12 V	4,50,000	
				Variable Display Boards	Wall & Pole mounted (72 x 48 inch)	60,000	
				Foot-over-Bridge	Foot-over-Bridge	4,00,00,000	
				Public conveniences	Male & Female toilet unit	20,00,000	
4	**Pashupati Nath Temple to Dhopeshwar Nath Temple**	Road 9 : Satellite to Cantt	4 km	Dismantling portion		5,00,000	1,28,63,000
				Civil Works	Not Required	0	
				Footpath	1 Side	76,08,000	
				Signages	1 Side	80,000	
				Electrical Works	1 Side (LED)	2,50,000	
				Dustbins	SS Twin Bins	2,00,000	
				Bollard	900 mm Concrete bollard on 1 side	10,50,000	
				Vending Kiosk	Fixed Vending kiosk (2x3 m size)	8,00,000	
				Cat Eye	Solar LED Road Studs, 12 V	3,15,000	
				Variable Display Boards	Wall & Pole mounted (72 x 48 inch)	60,000	
				Public conveniences	Male & Female toilet unit	20,00,000	
5	**Dhopeshwar Nath Temple to Tapeshwar Nath Temple**	Road 10 : Cantt to Bareilly Junction	2.8 km	Dismantling portion		3,00,000	82,45,600
				Civil Works	Not Required	0	
				Footpath	1 Side	53,25,600	
				Signages	1 Side	40,000	
				Electrical Works	1 Side (LED)	1,50,000	
				Dustbins	SS Twin Bins	1,20,000	
				Bollard	900 mm Concrete bollard on 1 side	7,00,000	
				Vending Kiosk	Fixed Vending kiosk (2x3 m size)	4,00,000	
				Cat Eye	Solar LED Road Studs, 12 V	1,80,000	
				Variable Display Boards	Wall & Pole mounted (72 x 48 inch)	30,000	
				Public conveniences	Male & Female toilet unit	10,00,000	
		Road 11 : Junction to Budaun Road via Subhash Nagar	1.6 km	Dismantling portion		1,00,000	2,44,84,700
				Civil Works	Not Required	0	
				Footpath	1 Side	30,43,200	
				Signages	1 Side	32,000	
				Electrical Works	1 Side (LED)	1,00,000	

NATH NAGRI CIRCUIT - Bareilly							
S.No	Temple	Name of road section	Length (km)	Component	Description	Total Amount	Total Cost
				Dustbins	SS Twin Bins	56,000	
				Bollard	900 mm Concrete bollard on 1 side	4,20,000	
				Vending Kiosk	Fixed Vending kiosk (2x3 m size)	2,00,000	
				Cat Eye	Solar LED Road Studs, 12 V	13,500	
				Variable Display Boards	Wall & Pole mounted (72 x 48 inch)	20,000	
				Foot-over-Bridge	Foot-over-Bridge	2,00,00,000	
				Public conveniences	Male & Female toilet unit	5,00,000	
6	**Tapeshwar Nath Temple to Madi Nath Temple**	Road 1 : Badaun road to Choupla	1.6 km	Dismantling portion		2,00,000	83,34,700
				Civil Works		37,50,000	
				Footpath	1 Side	30,43,200	
				Signages	1 Side	32,000	
				Electrical Works	1 Side (LED)	1,00,000	
				Dustbins	SS Twin Bins	56,000	
				Bollard	900 mm Concrete bollard on 1 side	4,20,000	
				Vending Kiosk	Fixed Vending kiosk (2x3 m size)	2,00,000	
				Cat Eye	Solar LED Road Studs, 12 V	13,500	
				Variable Display Boards	Wall & Pole mounted (72 x 48 inch)	20,000	
				Public conveniences	Male & Female toilet unit	5,00,000	
		Road 2 : Coupla to Qila	2.5 km	Dismantling portion		1,00,000	1,02,90,000
				Civil Works	Not Required	30,00,000	
				Footpath	1 Side	47,55,000	
				Signages	1 Side	40,000	
				Electrical Works	1 Side (LED)	1,50,000	
				Dustbins	SS Twin Bins	1,20,000	
				Bollard	900 mm Concrete bollard on 1 side	5,60,000	
				Vending Kiosk	Fixed Vending kiosk (2x3 m size)	4,00,000	
				Cat Eye	Solar LED Road Studs, 12 V	1,35,000	
				Variable Display Boards	Wall & Pole mounted (72 x 48 inch)	30,000	
				Public conveniences	Male & Female toilet unit	10,00,000	
7	**Madi Nath Temple to Alakh Nath Temple**	Road 3 : Qila to Kudeshiya	2.5 km	Dismantling portion		1,00,000	70,42,000
				Civil Works	Not Required	0	
				Footpath	1 Side	47,55,000	
				Signages	1 Side	40,000	
				Electrical Works	1 Side (LED)	1,00,000	
				Dustbins	SS Twin Bins	80,000	
				Bollard	900 mm Concrete bollard on 1 side	7,00,000	

NATH NAGRI CIRCUIT - Bareilly							
S.No	Temple	Name of road section	Length (km)	Component	Description	Total Amount	Total Cost
				Vending Kiosk	Fixed Vending kiosk (2x3 m size)	2,00,000	
				Cat Eye	Solar LED Road Studs, 12 V	27,000	
				Variable Display Boards	Wall & Pole mounted (72 x 48 inch)	40,000	
				Public conveniences	Male & Female toilet unit	10,00,000	

Total Project Cost	14,18,62,220

7.12 Nath Temple Precinct Development

Being recognized as Nath Nagri of India, Bareilly portrays a very strong image of the seven Nath temples situated on the seven routes of the city. The city inherits a very rich spiritual significance that brings pilgrims from many other cities to visit the Nath temples. These Nath temples witness their highest influx of visitors during the Sawan month and Maha Shivratri. Thousands of pilgrims also visit the city for Seven Nath temple parikrama which adds to the religious uniqueness of the city.

7.12.1 Condition Assessment of all Nath Temple Precincts

Since the construction of Nath temples at the city periphery as its gateways, the city has expanded drastically on all sides and the expansion has enveloped all seven Nath temples. These religious precincts have lost their imageability and presence over a period of time. Absence of identity markers, gateways, designated corridors, signage, façade lighting has led to degradation of the overall urban character of the precincts.

Existing Scenario of Nath Temple Complexes								
S.No.	Facilities and infrastructure	Alakh Nath Temple	Madi Nath Temple	Tapeshwar Nath Temple	Dhopeshwar Nath Temple	Pashupati Nath Temple	Vankhandi nath Temple	Trivati Nath Temple
1	Entrance Marker/ Gateway	Yes	Not in a good condition	Not in a good condition	Yes	Yes	Yes	Yes
2	Washrooms	Yes	Not available	Not available	Yes	Not available	Not available	Yes
3	Drinking Water	Yes	Not available	Not available	Yes	Yes	Yes	Yes
4	Availability and condition of Prasad/worship material Shops	Yes | Shop within the temple premise	No shop within the temple premise. Prasad/ worship material is provided by privately owned shops outside the temple	No shop within the temple premise. Prasad/ worship material is provided by privately owned shops outside the temple	Yes | Shop within the temple premise	No shop within the temple premise. Prasad/ worship material is provided by privately owned shops outside the temple	No shop within the temple premise. Prasad/ worship material is provided by privately owned shops outside the temple	No shop within the temple premise. Prasad/ worship material is provided by privately owned shops outside the temple
5	Dustbins	Yes	Not available	Not available	Yes	Yes	Yes	Yes
6	Seating	Yes	Not available	Not available	Yes	Yes	Yes	Yes
7	Police Booth/ Surveliance Room	Not available	Not available	Not available	Not available	Not available	Not available	Not available
8	Lost and Found facility	No proper infrastructure available. Temple authority operate the facility informally	No proper infrastructure available	No proper infrastructure available	No proper infrastructure available	No proper infrastructure available	No proper infrastructure available	No proper infrastructure available. Temple authority operate the facility informally
9	First Aid medical facilities	No proper infrastructure available. Temple authority operate the facility informally	Not available	Not available	No proper infrastructure available. Temple authority operate the facility informally	No proper infrastructure available. Temple authority operate the facility informally	No proper infrastructure available. Temple authority operate the facility informally	No proper infrastructure available. Temple authority operate the facility informally
10	Information Kiosks	Yes, available inside the temple	Not available	Not available	Not available	Not available	Not available	Not available
11	Segregated Pedestrian Pathway along the approach road	Not segregated pathway available	Not segregated pathway available	Not segregated pathway available	Not segregated pathway available	Not segregated pathway available	Not segregated pathway available	Not segregated pathway available
12	Lighting	Yes, available in the temple precinct	Improper lighting facility	Improper lighting facility	Yes, available in the temple precinct	Yes, available in the temple precinct	Yes, available in the temple precinct	Yes, available in the temple precinct
13	Signages	Signage present at the entrance but requires redevelopment	Yes	Yes	Yes	Yes	Yes	Yes
14	Trees for Shade along the road	Yes	Yes	Yes	No	No	Yes	No
15	Parking (condition if its there)	Parking space available in the temple precinct but lacks management	No parking available	No parking available	Parking space available but lacks management	Parking space available along the road	Parking space available but lacks management	Parking space available in the temple precinct
16	IPT Stand	Not available	Not available	Not available	Not available	Not available	Not available	Not available
Colour coding depicting the present condition			Available		Available, Not in a good condition		Not available	

7.13 Pilot Temple Precinct Development Project – Vankhandinath Temple

7.13.1 Condition Assessment

Located just one kilometer away from the Pilibhit bypass is the Vankhandinath temple, connected through Joginawada road. This one kilometer long stretch of Joginawada road is a designated corridor that not only forges a strong connectivity to the temple complex but also caters to all the informal vendor activity. Despite of having such a prominent connectivity, absence of signage, identity markers and designated approach road possesses a challenge for the visitors/ pilgrims to reach the temple complex. The temple complex is equipped with a multi – purpose hall that is used to cater pilgrims during special occasions. Availability of vacant land parcels also help in organizing fairs and accommodate the high influx. Lack of public conveniences is also one of the major issues that the visitors face while visiting the temple.

Figure 49: Vankhandi Nath Temple Precinct

(Source: Urban Design Team)

Figure 51: Vankhandi Nath Temple Approach Road

(Source: Author)

Figure 50: Vankhandi Nath Temple Approach Road

(Source: Author)

Figure 53: Vankhandi Nath Temple Fairground
(Source: Author)

Figure 52: Vankhandi Nath Temple
(Source: Author)

7.13.2 Main Entrance Gateway Design Proposal – Applicable to all Nath Temples

7.13.3 Broad Layout Plan for Development – Vankhandinath Temple Precinct

Figure 54: Precinct Development of Vankhandinath Temple

(Source: Urban Design Team)

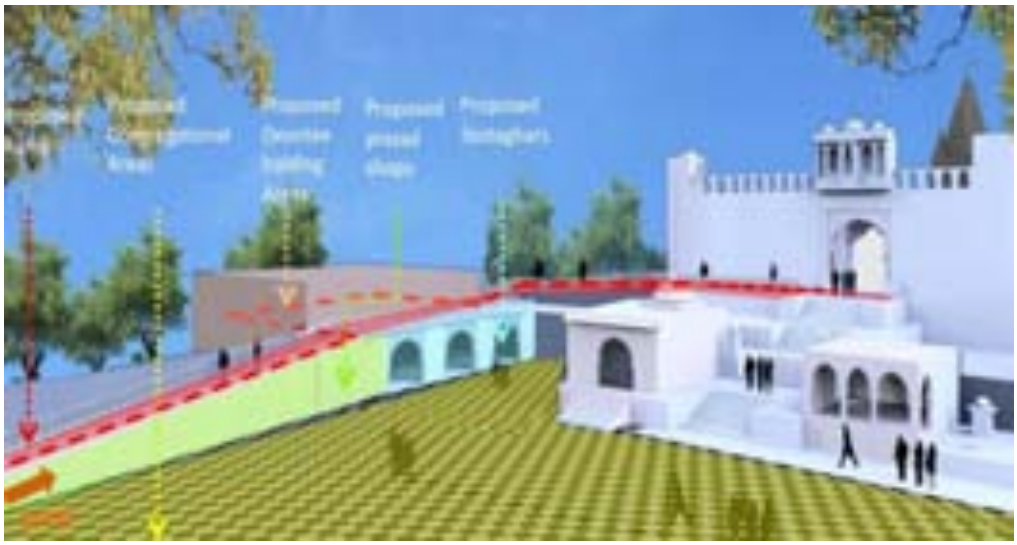
7.13.4 Vankhandinath Temple Precinct – Streetscape Proposal (Before & After)

7.13.5 Key Intervention

- Establishing identity markers/ entrance gateways and development of corridor leading to the religious places will enhance the urban character of their precincts.
- Provisions of public amenities like parking space, washrooms, etc. will not only offer convenience to the visitors but will also create a better user experience.
- Development of temple precincts will help in reclaiming the lost identity of all Nath temples and conserving the city's cultural value.
- The intervention envisions initiating more tourism influx to the city, which will further contribute to the city's economy.

7.14 Case Example - Brahma Temple, Pushkar

Restructured and pedestrianized temple precinct with added public functions like bazaars, eating points, utilities.



7.14.1 Design Component

Title of the Project: Urban Renewal of Nath Temple circuit & Infrastructure improvement of all Seven Nath Temples					
Vankhandi Nath Temple Precinct Development					
S.No.	**Components**	**Description**	**Cost per unit**	**Quantity**	**Total cost**
A	**Entrance Gateway**	Development of Entrance Gateway at the main road to mark the temple entry	Rs.20,00,000	1	Total Cost = 20,00,000/-
B	**Pathway Development**	One Km. long paved pathway with 1.5 m wide raised stretch for Kiosks	Kerbstone – Rs.5000 per cu. M Precast interlocking	Volume of kerbstone = 1000 x 0.15 x 0.15= 22.5 cu. M Total volume on both sides =	Cost of Kerbstone = 45 x 5000 = Rs. 2,25,000/-

			pavers forEntrance Drop-off plaza – Rs 570 per sq m	22.5 x 2=45 cu. M Area of footpath on each side of the road: 1000 m x 1.5 m= 1500 sq. m Total area of paved footpath: 1500 x2=3000 sq. m Area of Paved Road: 1000 X 6.6m = 6600 sq. m Total pavement area: 3000 + 6600 = 9600 sq. m	Cost of concrete pavement = 9600 X 570= Rs.54,72,000/- Total cost = Rs.56,97,000/-
C	**Fair Ground Entrance Gateways**	Development of Entrance Gateway for fairground area	Rs.8,00,000	2	Cost of Entrance Gateways – 800000 X 2 = Rs.16,00,000/-
D	**Services & Amenities Block**	Development of Service block for public promenade	Rs.27000 per sq. m	40 sq. m	Service block cost – 27,000 X 40 = Rs. 10,80,000/-
E	**Fair Ground development**	Fair Ground	Site development of 2 Fairgrounds = Rs.11030 per sq. m	Area of Fairgrounds = 7100 sq. m	Cost of developing open greens 11030 X 7100 = Rs.7,12,13,000/-
F	**Promenade Space**	Development of promenade for Kiosks	Cost of red sandstone for promenade = Rs. 1800 per sq m	Area of promenade: 3375 sq. m	Cost of sandstone promenade - 1800 X 3375 = Rs. 60,75,000/-

G	**Visitor Parking**	Visitor Parking	Cost of PCC flooring in parking = Rs.735 per sq. m	Area of Visitor Parking - 850 sq. m	Cost of Visitor Parking – 735 X 850 = Rs.6,24,750/-
H	**Kiosks**				
H.1	Food/ refreshment kiosks	To be placed along MUZ and within public nodes and plazas	Rs.8,00,000	Five kiosks per 100 m Kiosks on each side of the road 1000/100=10 10 x 5=50 kiosks No of Kiosk in Fairground = 70 Total kiosks=120	Cost of Kiosks 800000 x 120 = Rs.9,60,00,000/-
H.2	Information kiosks	To be placed at the intersections and public plazas	Rs.35000	2	35000 x 2= Rs.70,000
I	**Signage and way finding**	Signage's to be placed at entry plaza, sports grounds (4), food court, horse training zone and Mela ground.	Rs. 76,000	4	Total Signage Cost – 76,000 X 4 = Rs. 3,04,000/-
J	**Lighting**				
J1	Single arm pedestrian light pole	7000 mm high light poles @9 m c/c all along the edges of the boardwalk for safety, security and river edge illumination, in entry plaza , sports grounds, food court and play area	Rs. 25000	Lights along Internal road and parking zone = 1000 x 2 /9 x= 222 lights Lights in entry plaza= 2 Lights in Fair ground= 24 lights Total lights= 248 lights	Total cost of Lighting – 25,000 X 248 = Rs. 62,00, 000/-
K	**Street furniture**				

K1	Seating	Two 600 mm x 1800 mm stone/concrete/ wooden benches at every 250 m on the boardwalk	Rs. 18000	Total benches= 30	Total cost of seating – 18,000 X 30 = Rs. 5,40,000/-
K2	Dustbins	Dry and wet waste Segregation bins to be used on both sides of the boardwalk every 200 m and in entry plaza, fair ground and play area	Rs.15000	Dustbins in entry plaza = 2 Dustbins in fair ground=12 Dustbins on road =12 Total dustbins=26	Total cost of Dustbins – 15,000 X 26 = Rs. 3,90,000/-
				Total Project cost	**Rs. 19,17,93,750/-**

8. Project 6: River front development

8.1 Vision – A Place for Spiritual Tourism and Nature Retreat

8.1.1 Site 1 - Ramganga Riverfront

The Ramganga River is the largest river passing through the city and the river ghat is one of the well-known religious places in the city. The place inherits a rich historic as well as spiritual value that brings lakhs of pilgrims annually to the ghat. A fair after every 14 days is also organized on the river banks attracting tourists and pilgrims from all over the city. The river banks are flooded with people taking baths, performing religious activities and celebrating the festival.

Since the river crosses in close proximity to Chaubari village, a major fair is organized annually at the banks of the river known as Chaubari fair. The fair takes place on the occasion of Kartik purnima. One of the biggest attractions of this fair is the horse market, where people from far off areas visit the city to buy or sell horses. The fair is attended by lacks of pilgrims, which initiates tourism for the city on a large scale.

8.1.2 Area of Intervention

Site Area – 20 Hectares (49.4 Acres)

Figure 55: Ramganga Fair Ground Site

(Source: Urban Design Team)

8.1.3 Condition Assessment

The current scenario of riverfront displays a very abrupt image of city's natural features. Despite of being well connected to the city through state highway & railway line, the site completely lacks a prominent connectivity and a symbolic identity. The existing ghat and fairground does not contain any

public infrastructure to support the monthly holy bath and Chaubari fair. This has led to the depletion of the condition of the riverine, eventually affecting the overall ecology.

Despite of having a spiritual value of such prestige, the river ghat and the fairground still remains redundant. Due to lack of identity markers, entrance gateway and way-finding, the approach to the ghat area is not feasible for the visitors. The Ramganga fairground is not only an ecological asset but also holds a significant value in the social infrastructure of Bareilly.

Figure 56: Dilapidated Ghat along river edge and connecting bridge (left) Vacant land parcels near connecting bridge (right)

Figure 57 Provision of boating to cross the River (up) Provision of boating to cross the River (down)

8.1.4 Broad Layout Plan for Development

Figure 58: Ramganga Fairground Proposal – Key Plan

(Source: Urban Design Team)

Figure 59: Ramganga Fairground Proposal Plan

(Source: Urban Design Team)

8.1.5 Project Impact and its Benefits

Development of the riverfront will help in revival of the overall river edge and restoring its ecology as well. Integration of the riverfront along with the fairground will result in rejuvenation of the overall precinct benefiting the pilgrims and city residents. Also, provision of public amenities will add to the overall development and initiate more pilgrims to visit. The urban renewal of the existing ghat will eventually result in upliftment of the city social infrastructure.

8.1.6 Key Intervention

- Crafting Ramganga river ghat into a multi-functional public space that caters to all pilgrimage activity, fairs and festivals.
- Development of symbolic identity/ entrance gateway to the riverfront.
- Integrating facilities such as Bathing ghats, Naturopathy centre, Horse market area, Commercial zone, recreational zone, Mela ground, recreational greens, visitor amenities etc. into the proposed site layout.
- Place making of their precinct with respect to the surrounding neighborhood.
- Revival of the existing precinct while adding public infrastructure like designated parking space, washrooms, etc.
- Up gradation of Ramganga Jn. Railway station and improving its connectivity with the riverfront.

8.2 Case Example - FESTIVAL GROUND, PROJECT W.I.L.D, MADHOPUR- JANA URBAN SPACE

Project W.I.L.D – the restoration and rejuvenation of 12 km of Lutiya Nallah as an important water body, green mobility corridor and public space was one of the plan projects in the master plan. As a part of the rejuvenation of the Lutiya Nallah , an event ground was also proposed to catalyze new growth and generate jobs.

It was envisioned as a waterfront space that could be used for melas, fairs, concerts etc as well as an everyday public space, along the edge of the nallah. The event ground was also sited adjacent to the market by the nallah to accommodate spill over activities and vending.

Continuous Pedestrian pathway and plaza along the edge of the nallah

Stage for plays and **cultural events** has been created

Deck overlooking the nallah

8.3 Project Component

Title of the Project: Riverfront Development					
RAMGANGA RIVERFRONT					
S.No.	**Components**	**Description**	**Cost per unit**	**Quantity**	**Total cost**
A	**Ghat Development**				
A1	Bathing Ghat for Male, Female & Children	• Dholpur stone flooring • 5m x 5m Viewing decks placed at different levels and distributed over the entire ghat length • RCC river embankment • Lifeguard and first aid • Changing rooms, lockers and public amenities • Lighting and signage	Rs.50,000 per sq. m	5500 + 5500 + 3000 = 14000 sq. m	Cost of ghat development – 50,000 X 14000 = Rs. 70,00,00,000/-
A2	Boating Ghat	• Dholpur stone flooring • RCC river embankment • Lifeguard and first aid • Lighting and signage	Rs.20,000 per sq. m	6500 sq. m	Cost of Boating ghat development – 20,000 X 6500 = Rs. 13,00,00,000/-
A3	Upper Promenade Ghat	• Dholpur stone flooring • RCC river embankment • Lifeguard and first aid • Lighting and signage	Rs.20,000 per sq. m	12,500 sq. m	Cost of Upper Promenade development – 20,000 X 12500 = Rs. 25,00,00,000/-
					Total cost = Rs. 1,08,00,00,000/-
B	**Public amenities**				
B1	Boating Club	Development of a Boating Club	Rs.27000 per sq. m	400 sq. m	Boating Club cost – 27,000 X 400 = Rs. 1,08,00,000/-

B2	Service Block	Development of Service block for complete ghat area	Rs.27000 per sq. m	400 sq. m	Service block cost – 27,000 X 400 = Rs. 1,08,00,000/-
B3	Changing Rooms	Development of Changing rooms	Rs.27000 per sq. m	600 sq. m	Changing room cost – 27,000 X 600 = Rs. 1,62,00,000/-
					Total Cost – Rs. 3,78,00,000/-
C	**Naturopathy Centre**	Naturopathy Front Plaza Wellness Retreat Centre River Viewing Deck Green Buffer	Precast interlocking pavers for Naturopathy Front Plaza plaza – Rs 570 per sq m Cost of Wellness Retreat Centre - Rs.27000 per sq. m Cost of River Viewing Deck - Rs.20000 per sq. m Cost of Green Buffer = 550/- per sq. m	Area of Front plaza: 2500sq. m Area of Wellness Retreat Centre: 3000sq. m Area of Viewing Deck: 1500sq. m Area of Green Buffer: 10000sq. m	Cost of precast interlocking pavers = Rs. 14,25,000/- Wellness Retreat Centre cost – 27,000 X 3000 = Rs. 8,10,00,000/- River Viewing Deck Cost - Rs.20000 X 1500 = 3,00,00,000/- Green Buffer Cost - Rs.550 X 10000 = 55,00,000/- Total cost = Rs. 11,79,25,000/-
D	**Horse Training Centre**	Horse Market Plaza Horse Stables Horse Riding Field	Cost of Precast interlocking pavers for Horse Market Plaza plaza – Rs 570 per sq m Cost of Horse Stables – Rs 4500 per sq m	Area of Horse Market Plaza: 2000sq. m Area of Horse Stables: 4000sq. m	Cost of precast interlocking pavers - 570 X 2000 = Rs. 11,40,000/- Cost of Horse Stables - 4500 X 4000 Rs. 1,80,00,000/- Total cost = Rs. 1,91,40,000/-

E	**Commercial Area**	Market Stall row in the commercial area Market Plaza Paved Buffer	Cost of each market stall - Rs. 8,00,000 Precast interlocking pavers for Market Plaza plaza – Rs 570 per sq m Core of Paved buffer – Rs 570 per sq m	Total Market Stalls = 90 Area of Market Plaza – 3000 Area of Paved buffer - 14000	Market Stalls cost – 8,00,000 X 90 = Rs. 7,20,00,000/- Cost of Plaza pavement – 570 X 3000 = 17,10,000/- Cost of Paved buffer– 570 X 14000 = 79,80,000/- Total cost = Rs. 8,16,90,000/-
F	**Recreational Zone**	Facility Centre + Washrooms Multi-Purpose Pavilion Mela Ground	Cost of Facility Centre - Rs.27000 per sq. m Cost of Multi-Purpose Pavilion - Rs.27000 per sq. m Site development per sq m = Rs.11030	Area of Facility Centre - 2000 sq. m Area of Multi-Purpose Pavilion - 2000 sq. m Area of Mela Ground – 60000 sq. m	Facility Centre – 27,000 X 2000 = Rs. 5,40,00,000/- Multi-Purpose Pavilion – 27,000 X 2000 = Rs. 5,40,00,000/- Site Development cost of Mela ground – 11030 X 60000 = Rs.66,18,00,000/- Total cost = Rs. 76,98,00,000/-
G	**Parking & Drop-Off**	Solid Waste management zone Entrance Drop-off plaza Visitor Parking	Cost of Solid Waste management zone - Rs.27000 per sq. m Precast interlocking pavers forEntrance Drop-off plaza – Rs 570 per sq m	Area of Solid Waste management zone – 1200 sq. m Area of Entrance Drop-off plaza - 3000 sq. m Area of Visitor Parking - 11000 sq. m	Cost of Solid Waste management zone - 27000X 1200 = Rs. 3,24,00,000/- Cost of Entrance Drop-off plaza – 570 X 3000 = Rs.17,10,000/- Cost of Visitor Parking – 735 X 11000 = Rs.80,85,000/-

			Cost of PCC flooring = Rs.735 per sq. m		Total cost = Rs. 4,21,95,000/-
H	**Signage and way finding**	Signage's to be placed at entry plaza, sports grounds (4), food court, horse training zone and Mela ground.	Rs. 76,000	8	Total Signage Cost – 76,000 X 8 = Rs. 6,08,000/-
I	**Lighting**				
I1	Double arm pedestrian light pole	9000 mm high light poles @9 m c/c all along the edges of the boardwalk for safety, security and river edge illumination, in entry plaza , sports grounds, food court and play area	Rs. 25000	Lights along Internal road and parking zone = 1175/9= 130 lights Lights in entry plaza= 10 Lights in mela ground = 120 lights Lights in Ghat area = 80 lights Lights in market area = 65 Lights in Horse training zone = 75 Total lights= 480 lights	Total cost of Lighting – 25,000 X 480 = Rs. 1,20,00, 000/-
J	**Street furniture**				
J1	Seating	Two 600 mm x 1800 mm stone/concrete/ wooden benches at every 250 m on the boardwalk	Rs. 18000	Total benches= 75	Total cost of seating – 18,000 X 75 = Rs. 13,50,000/-
J2	Dustbins	Dry and wet waste Segregation bins to be used on both sides of the boardwalk every 200 m and in entry plaza, food court, mela ground and play area	Rs.15000	Dustbins in entry plaza = 2 Dustbins in food court= 12 Dustbins in mela ground=12 Dustbins in ghat =10 Total dustbins=36	Total cost of Dustbins – 15,000 X 36 = Rs. 5,40,000/-
				Total Project cost	**Rs. 216,30,48,000/-**

9. Project 7: Development of Aero city integrated complex near Airport

9.1 Aerocity integrated office complex near Airport development

Bareilly is listed as one of the nine counter magnets of the National Capital region which can be developed as the economic growth center. Trade and commerce are one of the important sectors which can amplify the economy of the city. As per draft master plan 2031, the existing landuse of the commercial area is found to be 3.31 percent against the URDPFI guidelines of 4-6 percent. Lack of commercial space is also outlined by stakeholders such as Bareilly Vyapar Manadal, etc. Bareilly city needs commercial area as given below:

Year	Projected Population	Total Master Plan Area (Ha)	Proposed Percentage (Ha)	Commercial Area (Ha)	Additional Area additional to Master Plan 2031 (Ha)
2031	1949012	22815.76	4	912.63	0
2041	2422433	25499.25	4	1019.97	107.33
2051	2894499	30468.41	4	1218.73	306.10
2061	30,29,478	31889.24	4	1275.56	362.93
2071	37,02,015	38968.58	4	1558.74	646.11

9.2 Area of Intervention

Located at the intersection of the Bareilly bypass and Pilibhit road, the proposed site of size 30 hectare is a strategically selected location for the development of mixed-use development. Considering the context of the proposed site, the Radisson hotel and Airport in its close proximity can be foreseen as a supportive infrastructure for further development. Along with the existing mobility infrastructure and the available assets around the site, an integrated precinct for mied-use development can be envisioned.

Figure 60: Proposed Site for Mixed Use Development

(Source: Consultant Analysis)

9.3 Broad Layout Plan for Development

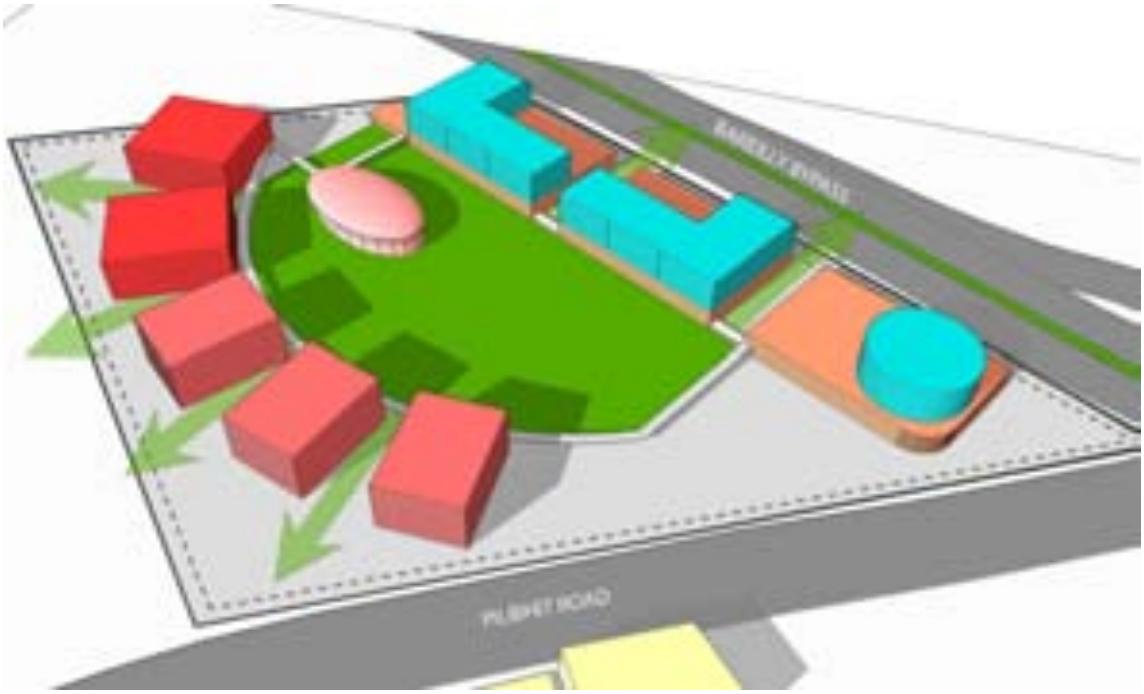


Figure 61: Layout Development of 30 Hectare Site

(Source: Urban Design Team)

Bareilley- Mixed Use, Aerocity			
Site Area- 30Hectares/ 3,00,000sqm			
1	Permissible F.A.R- 2		
2	Permissible Ground Coverage (33%)-		99,000sqm
2.A	Block	Area in percentage	Area in sq.m
i	Hotel	40%	39600
ii	Mixed Use	60%	59400
3	Permissible Built up Area- (FAR x Site Area)		6,00,000sqm
3.A	Block	Area in percentage	Area in sq.m
i	Hotel	40%	2,40,000
ii	Retail	30%	1,80,000
iii	Office	30%	1,80,000
4	Permissible Height- 45m		
5	Site Setback - 9m		

9.4 Key Interventions

1. Development of Aerocity by allocating a land parcel near the city airport for mixed use development to foster new growth opportunities for Bareilly.
2. Development of the allocated land parcel featuring state-of-the-art Retail centers, Offices, Hotels and convention centers will result in city's economic growth and generate new employment for the city residents.
3. The proposal will also act as a gateway to the city.

9.5 Project Impact and its Benefits

The development of regional trade and commerce hub will expedite the speed of economic growth and will establish the city as a major economic generator and employment provider in the region. It will strengthen the economic base and to develop the city as prominent trade and commerce hub in the region.

9.6 Case Study - Cyber City, Gurgaon

9.7 Design Component

Title of the Project: Aerocity integrated office complex near Airport development					
AEROCITY DEVELOPMENT					
S.No.	**Components**	**Description**	**Cost per unit**	**Quantity**	**Total cost**
A	**Built area development**	Site area X Permissible F.A.R = Total Built up area Site Area – 3,00,000 sq. m Permissible F.A.R – 2	Structure & civil work cost – Rs 27,000 per sq m	Hotel Built up Area (40%) – 2,40,000 sq. m Office Built up Area (30%) – 1,80,000 sq. m Retail Built up Area (30%) – 1,80,000 sq. m Total Built up Area – 6,00,000 sq. m	Cost of Built up Area – 27000 X 600000 = Rs. 1620,00,00,000 /-
B	**Site Development**	Total Site area – permissible ground coverage = Built free area Site Area – 3,00,000 sq. m Permissible ground coverage – 33%	Site development cost per sq m = Rs.7000	Area of site after permissible ground coverage – 2,01,000 sq. m	Cost of site development – 7000 X 201000 = Rs. 140,70,00,000/-
				Total Project cost	**Rs. 17,60,70,00,000 /-**

10. Project 8: City Plan for Water Logging / stagnant spots and flood prone areas

10.1 Drainage Plan

A Drainage Infrastructure Plan has been prepared to elucidate drainage requirements for the current and upcoming predicted population of the city. The objectives of the Plan are to identify and analyse the existing drainage system of the city and propose a tapped drainage system in the city for the betterment of the health and environment of the city. The segment further enlists, based on assessment, the projects that can be developed. An implementation strategy has been devised prioritising the identified projects with short, medium, and long-term implementation plans along with cost estimates, supported by adequate rationale.

10.2 Methodology

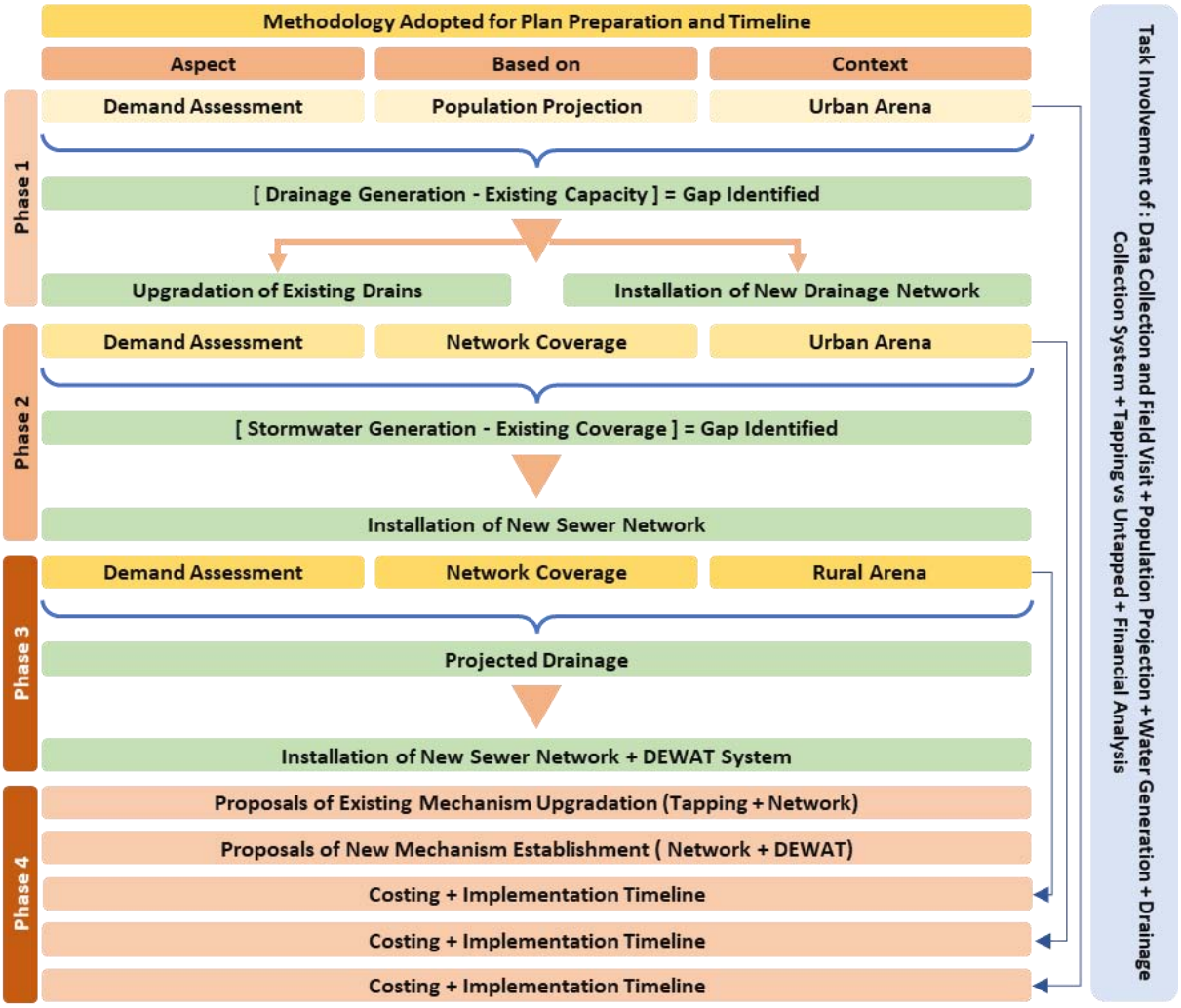


Figure 62: Methodology Adopted for Plan Preparation

10.3 Topography

Standing on the Ramganga River, Bareilly is located at 28°10'N, 78°23'E, and lies in northern India. It borders Pilibhit and Shahjahanpur on the East and Rampur on the west, Udham Singh Nagar(Uttarakhand) in the North and Badaun in the South. It is a level terrain, watered by many

streams, the general slope being towards the south. In terms of geology, the district is alluvial. The district is separated into three sub-micro areas based on geology, soils, terrain, climate, and natural vegetation:

I. Bareilly Tarai
II. Bareilly Plain
III. Ram Ganga

Figure 63: Base map of Bareilly

10.4 Land use Pattern

The existing land use of Bareilly city covers only 7421.66 hectares of area in 2021 against 20,563.82 hectares. There is only 36.09 per cent of the total allocated area in Master Plan 2021. As per the Draft Master Plan 2031, 2,251.94 hectares of additional area are added to the Master Plan boundary making it a total of 22815.76 hectares. For 2051 and 2071, an additional area of 7,652.65 hectares in 2051 and 16,152.82 in 2071 hectares need to be added to regulate and develop the area in 2071.

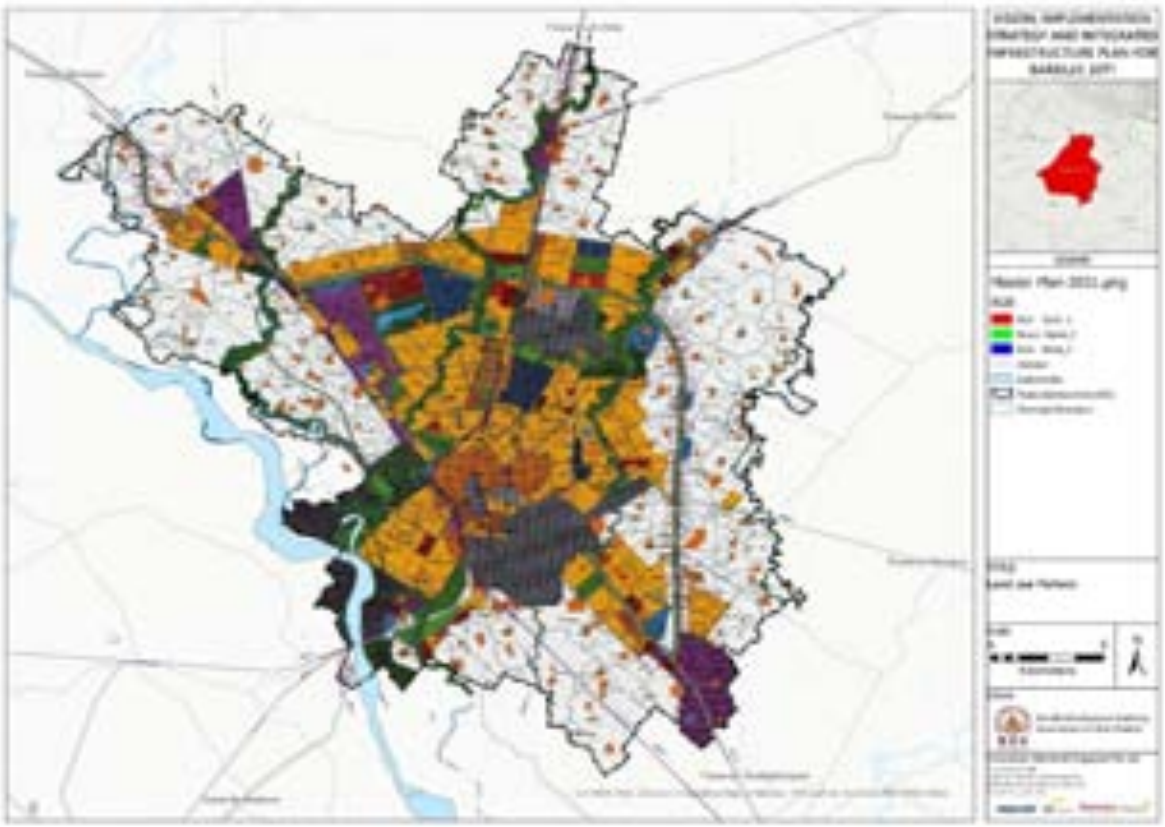


Figure 64: Land use map – BDA Masterplan 2031

10.5 Climate:

Bareilly has a humid subtropical climate with high variation between summer and winter temperatures. Summers are long, from early April to October, with the monsoon season in between. Winter starts in October and peaks in January and is notorious for its heavy fog. Extreme temperatures range from 4 °C to 44 °C. The annual mean temperature is 25 °C (77 °F), and monthly mean temperatures range from 14 °C to 33 °C (58 °F to 92 °F). The average annual rainfall is approximately 1714 mm (28.1 inches), most of which is during the monsoons in July and August.

10.6 Normalized Difference Vegetation Index (NDVI):

NDVI is a measure of surface reflectance and gives a quantitative estimation of vegetation growth and biomass. Plants and their roots affect the soil's physical properties, such as infiltration rate, aggregate stability, moisture content, and shear strength, which play a significant role in soil conservation). Plants and their roots decrease runoff and soil erosion in both dry and wet seasons. The root systems of plants play a critical role in stabilizing banks of gullies and streams by enhancing soil shear strength.

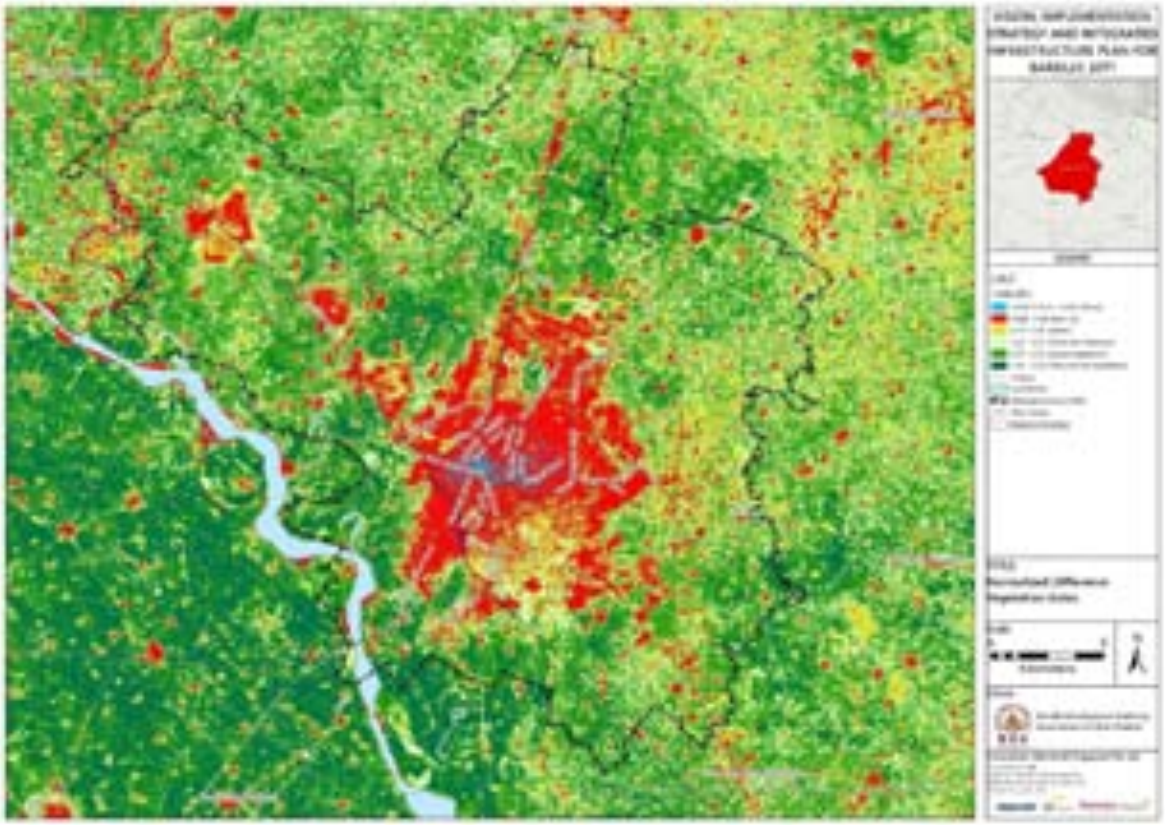


Figure 65: NDVI Map of Bareilly

10.7 Geology & Geography

The Ramganga is the district's primary river, which enters from the west and runs southeast. The Sidh Dejora, Bahgul, Sankha, Aril, Deoha, Deoanian, and Nakatia rivers, as well as their tributaries, all start in Tarai and flow across the district in southern and south-eastern directions before joining it. In terms of geology, the district is alluvial.

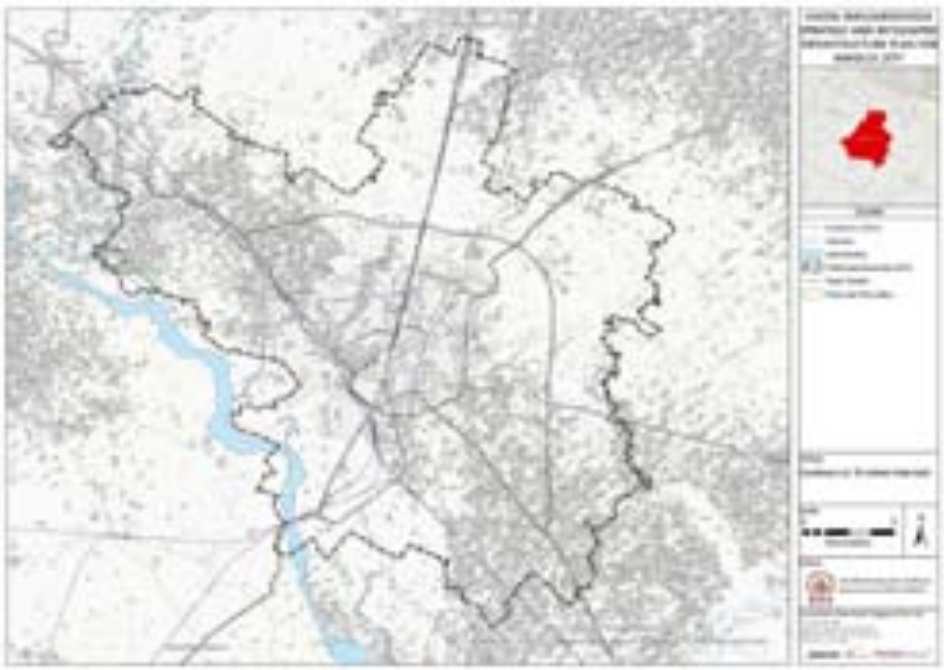


Figure 66: Contour Map of Bareilly

Only 105 km, or 12.62%, of the 832 km of roads in the City of Bareilly total length have closed stormwater drains. The Deveraniya drain, Chaubari drain, and Nakatiya river/drain are the three natural drains in the city.

In the planning area, surface water is a problem during the rainy season. Many urban areas with major streets lack an adequate drainage system. The Ramganga River is a catchment area for all of Bareilly's drains. The Bareilly metropolitan area's roads are currently flooded due to the city's growing population, and this could get dangerous. During the monsoon, Bareilly's low-lying areas are also inundated. A suitable stormwater drainage system is required for this.

10.8 Natural Drainage:

There are three major drains in the Bareilly planning area. The problems of waterlogging, overflowing and choked drains and a host of water-borne diseases can be seen here. The details of these drains are as follows: -

10.8.1 DEVERANIYA DRAIN:

Deveraniya Drain's originating point is Sarai Talfi. The drain starting point coordinates are Latitude: 28°24'31.60"N & longitude: 79°22'15.62"E. Deveraniya drain meeting to river Ramganga at village Virya Narainpur. Coordinate of the confluence point of the Deveraniya Drain is Latitude: 28°19'1.47"N & Longitude: 79°22'31.71"E. Covered Distance of Deveraniya drain from Bareilly town to its meeting point to river Ramganga in the village Virya Narainpur is approx.: 23.6 km. Detail of situated industry & discharge of their effluent to the drain Deveraniya drain carries domestic wastewater of Bareilly town as well as effluent from 02 Industrial units. Total Discharge from Deveraniya drain to Ramganga is 102.28 MLD, out of which 0.75 MLD is treated industrial effluent and the rest is untreated sewage of Bareilly Town. The Water Quality of Deveraniya Drain meeting in river Ramganaga having pH 7.2, BOD (mg/l) 39.8, COD (mg/l) 80, TSS (mg/l) 89.

10.8.2 CHAUBARI DRAIN

Chaubari Drain's originating point is Subhash Nagar. The drain starting point coordinates are Latitude: 28°22'4.95"N & longitude: 79°23'43.17" E. Chaubari Drain meets to the Ramganga River at Gomidpur. Coordinate of the confluence point of the Chaubari Drain is Latitude: 28°12'28.09"N & Longitude: 79°25'34.55"E. Covered Distance of Chaubari drain from Bareilly town to its meeting point to river Ramganga in Gomidpur is approx 10.7 km. Chaubari drain carries domestic wastewater of Bareilly. The total Discharge from Chaubari drain to Ramganga is Gomidpur, out of which 50.47MLD is untreated sewage of Bareilly city. The water quality of Chaubari Drain meeting in the river. Ramganaga having pH 7.1, BOD (mg/l) 33.2, COD (mg/l) 200, TSS (mg/l) 70.

10.8.3 Nakatiya River:

Nakatiya River/Drain's originating point is Deennagar. The drain starting point coordinates are Latitude: 28°36'16.14"N & longitude: 79°34'1.13"E. Nakatiya Drain meets to the Ramganga River at village Ahargauthiya. The Coordinate of the endpoint of the Nakatiya Drain is Latitude: 28° 8'9.06"N & Longitude: 79°29'4.08"E. Covered distance of the drain from Bareilly town to its meeting point into river Ramganga is approx.: 100 km. Detail of situated industry & discharge of their effluent to the drain Nakatiya Drain carries domestic wastewater of Bareilly, the town as well as effluent from 03 Industrial Units. Total Discharge from Nakatiya Drain to Ramganga is 24.13. The water quality of Nakatiya Drain meeting in river Ramganga having pH 7.3, BOD (mg/l)- 44.8, COD (mg/l)-120, TSS (mg/l)- 14.

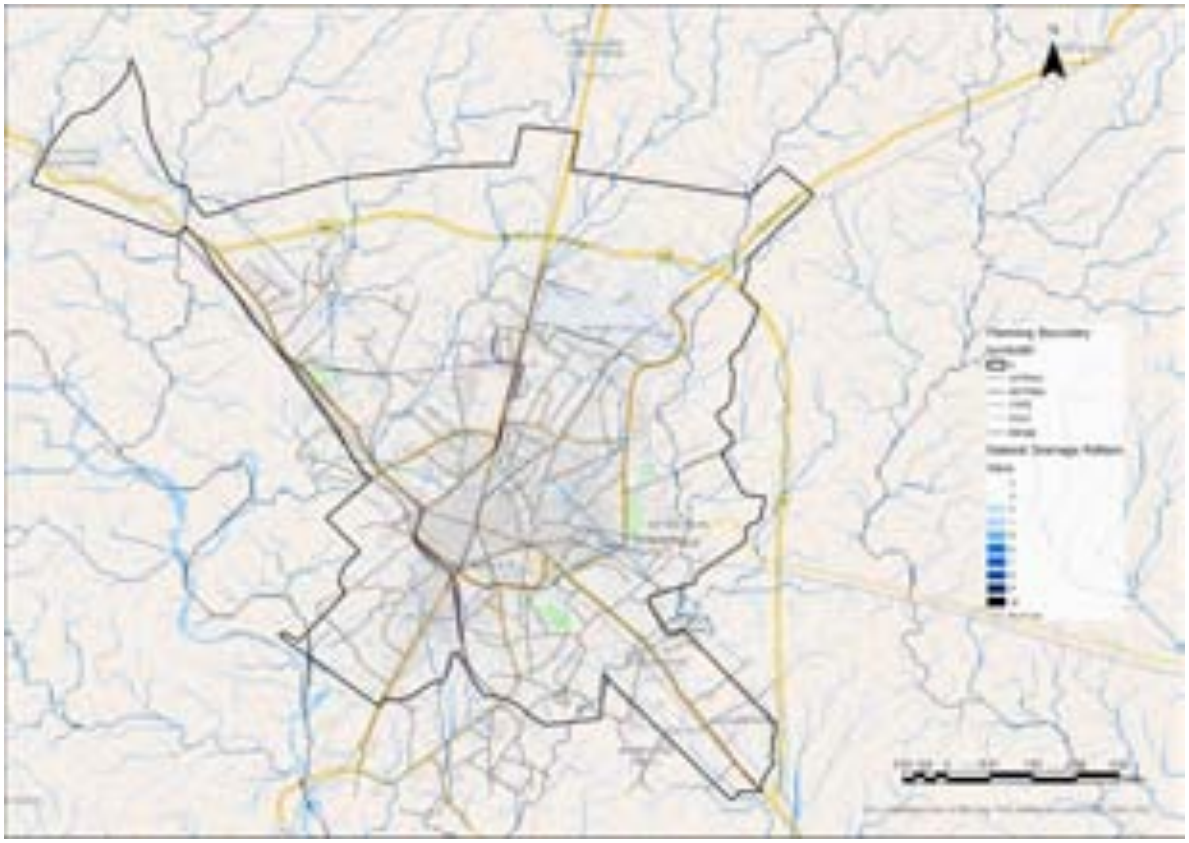


Figure 67: Natural Drainage Pattern

10.9 Approach to Storm Water Drainage Mapping:

An integrated stormwater network is required to be planned for the entire city based on the topographical features. Identification of existing drains followed by realignment and upgradation has to take place. Cleaning of drains should take place at regular intervals. Above figure red marked contours dissect flood-prone stretches of the Ramganga river. Therefore, these areas experience, maximum runoff annually. The pour points shown in the map must be connected with secondary drains for a citywide stormwater drainage plan.

Figure 68: Flood-prone areas of Ramganga river

This catchment area is further divided through man-made roads and embankments. The catchment area with a natural drainage channel is shown in the figure below. The waterlogged low-lying areas of Bareilly are shown in the following map:

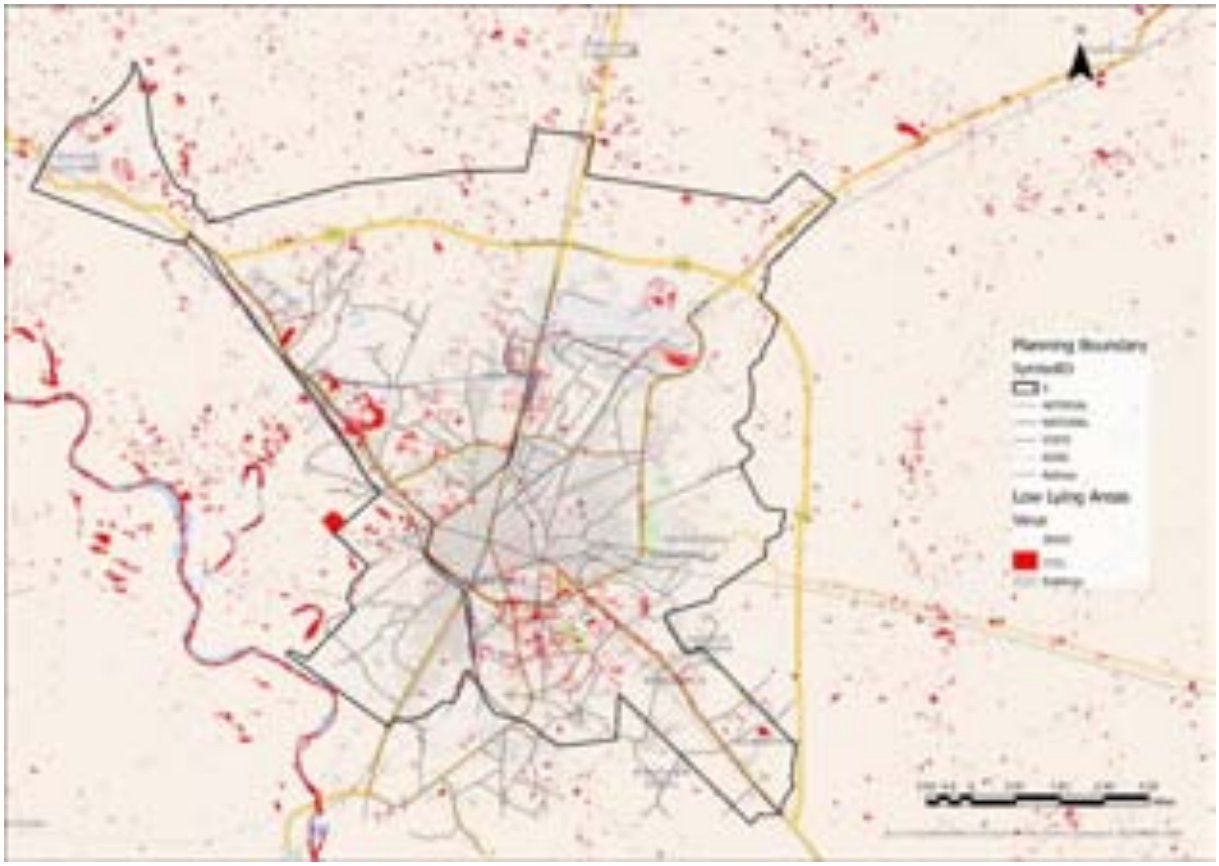


Figure 69: Low-lying Areas

The areas highlighted in red are the low-lying areas of Bareilly. If Ramganga, the nearby river tends to overflow or a lower portion of landfills up quickly in heavy rain, diversion of such volume of water is required. Existing drainage systems have minimal capacity to divert floodwaters to other bodies of water or pre-prepared spaces set aside for water retention but long-term planning solutions like full drain coverage along with a stormwater management system have been found to experience lesser challenges due to the construction of stormwater drain systems.

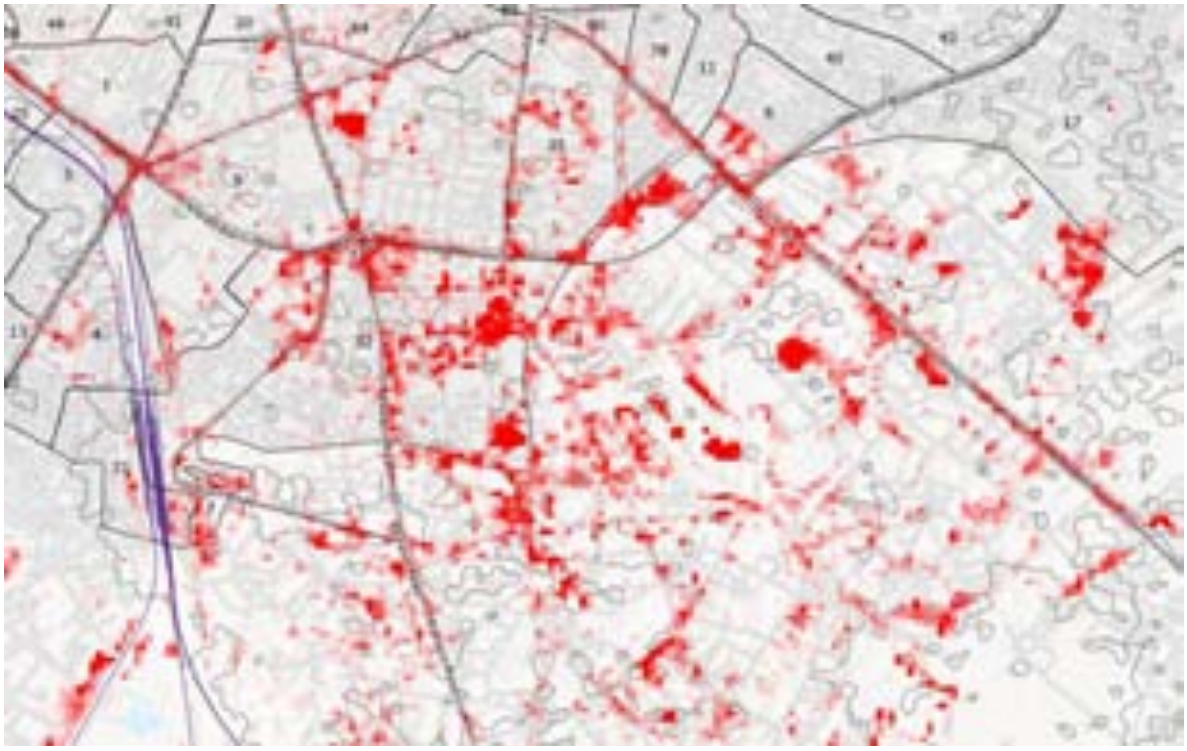


Figure 70: Low-lying area 1 – Near Gandhi Udhyan, Civil Lines, Bareilly

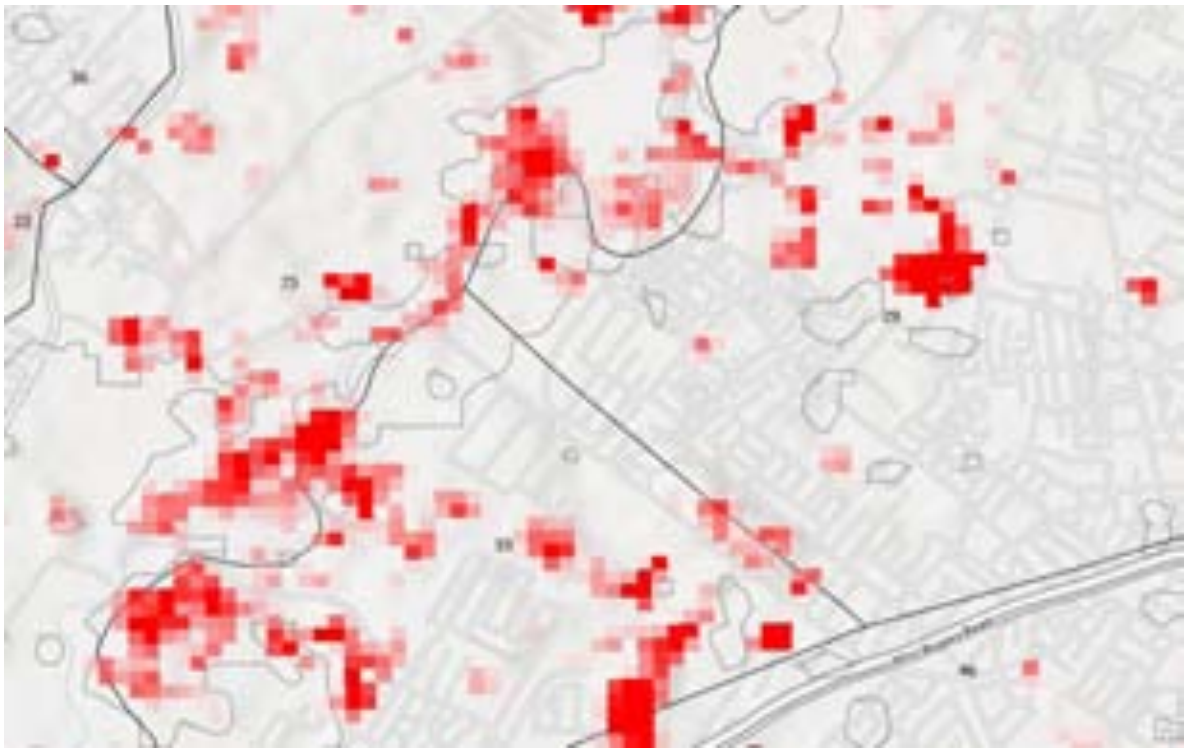


Figure 71: Low-lying area – Near Mini Bypass Road, Izzatnagar, Bareilly

Figure 72: Low-lying area – Baqarganj, Bareilly

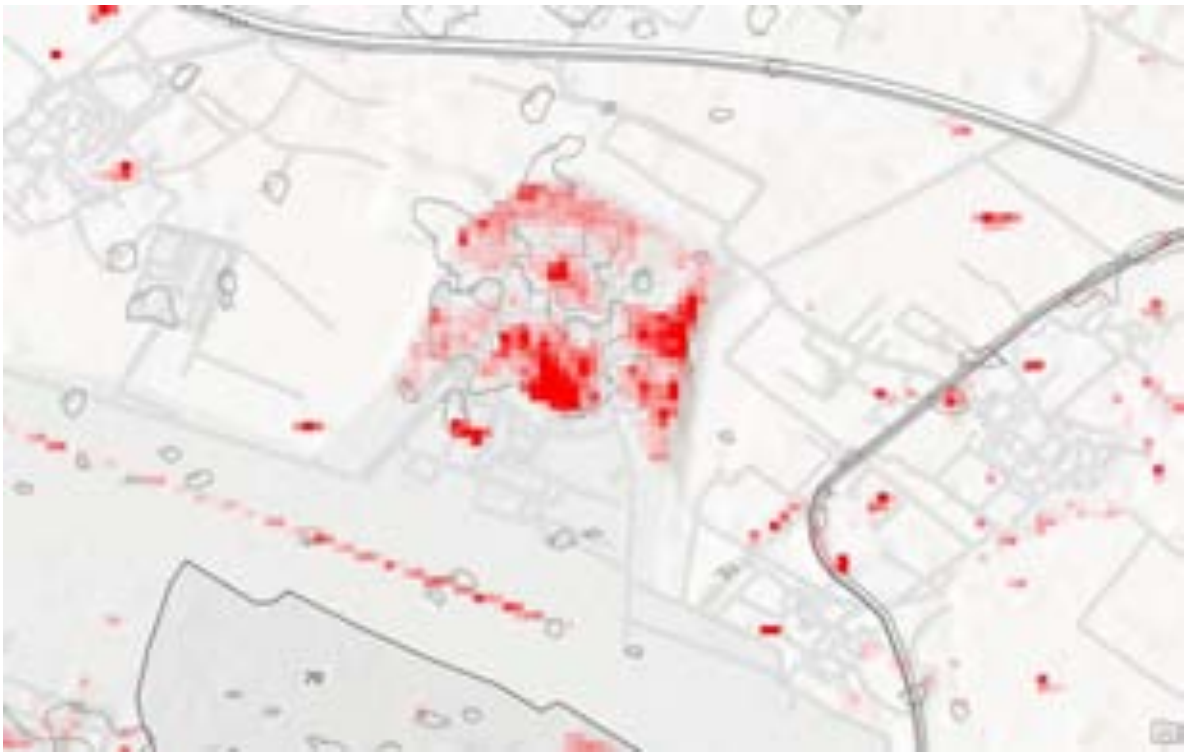


Figure 73: Low-Lying area - Hazipur Brij Lal, Bareilly

Figure 74: Low-lying area - Pilbhit Bypass Road, Dohra, Bareilly

Table 11.1: Ward-wise Vulnerability Analysis of flood-prone areas in Bareilly

Ward Number	Wards with waterlogged areas	Wards with natural drainage	Wards most susceptible to flash flooding
1			
2		Y	
3		Y	
4	Y		Y
5		Y	
6	Y	Y	
7	Y		Y
8		Y	
9	Y		Y
10		Y	
11			
12		Y	
13		Y	
14	Y	Y	
15		Y	
16		Y	
17		Y	
18	Y	Y	
19		Y	
20	Y		Y
21		Y	

Ward Number	Wards with waterlogged areas	Wards with natural drainage	Wards most susceptible to flash flooding
22	Y	Y	
23		Y	
24		Y	
25		Y	
26		Y	
27	Y	Y	
28	Y	Y	
29	Y	Y	
30	Y	Y	
31	Y		Y
32	Y		Y
33			
34		Y	
35	Y	Y	
36	Y	Y	
37		Y	
38		Y	
39			
40		Y	
41			
42		Y	
43		Y	
44			
45	Y	Y	
46		Y	
47	Y	Y	
48		Y	
49			
50		Y	
51	Y	Y	
52		Y	
53		Y	
54		Y	
55	Y	Y	
56			
57			
58		Y	
59	Y	Y	
60	Y		Y
61		Y	
62	Y	Y	
63	Y		Y
64	Y		Y

Ward Number	Wards with waterlogged areas	Wards with natural drainage	Wards most susceptible to flash flooding
65	Y	Y	
66			
67		Y	
68			
69			
70	Y	Y	
71		Y	
72	Y		Y
73	Y	Y	
74			
75		Y	
76	Y		Y
77			
78			
79		Y	
80	Y		Y
Total	**31**	**53**	**12**

Here flood vulnerability is used as a multi-dimensional measure of the potential damage the human settlement inhabiting the wards may encounter during a flood event, which is a totality of the topography i.e. settlement built in or around low-lying areas prone to having flash floods during heavy rains and physical-environmental condition of the area. Based on the above analysis there are twelve wards of waterlogged areas but with an absent natural drainage system.

Table 5: Main Components of Primary Drains

S. No.	Components	Year	
		2012-13	2015-16
1	Total Length of Roads (in km)	791	832
2	Total Length of Closed Pucca Drains (in km)	388	493
3	Percentage of Drainage Coverage	49.1	59.3
4	Water Clogging/Flooding Instances in Number	8	0
5	Water Clogging/Flooding Areas	8	8

The total road length is Bareilly is 832 kilometres out of which **493 kilometres** are serviceable by primary drains acting as stormwater drains during heavy rains. That translates to a drainage coverage of **59.3 per cent** in the city. All the primary drains have outfall in twelve major secondary drains listed in the table below:

Table 11.3: Location of Secondary Stormwater drains

S. No.	Name of Secondary Drains	Location	Ward Number
1	Bisalpur Road Nala	Haroongla	17
2	Rampur Road Nala	Swale Nagar	30
3	Peerbahoda Nala	Pirabahooda	70

4	Saufita Road Nala	Badi Bihar	10
5	Harunagla Nala	Haroongla	17
6	Badi Bihar Nala	Badi Bihar	10
7	Sufi Tola Nala	Sofi Tola	78
8	Tuliya Nala	Nandausi	37
9	Partappura Nala	Partapur Chaudhary	34
10	Sanjay Community Hall Nala	Elan Club	35
11	Akshar Vihar Nala	Bareilly Club	32
12	Delapeer Lake Nala	Near Satya Petrol Pump	10

10.10 Issues with the existing stormwater drainage system:

The sub-drain flows through the middle of the city starting near the BNN compound and empties out into river Nakatia. Several culverts are built up on it. Over the years, the lanes adjacent to the drain have risen because of repeated layering whereas all culverts have remained below the level of the lanes. When it rains, these culverts get flooded and underdrain the water. The filthy water enters the nearby houses and rises up to two feet. Before the monsoon commences, the BNN sanitation workers clean the drain, but heavy rainwater makes the area waterlogged. Following are some issues identified with the current system:

- Silting of the drain
- Unlined drains
- Dumping of debris and garbage into the open drains & nallah
- The roads are below the drains' top level which causes the overflow from drains to fill the roads and the low-lying areas
- The increased impervious areas also add to the worsening of the situation

Interventions required for stormwater drainage system:

- Govt should impose fines on those industries discharging wastewater into the stormwater drain
- All the house service connections shall be properly connected through the sewer network and shall be treated in the STPs to maintain the stormwater drain as a dedicated facility.
- All the untapped drains should be tapped and diverted to STP
- Ensure sufficient right-of-way provision for constructing drains in future proposals.
- Cost and O&M framework

10.11 Suggestions to be considered during the preparation of a detailed project report for the stormwater management plan:

- Assessment of existing stormwater drain condition ward wise
- Based on the assessment, provide recommendations for reconstruction of the structure wherever possible
- Analyze the surface runoff and increase the width of the drain wherever required
- Based on the assessment, identify the financial stability of the developer and workout the phase-wise implementation strategy
- Achieve 100% coverage through effective planning
- Remedial Measures for controlling water logging and ailing drains

An integrated stormwater network is required to be planned for the entire city based on contour maps. There should be realignment and upgradation of existing nallas. Cleaning of drains should take place at regular intervals. Finally, the separation of stormwater drains from the sewerage network should be executed on priority.

10.11.1 SILTING AND WEEDING OF DRAINS

- Almost all the length in the meter of the major drain is silted and weeded. The drain has to be de-silted and deseeded. Deweeding will be done on the bed, side slopes and 50 cm at the top on both sides of the drain.

10.11.2 INFLOW OF SEWAGE AND DUMPING OF SOLID WASTES INTO DRAINS

- With the implementation of sewerage and solid waste management sub-projects, it is expected that this problem would get solved. However, it has to be ensured by the implementing agencies that all residences are connected to branch sewers which in turn are connected to trunk sewers. A public awareness campaign by the city to educate people not to dump solid wastes into sewers/drains should be carried out.

10.11.3 SILTING, WEEDING AND BLOCKAGE OF TERTIARY DRAINS

- Regular cleaning and maintenance by Nagar Nigam coupled with deterrent punishment to persons who block the tertiary drains are to be carried out.

10.11.4 ENCROACHMENTS OF FLOW CHANNELS AND TANKS

- BNN and BDA must enforce measures to disallow any construction on drain/tank beds and periphery. The practice of drying tanks and reclaiming them for building must be stopped to preserve the depleting stormwater storage/buffer areas. Encroached drain sections are to be cleared and drains provided with an adequate cross-section to carry the flow.

From Urbanization to Riverization – A case study of Varanasi

Varanasi is situated between two water commons: Varuna River in the north and Assi Drain in the south. The current "Varanasi 2031" Master plan proposed by the authorities is based on ring roads; it does not consider the actual ground truths of the city's rich landscape such as natural water bodies, whether in the form of flows or holdings.

There are some big nallas in the city, which are very dangerous to human and animal lives. The city is presently divided into four sewerage districts. Central City sewage district draining to Dinapur STP. This area includes the old city, about 1 km in breadth and 5km along the Ganga River from Assi to Raj Ghat. Zone 2A is the sub-central district on the CIS-Varuna side west of the city centre and zone 2B is a slice of the Trans-Varuna district along the Varuna River up to the ridge line defined by the Jaunpur road. Trans-Varuna district north of the Jaunpur road. Wastewater in this. BHU/Assi district south of the City. At present this area is mainly the Banares Hindu University campus, which has full sewer coverage. The area generally falls in the northeast direction.

10.12 Rejuvenation plan of Assi Nallah:

"**If We Want a Clean Ganga, We Need to Start with the Nallahs**". The origin point of the Assi drain, should be decentralized, and made into a biotic sewage treatment system. Since the landscape filtration system cannot treat all the wastewater, sequential platforms will provide initial wastewater treatment by removing the solids and reducing the smell. After this step, bio-filtration takes place to further clean the water. Runoff water is also treated through these

folds in the landscape that acts as bioswales. This treats wastewater and runoff water is channelled through the site into a larger water body that is designed along the open (maidan) spaces. Water from this water body filters into the existing Kund (tank) and filters out to become the starting point of the Assi Nallah. These platforms of biotic sewage treatment infrastructure are expected to be owned and maintained by the public health engineering department. **At the confluence of the Assi and Ganga, this project celebrates this holy intersection by transforming an existing park into a delta of temporal productive landscape- for use by pilgrims and able to accommodate the flood waters of the monsoons.** Assi receives three billion litres of untreated waste every day via nallahs which makes enormous untreated sewage pollutants to river Ganga.

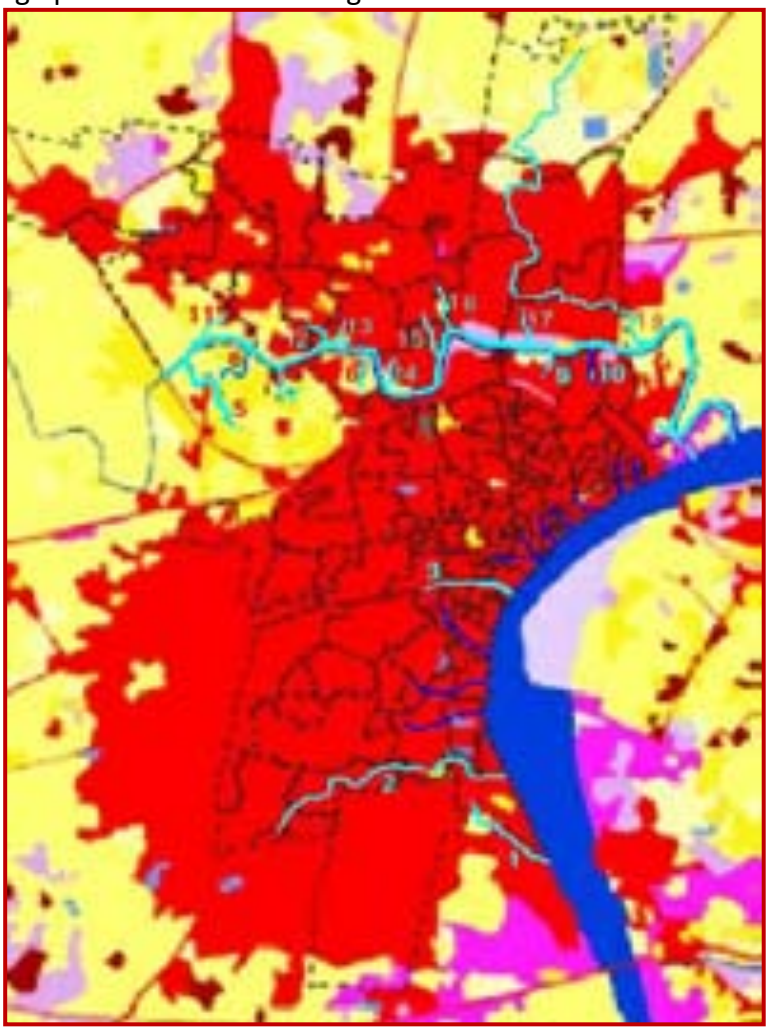


Figure 75: Natural Drainage Channel in Varanasi

10.13 Making room for river floods

The Varanasi Development Authority has prepared a 2031 Master Plan meant to expand the city to accommodate the growing population. But looking Varanasi is not meant as a fast-growing urban centre but tries to enhance its carrying capacity to adjust influx of seasonal nomadic. So, rather than static and linear growth entities, public spaces should be flexible, adaptable and resilient to accommodate the intensifying seasonal flux of people, flora and fauna.

Open space- maidan always welcomes the density of users and adaptability to different seasons. Talabs, parks and the edges of the Ganga River are common public spaces in Varanasi. They are

identified as potential maidans which can be transformed into seasonal, adaptable and resilient spaces to absorb the intensifying flux.

Chakra Tal as a Maidan: Chakra Tal is currently an abandoned natural pond that once was an important social space for communities and a flourishing habitat for wildlife. The revitalization of the talabs (ponds) by introducing dams at the entrance of waterways into the talabs to act as silt traps during the monsoon. The residents will be encouraged to harvest this silt during rituals and then use the silt in community gardens along the talab. Service hubs and market stalls are proposed at the periphery to integrate the talab with the community and to turn it into a front yard rather than a backyard, the way it once used to be. Sewage treatment tanks are proposed to purify the water from the residential developments into the talab and to sustain the talab ecosystem.

Beniya Park as a Maidan: Beniya Park is currently occupied as a temporary shelter, flute makers use it as a shelter and production space, and residents around it use it as a playground. The park is currently enclosed and fenced separating it from the surrounding urban fabric with an unfinished abandoned structure that was supposed to be a fish market and is currently used as a toilet. Beniya Park can be transformed into a productive maidan, with the fences removed to create direct and continuous access. Trees can define the park and prevent encroachment. This wetland can be used as a migratory bird hub and in the dry season for festive markets.

Dashashwamedh Ghat and the Sandbank as Maidans: Physical barriers along the Ghats prevent the continuity of public spaces and soiled water outflow is currently contributing to the pollution of the Ganga River. An extension to the edge of the Ganga River is introduced by adding floating docks and gathering points that will ease the intense crowds and provide a continuity of public spaces along the Ghats. During the monsoon season, Ghat activities can be temporarily shifted inland to seasonal markets and ponds. The kit of parts highlights the temporary elements that correspond to the needs in different seasons.

10.14 Ganga Floodplain Urbanism

In the floodplain site between the Ganges River, the Ring Road, and Banaras Hindu University, ‘fingers of high ground’ may use for a combination of soil from cut and fill operations and dredged river silt to build the fingers. This will be followed by an incremental building strategy on top of the fingers and the low-ground areas between the fingers will become capable of draining water to the river during monsoons while serving as a ground for urban agriculture during the rest of the year. Infrastructure and transportation are also proposed along the spine of the fingers, which will enable people formerly living on the low grounds to have better connections with the city and its infrastructure, and live with resilience, harmony and improved economic opportunity.

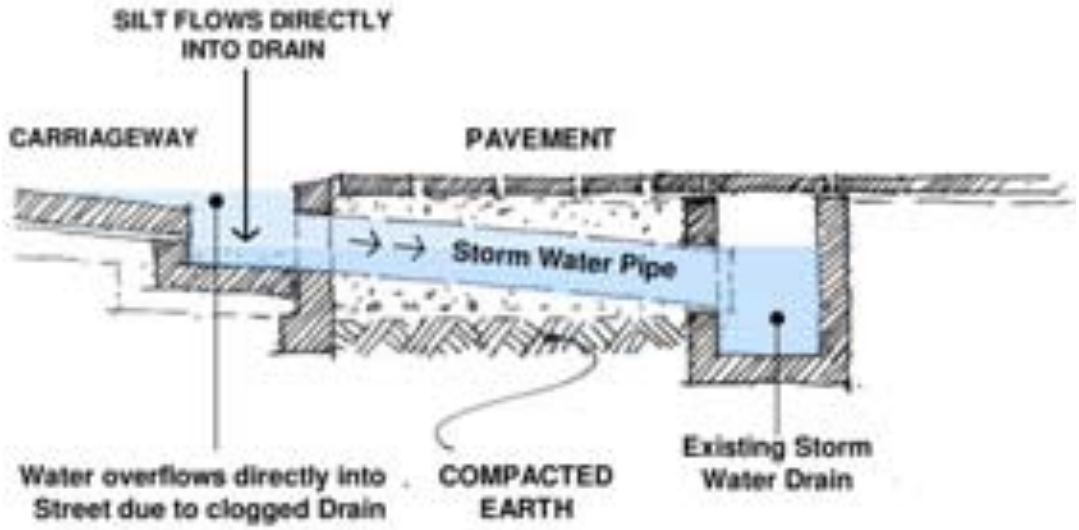
10.15 Varuna River as an Entrance

Varuna should once again become the front of the city. Starting from the railway tracks, situated on a higher level, down to the Varuna River with this goal, a series of holdings of water in the form of natural talabs (ponds), as well as kunds (tanks) where water flows through a filtration nallah (waterways), should reclaim. The idea is to be able to filter and store water at different locations. At the Varuna, we propose to soften the river’s edge to create different ecological habitat areas as well as constructed wetlands that will help in bioremediation-wastewater treatment for the wastewater that is discharged by the buildings along the river. At the confluence point with Ganga Varuna should have a designated delta designed to create a set of floodable islands that serve as the last layer of water-bioremediation as Varuna enters the Ganges. During the dry season, these floodable islands

can become destination points for boats and tourist flows, hosting various types of public spaces as well as a farmer's market.

10.16 Proposals and Recommendations:

Currently, stormwater and silt flow directly into the stormwater drains, carrying all pollutants with them. Additionally, the slope of the Strom Water Pipe prevents rain from being used to full capacity. Bioswales and planting strips provide a bio-filtration bed for streets Storm Water flows directly into a Bio-filtration or Bio retention Swale. Water is retained and infiltrated in the bio-swale.



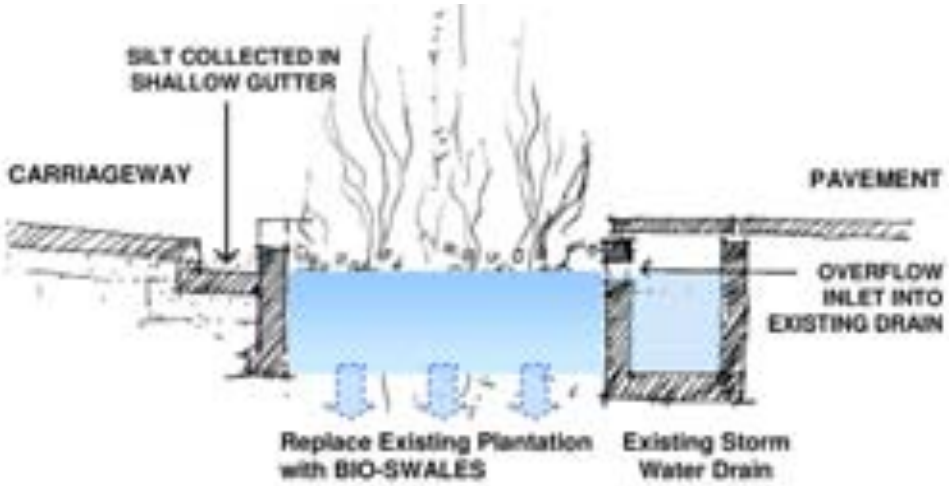
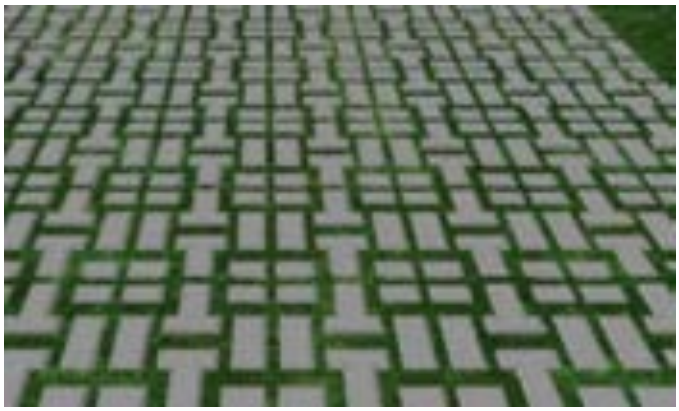


Figure 76: Represntation of Bioswales and Plantation Strips

- Generally, stormwater is collected across the edges of the carriageway by an inlet placed at regular intervals and directed into the stormwater drainage system. The natural stormwater management system is to be preferred for ecological reasons.
- SW lines need to be along both sides of the street, ideally in the shoulder or the Multi-utility zone if provided. Care should be taken to follow the longitudinal slope of the street and water should not accumulate at the intersections.

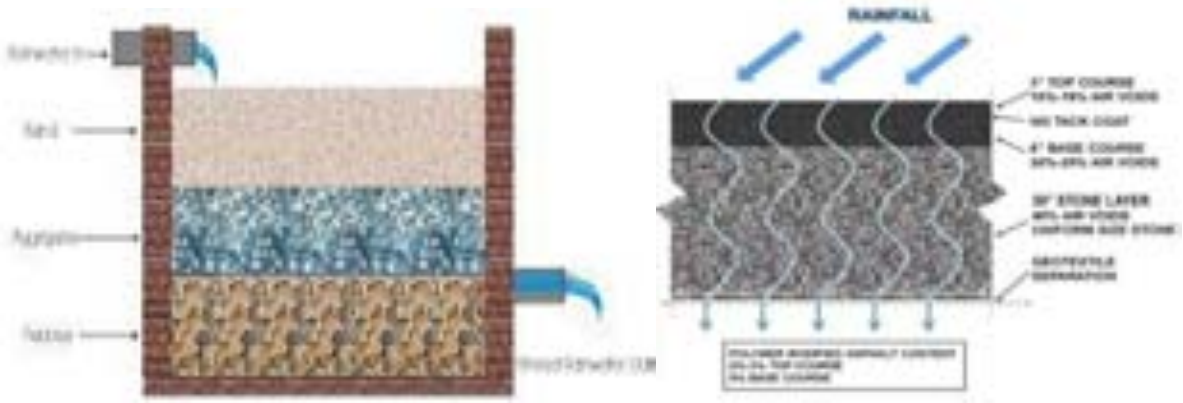


- The street should have a gradient on both sides towards the edge. Also, the footpath has a gradient slope towards the shoulder so that water does not accumulate on footpaths or enter any property.
- Bio-swales are recommended along roadside planting strips, within MUZs, within wide central medians and in spaces created by grade separators.

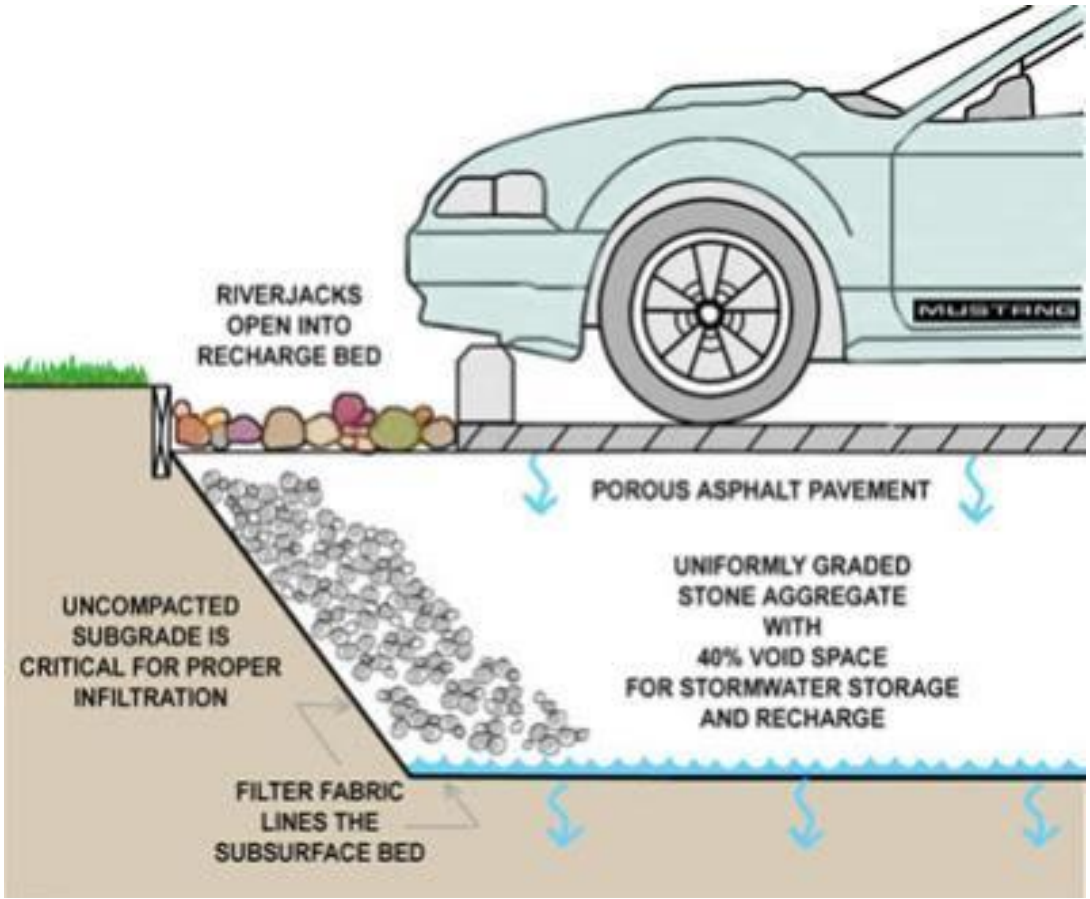
- The minimum width of swales should be 1m and ideally run continuously along a stretch of the road.
- Permeable pavers should be used for parking belts and sidewalks and any other non-vehicular roadway in parts or in totality.
- SWD pipes need to be cleaned and de-silted at regular intervals, especially before the onset of monsoons.

10.16.1 URBAN RAINWATER MANAGEMENT

- Urban runoff needs to be de-silted and accompanying debris and garbage removed
- Should be collected in a silt trap and frequently cleared
- Stormwater can be drained into a sub-surface drainage structure with brickbats, aggregate, and sand to work as a filtering agent
- The Recharge system needs to be designed in more detail to keep out oils and automotive pollutants
- Engineered Surfaces
- Pervious Paving for better stability and Percolation
- Reduces flooding problems considerably.
- Increase groundwater level



1. Green belt a Relief Zone
2. Open areas, Parks are for the rainwater holding area



Under Urban Master Plan Green belts have been proposed all along the city mainly along the riverbed, drainage channel, and small parks as under to hold for an influx of rainwater.

Even excess rainwater can be stored in the manmade reservoir along the river in the low-lying area through channelisation water can accumulate. For restoration purposes, Delapeer Lake would also become a water reservoir point. Several reservoirs may propose as water-holding areas during heavy rains.

11. Project 9: Development of Working Shed for Zari Handicraft Artisans

11.1 Background of the study:

Bareilly is one of the fastest growing cities of India and the reason behind its growth story is its rapidly booming economy through various sectors, however Bareilly is still an Agri based economy largely but there are a few traditional sectors as well like Zari Work, Bans Work, Kite making etc. The existing industrial set up of Bareilly is flourishing mostly with Agri based products.

Bareilly is an educational hub of Western Uttar Pradesh with multiple universities and research institutes. Bareilly College, located in the heart of city, is among the oldest educational institutions in India, built prior to the Revolt of 1857. Bareilly is a seat of M. J. P. Rohilkhand University, and it also hosts Indian Veterinary Research Institute and Central Avian Research Institute. The city holds numerous Engineering Colleges, Management Colleges, Law Colleges, Medical Colleges, and also there are colleges running general courses. The city is equidistant from New Delhi (public capital) and Lucknow, the capital of Uttar Pradesh. This makes Bareilly a nodal point between two significant urban communities of India.

Bareilly has a District Domestic Product of INR 44,467 Cr in 2019-20 contributing to 11.5% of the total GSDP for the state of Uttar Pradesh. The DDP has witnessed a stable and steady growth of 8.6% CAGR over the last decade as compared to the State CAGR of 8.72% during the same period.

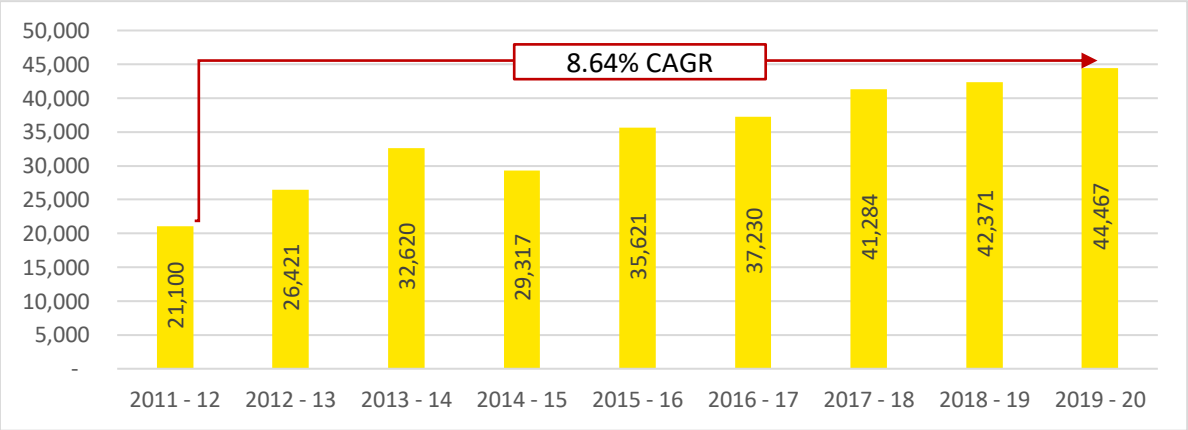


Figure 77: District Domestic Product y-o-y growth for Bareilly

Agriculture sector has been the mainstay for both employment as well as Agri-produce based food processing and manufacturing sector. Bareilly with a total of approx. 14 lakh main and marginal workers across the district, is highly dependent on agriculture and related village household industries for job opportunities. Household industries such as Zari workers account for over 8% of total workforce in Bareilly.

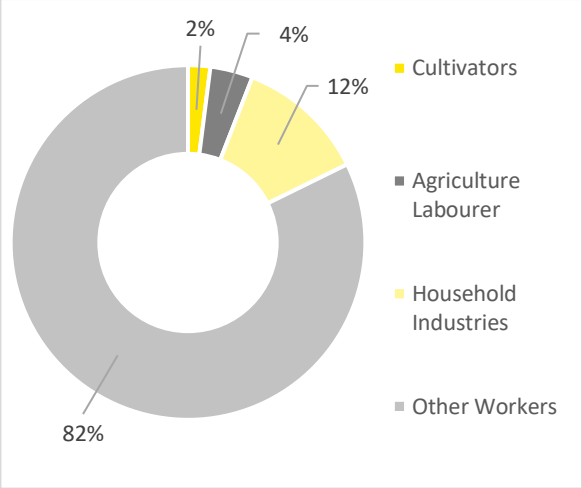


Figure 78: Distribution of workforce in Bareilly

Objective:

It is with this objective of facilitating and promoting the traditional crafts of Bareilly and enhancing the economic opportunities and livelihood for the weaker sections engaged in such traditional household industry like the Zari work those smaller facilities of worker sheds are being proposed across multiple clusters of Zari workers to facilitate the artisans in the area.

11.2 Current Scenario - Handicraft sector in Bareilly

Bareilly is known for its handicraft such as Zari zardozi (gold embroidery), Surma (kohl), manjha (abrasive kite string), striking cane furniture. These handicrafts are mostly performed at household level or as a group with specific expertise.

Zari-Zardozi -

Zari work is made from three types of threads-gold, silk and silver. Presently, thousands of micro and small units are involved in the work of Zari-Zardozi in the district. People are engaged in this work, directly or indirectly. Several items with Zari-zardozi work can be found in the market like dresses, scarves, handbags, jackets, sarees, lehngas etc.

Cane & Bamboo Products -

Bareilly is also known as Baans Bareilly, though it doesn't co-relate with the bamboo trees found here. Yet, large numbers of products manufactured from Bamboo are produced here. These products can be categorized as decorative items. Bamboo furniture is also a dominating product available here. This industry is developed in Bareilly as Cottage Industry and providing employment to a big portion of rural population of this district.

Surma –

The USP of Bareilly's surma is that it is finely grinded and instantly provides cool comfort to the eyes. Though surma prepared in Bareilly is available in more than 80 varieties, a majority of Haj pilgrims from all over the world opt for surma gulab prepared in Bareilly as per the discussions.

Manjha –

Manjha manufacturers date back to over two centuries. People are involved in the manufacture and trade of manjha in the city at individual or small group level. Bareilly's manjha is crafted through a relatively natural process.

Zari, Cane & Bamboo is one of the clusters in Bareilly district. The cluster has been identified under MSE-CDP scheme. Basis the review of the industry and its value chain the following challenges currently being faced by the industry were identified –

- Lack of work sheds in the area, left the workers with no option but to work from their homes in unhygienic conditions without proper facilities for sanitation, lighting and appropriate place for their tools, equipment, raw and processed material as well as finished products etc.

- Given the decentralized and rural & household nature of artisan production, initiatives to provide solar power facilities to alleviate hardship resulting from lack of electricity is essential.

- As women constitute a large portion of handicraft sector employment, the issue of toilet facilities for women in the cluster/ working shed needs to be taken up.

- Need of propound merging of work environment improvement for artisans under various schemes of other departments such as Departments of Ministry of Rural Development, etc.

Some of the snapshot of the challenges being faced by the industry is shown as follows –

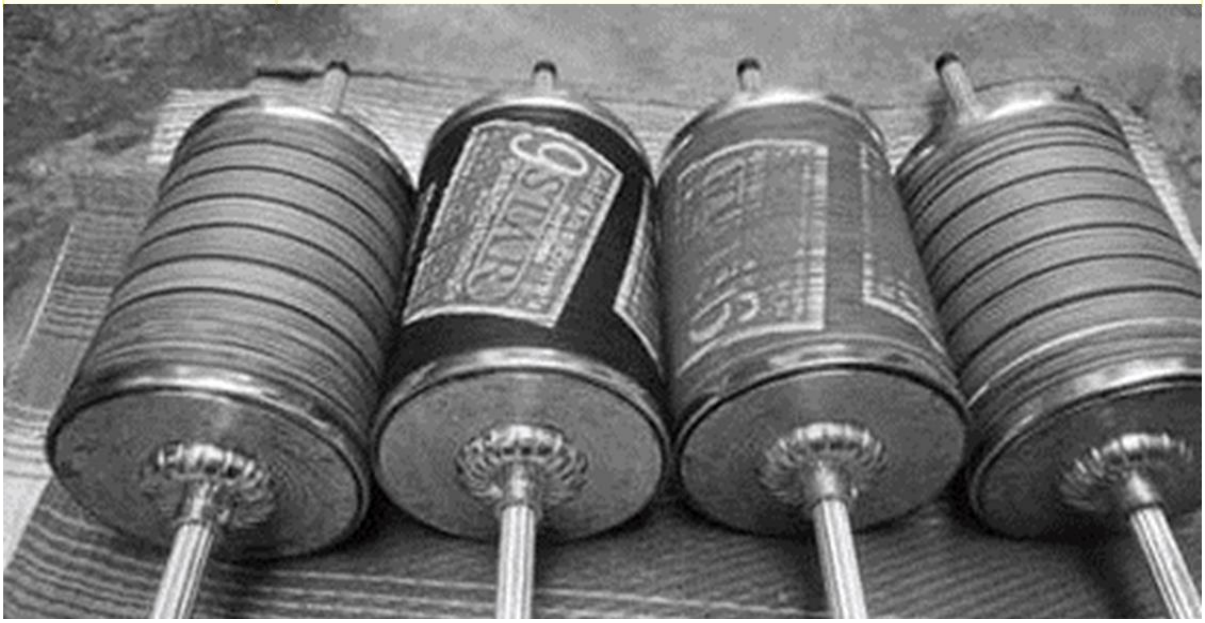
The snapshot of key economics of these household industries have been further provided as follows -

Zari-Zardozi	Zari-Zardozi is a type of hand embroidery and usually done on apparels for embellishment with the help of needle, threads and metal wires. This handicraft work has been taken as patrimonial art in the artisan family.
Principal Products Manufactured	Sari, Salwar Suit
Hub for Zari-Zardosi work	Bareilly
National Export	In 3 prominent areas Bareilly, Delhi, and Jaipur and bulk of orders came from these cities.
International Export from India)	India exports zari embroidery to the United States, the United Kingdom, the United Arab Emirates, Japan and Saudi Arabia. Overseas exporters also get their consignment manufactured in India and export it to other countries.
Raw Material	Silk, kardana pearl, kora kasab, fish wire, nakshi, nos, pearls, tubes, chanla, jarkan nori, leaves, mirrors, golden chain etc.
Types of workers involved in this sector	• Those who are doing this work as their main occupation and engaged in that throughout the year • temporary workers whose main occupation is some other but to earn sufficient or to use their holidays, they work for some hours or few days in a month or year. The nature of employment may affect the labour productivity.
Income per day	Rs 400-500/day earlier Now it has been reduced to Rs 250-200/day.
Reason for such sharp decline in wages	• 18% of GST on the raw material and Subsequently another 18% on the finished product It has led to drastic decrease in the number of orders of Zari-Zardosi products and consequently also eroded livelihood base of hundreds of artisan families.
Reasons for decline in this industry	• GST (Goods and Services Tax) policy • Skyrocketing prices of raw materials • Almost static price of the final products • Invasion of international products • Tough competition from cheaper domestic products • Low wages paid to workers has played a major role in the "ongoing extinction" of the industry. The existing wages are too low (.200-250 Rs per day)
Government initiatives	The government issued Zari card to workers engaged in this economic activity in 2009, under the **'Zari Card Health Benefit Scheme'** having an upper limit up to Rs. 30,000. This was primarily a smart card linked with the card-holder's bank account number, however after some time the smart cards failed to work

Cane & Bamboo

Products	Cane furniture — intricately woven sofa sets, diwan, stools, tables, trays, side racks and swings, Lawn Furniture, Gift Item, Lamp Shed, etc.
Raw material	Cane and Bamboo
Raw material source	Assam, Meghalaya, Tripura and few nearby districts of Uttar Pradesh
Number of artisans and traders	Only 1,100 artisans and 50 traders are associated with this industry
Existing Cluster	(i) Cane & Bamboo Adhunik Vikas Audyogik Sehkari Samiti Ltd. Mathurapur, C B Ganj, Bareilly, No. of functional units in the clusters is 172 and Employment in Cluster Approximately 1200. (ii) The Fatehganj cluster is able to form 500 plus Artisans & 40 SHGs supporting the strong work force. The mobilisation gains momentum day by day.
Types of workers involved in this sector	Majorly artisan households, which have been performing this handicraft form for a long time. Following are the categories - • Those who are doing this work as their main occupation and engaged in that throughout the year • Temporary workers whose main occupation is some other but to earn sufficient or to use their holidays, they work for some hours or few days in a month or year.
Income per day	400-700 Rs per day
Reason for low wages	Lack of skilled manpower, training, and knowledge of tools & machinery
Reasons for decline in the industry	Labour cost and the prices of raw materials have gone up. As a result, cost of a cane sofa is between Rs 8,000 to Rs 25,000 based on its quality and design. Therefore, customers prefer to go for wooden furniture, which is considered more durable. Cheaper and durable furniture is available in plastic variants.
Thrust Area	Technology/ Product/ Market/ Export/ quality etc.
National Export	All over India
International Export from India)	Europe (for eco-friendly furniture and artifacts)
Challenges in this industry	• Availability of cheap raw material • Absence of GI tag and certification of the handicraft • Tough competition from plastic and other substitute material products which are cheaper and comparatively more durable • Low wages paid to workers has played a major role in the "ongoing extinction" of the industry.
Government initiatives	Formulation of Clusters and common facility centres along with common tools and machinery.

Products	Strings for Kites
Kite artisans in Bareilly	200-250 with artisans cards
Number of artisans involved	Approx. 30,000
Raw material	Manjha is made through strings prepared through natural process. Raw material used for making string is Coarse rice which is being grown locally
Wages of artisans	Rs 100/day
Import Areas	Only Nylon Kite stings are being imported from China. No Cotton kite strings are being imported.
Export Areas	PAN India.
Initiatives by Government to boost this industry	• Government had imposed ban on the business of Nylon & Chinese manjhas which were giving tough competition to this industry. • Proposal have been made in mast for an Industrial cluster in Rohilkhand for this Industry. • Comprehensive Handicrafts Cluster Development Scheme (CHCDS)
Training for kite making	30 artisans programs have been held for Kite and Manjha artisans
Reason for low wages	Lack of skilled manpower, training, and knowledge of tools & machinery
Challenges in this industry	• Tough competition from synthetic and other substitute material products which are cheaper and comparatively more durable • Low wages paid to workers has played a major role in the "ongoing extinction" of the industry.



11.3 Vision

It is envisioned to provide facilities for upliftment of the working conditions of the handicraft artisans through providing the necessary know how and technological advancement, infrastructure for using modern frames and technologies as well as overall revival and upliftment of the sector through softer measures.

Vision Statement – Handicraft

- Upliftment of working conditions of the handicraft artisans
- Support in technological know-how
- Revival and upliftment of the existing artisan communities in Bareilly

The Proposal - Development of working shed for Zari Handicraft artisan

The Work shed project for Handicraft Artisans is an attempt to facilitate the development of artisans and their families by way of providing them financial assistance for construction of work sheds. It would include the following –

- Working shed (temporary / permanent) with specific number of "Adda (wooden frame)" and circulation space (maximum 40 – 50 artisans per shed)
- Paved area to place "Adda or Wooden frame"
- Exhibition / selling area – to showcase the final product
- Toilet and rest room
- Creche area for children

Each of these worksheds are expected to be around 3,150 sft. A total of six such work sheds are proposed across the major artisan villages that are engaged in Zari work.

11.4 Site location & Broad Concept

Site location

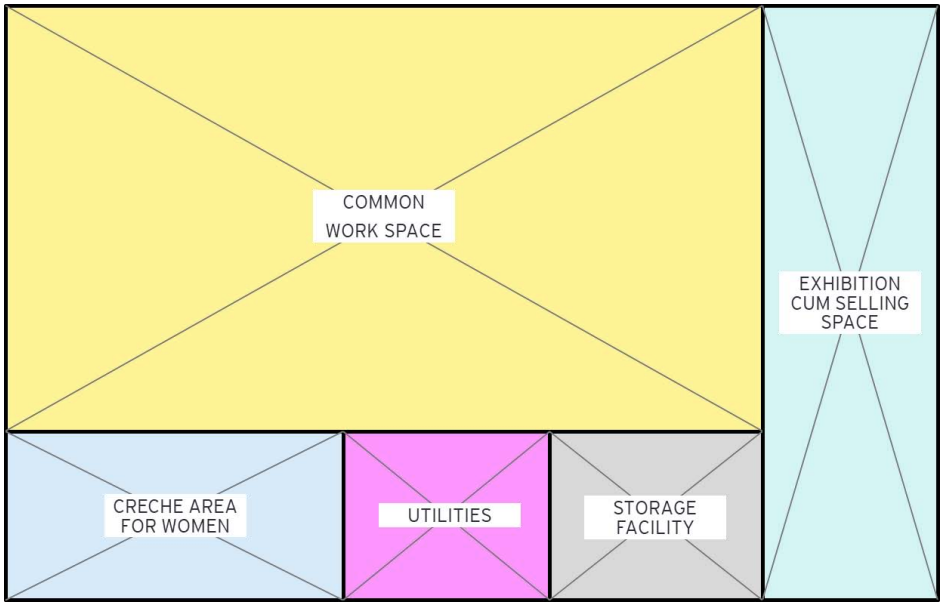
A total of six such work-sheds are proposed across the major artisan villages that are engaged in Zari work. The key villages with significant presence of artisans include Paraskhera, Invertis Chauraha, Biharipur, Kasgaran, Puranashahar, Chipitola, Partapur and Katrchand khan.

Broad Concept

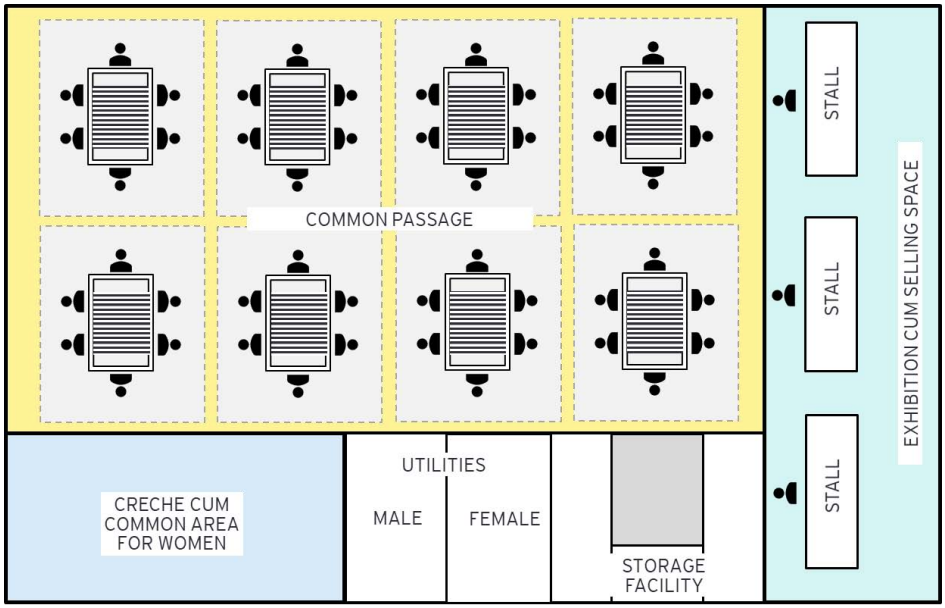
The Zari work-shed would be developed on village land provided by the local SHG/ Primary Artisan Cooperative Society or on land provided by Bareilly development authority. This would be the equity stake of the local artisans as part of the project component. They would also be required to ensure sustainable operations and maintenance of the proposed work-shed.

The working shed area requirement will vary from **3000-4000 Sq. ft. for minimum sitting capacity of 40-50 artisans at a stretch.** A single working shed would be able to facilitate approximately 2500 workers in a year considering a rotational use of the frame and work-shed.

- Schematic Diagram – The schematic of the proposed work-shed is as follows –



Detailed schematic-



- **Operation and Maintenance –** The operations and maintenance of the proposed work-shed would have to be taken up by the local SHG or Artisan Society. Assistance can also be provided by the District Handicraft Department in coherence with District Industries Centre (DIC). The operation responsibility may be leased out on turn basis to the Self-Help Groups (SHGs) / community associations / similar bodies.

11.5 Project costing & Financials –

The area statement for the proposed Zari work shed is as follows –

High level Area Statement		
Items	**Remarks**	**Units**
Number of artisans per frame	5	number
Number of frames proposed	8	number
Total number of artisans per shed	40	number

Area of 1 unit frame (5 x 10 ft.)	50	Sq. Ft.
Area for 1 frame with circulation(15 x 20 ft.)	300	Sq. Ft.
Area requirement for frames	2,400	Sq. Ft.
Area calculation	**Area (ft)**	**Units**
Working shed area	2,400	Sq. Ft.
Utility space (2 toilets)	60	Sq. Ft.
CRECHE (10-12 sft per child)	140	Sq. Ft.
Storage area	100	Sq. Ft.
Exhibition cum selling area (3 stalls)	450	Sq. Ft.
Total area requirement	**3,150**	Sq. Ft.

It is expected to incur a CAPEX of INR 75 lakh per work shed for development. The breakup of same is indicated as follows –

CAPEX[1]	INR lakh
Construction cost @ CPWD rates	60.6
Utilities Cost ~ @ 25% if Construction cost	15.1
Equipment & frame	0.20
Total cost (approx.):	**75.9**

11.6 Project Time-line

The Development of proposed work-sheds is estimated at 1 to 2 years from the sanction of the project.

[1] *Note: This is a working draft and The Costs are indicative CAPEX only do not include the CAPEX towards site development as well as costing towards landscaping, gardens and infrastructure provisions for the proposed Medi-city.*

12. Project 10: "Medicity" – designated area with multiple health business and activities

12.1 Background to the district:

Bareilly is one of the fastest growing cities of India and the reason behind its growth story is its rapidly booming economy through various sectors, however Bareilly is still an Agri based economy largely but there are a few traditional sectors as well like Zari Work, Bans Work, Kite making etc. The existing industrial set up of Bareilly is flourishing mostly with Agri based products.

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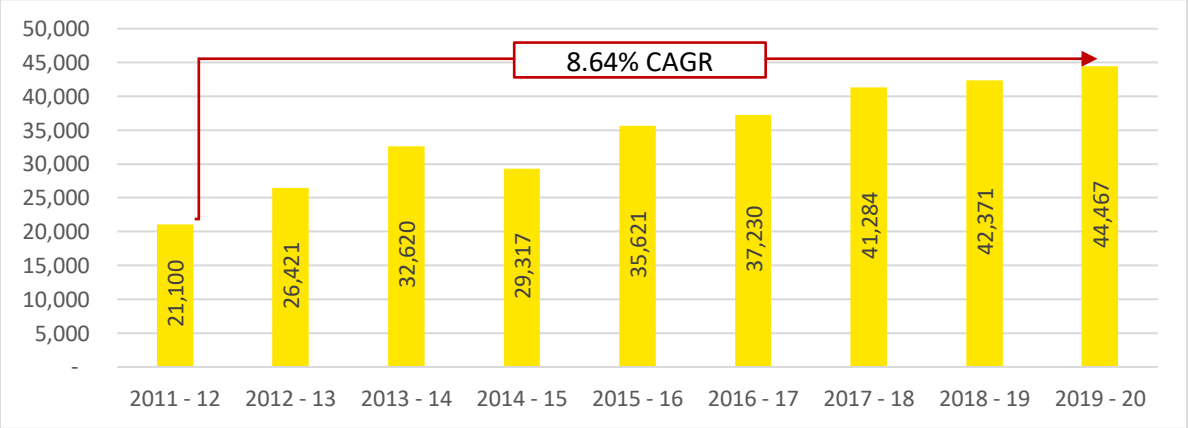


Figure 79: District Domestic Product y-o-y growth for Bareilly

Tertiary sector is the largest contributor to the economy of the city with Real estate and local businesses as well as construction activity being the largest driving sectors. The sectoral breakup of the DDP is indicated as follows –

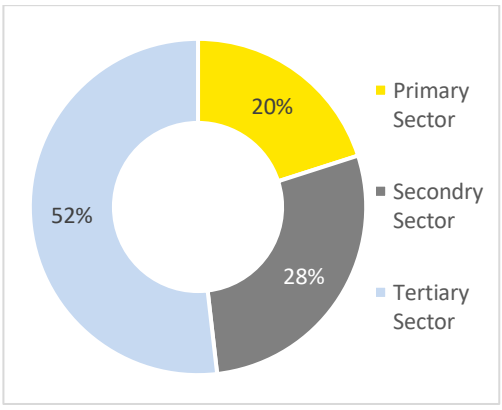


Figure 80: DDP spread across sectors

Amongst the tertiary sector, particularly medical and Health Care, Bareilly is among one of the leading cities of Uttar Pradesh. In terms of medical facilities, the city serves as a gateway to the patients of the Kumaun, Rohilkhand, and West Nepal region and has strong prospects of becoming a leading hub for medical tourism in the region.

12.2 Current Scenario

The existing infrastructure in Bareilly includes a total 255 Private Hospitals with 10957 number of beds are present. As per URDPFI norms up to 2031, there will be requirements of additional 5 multi-speciality hospitals, 14 speciality hospitals. The existing infrastructure includes

- In Urban area, there are District Women Hospital, District Hospital, 300 Bed Hospital, PHC's & Others including District Mental Hospital, TB Hospital, Mother and Childcare (MCH) Wing, Railway Hospital, Military and Army Hospital, Employee's State Insurance Corporation Hospital.

- In Rural areas, there are government facilities PHC's, Health Sub – Centres & CHC's.

- Private Health Centre also available in this region due to high demand of health services. Most of private health centre situated in the urban regions Bareilly as a head quarter has high density of medical facilities. Clinical Health Centres and Nursing Homes are well dense in Bareilly city.

Bareilly being one of the leading cities of Uttar Pradesh in terms of medical facilities, has a strong health infrastructure base which can be utilised in an improved planned manner by in the form of a Medi – city encompassing a Multi – speciality Hospital, academic medical institutions, and allied activities in an integrated matter. With the increase in population of the Bareilly, there will be a requirement / demand of more health facilities in order to cater the health requirement of Bareilly as well as nearby regions.

It is with that perspective that development of a Medi-city has been proposed as part of the vision for Bareilly.

12.3 Vision and Proposed Development

Vision

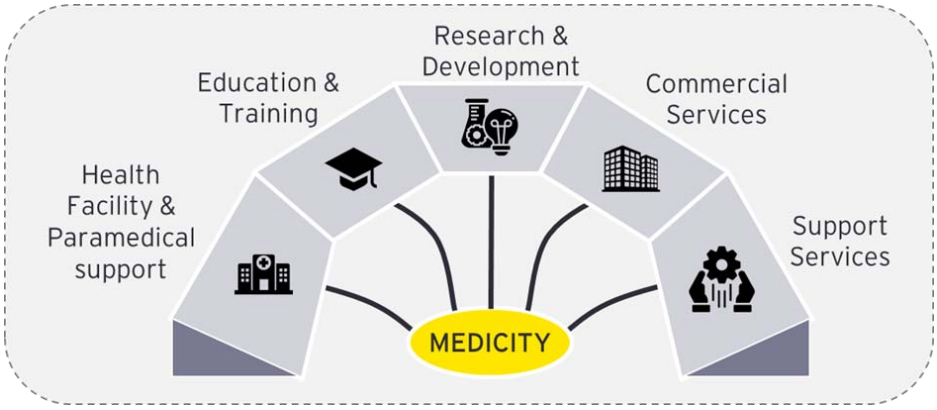
It is envisioned to develop Bareilly Medi-city as a hub of regional medical tourism by facilitating and attracting private sector hospitals to Bareilly thereby also ensuring provision of world class super speciality services to the local population of Bareilly.

Vision Statement - Health & Education

- Comprehensive planned development of an integrated health facility
- Amalgamation of conformative land uses and activities at a single space
- Live & work space concept

12.4 The Medi-city Proposal

Medi City aims to functionally integrate within one campus and one management of the facilities related to medical care, teaching, research, and development. It also offers to explore the possibility of integrating knowledge of traditional and alternative medicine with modern medicine, through means of scientific research.



- Medical College & Hospital
- Super speciality Centre of Excellence
- Paramedical education hub
- Convention centres & Hotels and related facilities for patients in order to promote medical tourism
- Wellness & rehabilitation centres as allied services
- Other related medical support facilities

12.5 Site location & Broad Concept

12.5.1 Site location

The Medi-city is proposed to be developed at the site already identified by the state Govt. under the Bareilly Masterplan. As part of it, an area of 86.4 Ha is proposed in between Pilibhit Bypass road to Kathgodam Road. As part of this proposal a total area of 30 Ha out of the proposed 86 Ha is to be earmarked for the proposed Medi-city. The site location is indicated in the following exhibit.

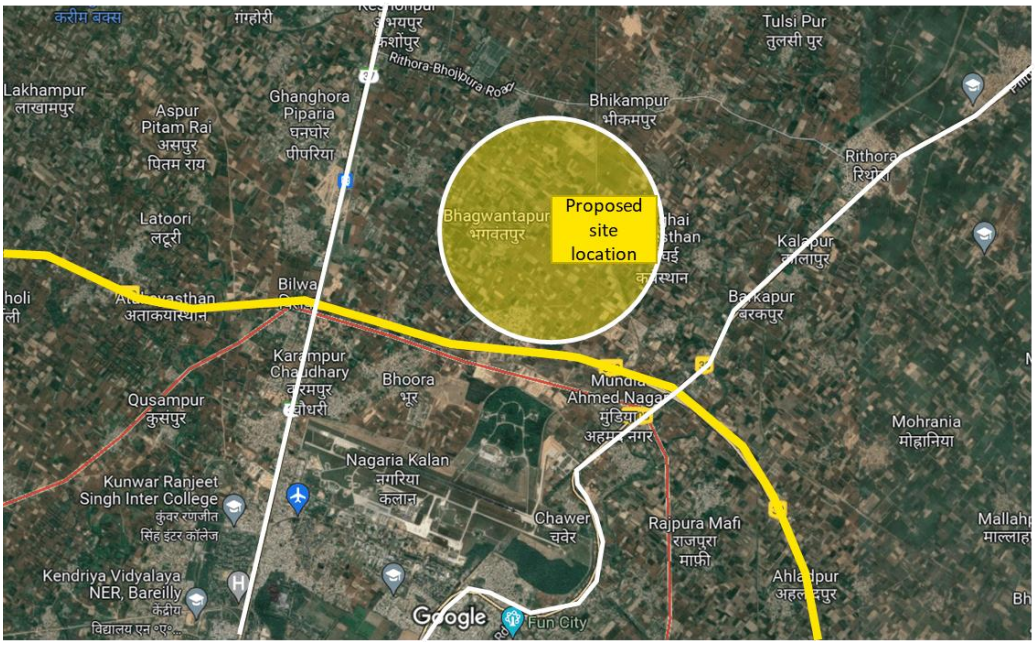


Figure 81: Proposed Site for Medi-city

12.5.2 Broad Concept.

The proposed Medi-city is proposed to be a 250 bedded multi-speciality hospital catering to the advanced medical needs of the people residing in Bareilly and adjoining areas as well as medical tourist arriving from nearby places including Nepal.

Along with the hospital, adequate facilities would be provided such as

- Residential housing for doctors and staff,
- Hostels for paramedic and related ancillary workers,
- Budget hotel to cater to the needs of the patients and their families
- Wellness centres and meditation centres
- Commercial complexes to provide facilities for additional diagnostic and other services
- Green spaces and medicinal gardens

It is proposed that a total of 12.5 Ha of land be developed at this stage and a land of 17.5 Ha of adjoining be earmarked for future expansion of the Medi-city for new hospitals, hotels and convention centres.

The Indicative area statement for the same is shown as follows -

Sl. No.	Components	Share (%)	Total land area (in sqm)	Proposed Built Up area (in sqm)
	MEDICITY			
1	Staff & Worker Hostel (50 keys)	2%	2,500	1,700
2	Budget Hotel (80 keys)	7%	8,500	5,000
3	Wellness Centre (50 keys)	12%	14,800	5,700
4	Multi-speciality Hospital (300 bedded)	37%	45,700	27,800
5	Convenience stores (incl. Pharmacy)	3%	4,100	2,400
6	Housing for Hospital staff	11%	14,200	13,000
7	Nursing & para-medic college	5%	6,200	2,200
8	Garden & Green area	8%	10,000	
9	Infrastructure , Services & roads, etc.	15%	19,200	
	Total		**1,25,200**	**57,800**
	Total Area in Ha.		**12.52**	

12.6 Project costing & Financials –

Cost Estimates for the proposed Medi-city is indicated as follows –

Sl. No.	Components	Share (%)	Total land area (in sqm)	Proposed Built Up area (in sqm)	Approx. Development cost (INR Cr.)
	MEDICITY				
1	Staff & Worker Hostel	2%	2,500	1,700	7.5
2	Budget Hotel	7%	8,500	5,000	24.0
3	Wellness & Rehab. Centre	12%	14,800	5,700	38.0
4	Multi-speciality Hospital	37%	45,700	27,800	216.0
5	Convenience stores (incl. Pharmacy)	3%	4,100	2,400	9.0
6	Housing for Hospital staff	11%	14,200	13,000	41.5
7	Nursing & para-medic college	5%	6,200	2,200	15.0
8	Garden & Green area	8%	10,000		
9	Infrastructure , Services & roads, etc.	15%	19,200		
	Total		**1,25,200**	**57,800**	**351.0**

Note: This is a working draft and The Costs are indicative CAPEX only do not include the CAPEX towards site development as well as costing towards landscaping, gardens and infrastructure provisions for the proposed Medi-city.

12.7 Project Time-line

- The Development of proposed Medi-city initial phase is estimated at 4 to 5 years from the sanction of the project.

13. Project 11: Demonstration of Solar Energy for streets and Gov. buildings

13.1 INTRODUCTION

The world is moving on renewable power, the easiest way to generate electricity through sun is solar power. Its cleanest, greenest & cheapest mode of power where power is generated through array of photo voltaic panels.
The solar power plant comes as :

13.1.1 ON GRID SYSTEM

The solar power is directly connected to the grid & the generated power is fed to the grid.
The system converts DC power from array to AC through solar inverter, incorporated with Net & Generation meter.

13.1.2 OFF GRID OF HYBRID SYSTEM

As the name suggest, the system generates & distributes self-generated power to the load, thereby storing power in the battery bank for night use.

13.2 PARAMETERS FOR SELECTION OF SOLAR POWER PLANT

A : **Civil Set Up.**
RCC Rooftops (tin / profile sheet) & Ground mounted structure
Open to Sky, shadow free & ample of sunlight from 8 AM to 4:45 PM.
B : **Atmospheric Condition** : Bareilly is normally having clear sky over the course of the year, the temperature typically varies from 47°F to 105°F and is rarely below 41°F or above 111°F.
C : **Weather Criteria:** Taken Average Solar radiation/kWh/m^2/day.
D : **Solar Calculation** : Monocrystalline Technology (18% eff). Generation Capacity for 1kWp setup at 100% eff (5.85m2 with 545 Wp modules). Thereby calculating Annual Average Units generation.
E : **Electrical Parameters** : Study of transformer capacity, LT panel, distribution of load, DG Change Over, distance from solar power plant to LT Panel, Scope of installation of Inverter, SPD & ACDB DCDB.
F **: Electricity bill analysis :** To analysis yearly, monthly & daily electrical units consumption for the exact capacity of solar plant.

13.3 Technical Requirements for Connecting Solar Power Plants to Electricity.

This chapter discusses basics of technical design specifications, criteria, technical terms and equipment parameters required to connect solar power plants to electricity networks. Depending on its capacity, a solar plant can be connected to LV, MV, or HV networks. Successful connection of a medium-scale solar plant should satisfy requirements of both the Solar Energy Grid Connection Code (SEGCC) and the appropriate code: the Electricity Distribution Code (EDC) or the Grid Code (GC) as the connection level apply. Connection of a large-scale solar plant to the transmission network should satisfy the requirements of both SEGCC and GC. For Small-Scale Photovoltaic (SSPV), the connection should satisfy both the SSPV Connection Code and the EDC. The objectives are to establish the obligations and responsibilities of each party; i.e. operators and all network users, thus leading to improved security, higher reliability and maintaining optimal operation. The technical specifications include permitted voltage and frequency variations in addition to power quality limits of harmonic

distortion, phase unbalance, and flickers. Operational limits and capability requirements will be explained and discussed. Solar power grid connection codes of Indian Electrical standards.

The share of renewable resources for generating electric energy is increasing worldwide to cope with increasing demand. Current generation expansion plans of various countries expect increasing share of renewable energy resources in the electricity generation mix. By 2020, utilities set a target to reach a ratio of 20% renewable energy of the total energy required for electricity generation. Other utilities forecasted a higher share reaching about 50% by 2050. Wind energy and solar energy are the most promising resources and proven to be efficient in real applications with decreasing competitive costs of generated electric energy. The increasing share of renewable energies to be integrated to electric power systems has resulted in technical issues such as power quality requirements, capacity limits, safety measures, security, protection systems, synchronization process, lower system inertia, etc.

Solar energy is the radiant light and heat from the Sun that is harnessed using solar heating, photovoltaics (PV), concentrated solar power (CSP), solar architecture, and artificial photosynthesis. Solar power is the conversion of the energy from sunlight into electricity, either directly using PV, indirectly using CSP, or a combination. The Sun is 1.3914 million km in diameter, and the radiated electromagnetic energy rate is 3.8 × 1020 MW.

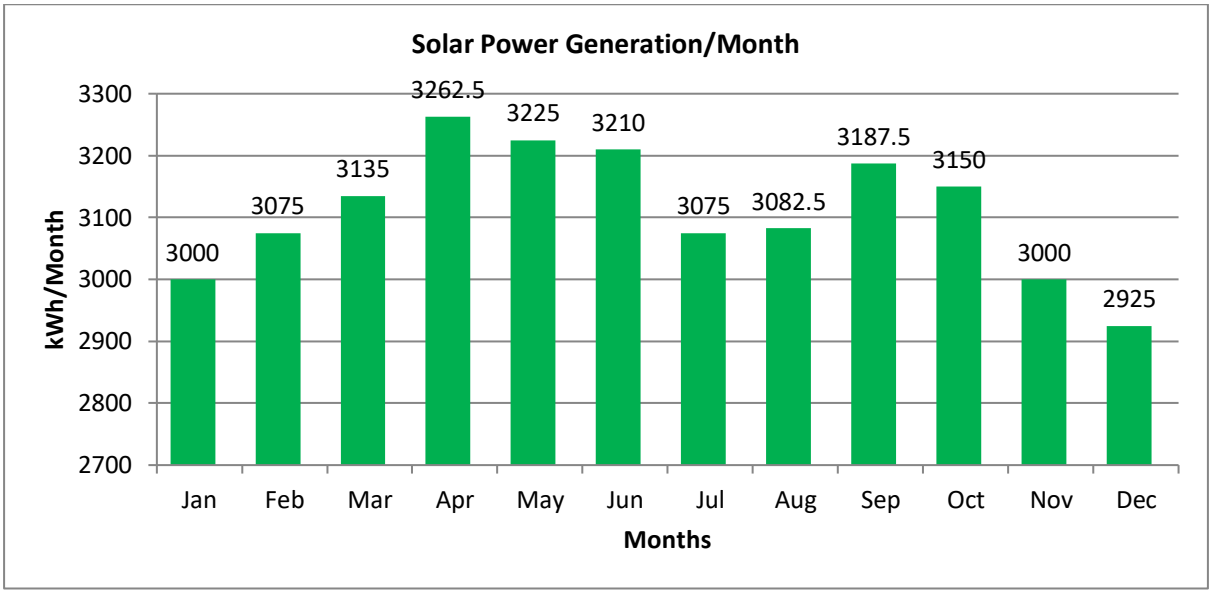
13.4 TECHNICAL OUTCOMES OF SOLAR ENERGY

Capacity	Solar Units Generation	Area Required	Co2 emission Saved	Costing	Savings @Rs.10/Unit.
1 KW	4 Units	80 Sq.Foot	0.865 lbs	60,000=00	Rs.40/-

13.4.1 SOLAR POWER PLANT AT COMMISSIONER RESIDENCE

Plant Capacity	Area Required	Model	Costing.
25 KW	2000 Sq.Foot	CAPEX	15,00,000=00

25KW Power Generation					
Sr.No	Months	Bareilly Irradiance/Month	Average 4KW plat units/day	Units/months	Monthly units/ 8 Rupee (Savings / Month)
1	Jan	4.00	100	3000	24000
2	Feb	4.10	102.5	3075	24600
3	Mar	4.18	104.5	3135	25080
4	Apr	4.35	108.75	3262.5	26100
5	May	4.30	107.5	3225	25800
6	Jun	4.28	107	3210	25680
7	Jul	4.10	102.5	3075	24600
8	Aug	4.11	102.75	3082.5	24660
9	Sep	4.25	106.25	3187.5	25500
10	Oct	4.20	105	3150	25200
11	Nov	4.00	100	3000	24000
12	Dec	3.90	97.5	2925	23400
Total	Year	4.15	1244.25	37327.5	Rs 2,98,560=00



BOOK OF MATERIAL. (25 KW)

Sr.No.	Description	Quantity	1Make
1	Mono Crystalline 540 Watts Solar Panels MNRE Approved IEC Certified	46	Warree/ Renewsys/Panasonic
2	Fabricated Galvanized Steel Structure	AS per Design	ISO 9002
3	Solar Grid Inverter	25 KW, Three Phase Transformer less with Remote Monitoring.	Delta / ABB
4	Online Monitoring	LAN Cable WiFi Based 25 Mtrs.	ABB
5	Zero Export Device	25 KW	Intello / Solar Log
6	AC Solar Cable & Accessories	120 Meters (4 Core 120 Sq.mm Insulated)	Polycab/ KEI/Finolex
7	DC Solar Cable & Accessories	Single core 4 Sq mm. As per Design	Siechem
8	AC Side Breaker 3 Phase ACDB	Input Terminal 100 Amp, Encloser with IP65 Protection.	SPD - Phoenix Contract. MCB – ABB / Hager
9	DC Side Breaker with 3 phase DCDB	Positive terminal 10 with Amp, Encloser with IP65	SPD - Phoenix Contract. Fuse – Ferraz

		Protection, 2 In 2 Out DCDB.	
10	Junction Box, Lighting Arrestor, Earthing with Accessories, With rods, Chemical, Pipe etc	As Required	True Power etc
11	MC4 Connectors	As Required	Branded ISO Standards
12	Earthing & LA Cable	As Required	Polycab or Equivalent
13	Cable Tie, Clamps & Pole Box	As Required	Branded
14	Generation / Energy Meter	1 No	HPL / L&T UPPCL Approved.

COMMERCIALS:

SUPPLY INSTALLTION TESTING COMMISSIONG OF 25 KW SOLAR PLANT WITH ONE YEAR AMC.
Detailed Engineering, Designing, Procurement & Installation as per plant size & load. (EPC)

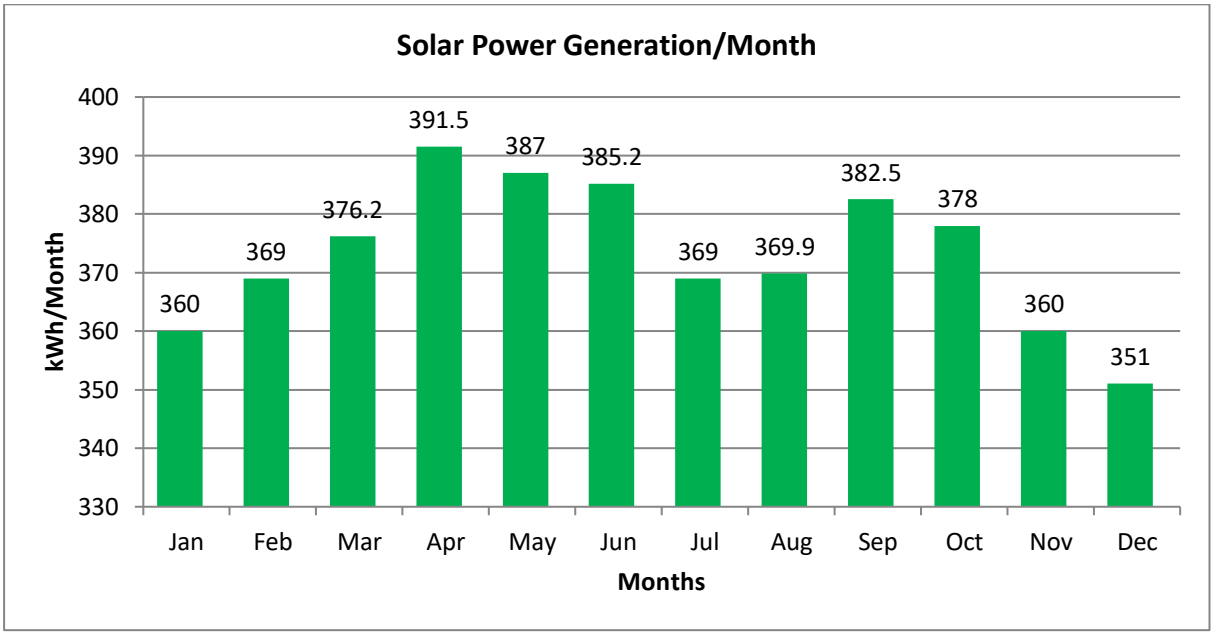
Sr.No	Description	Rate	**Amount**	Warranty
1	Supply & Installation of 25 KW Solar Plant	Rs. 60 PER WATT.	**15,00,000 =00** **(Rs. Fifteen lacs Only)**	For Panels – Product Warrant **10 Years**, Performance Warranty – **25 Years.** **Inverter – 5 Years.** Others – **2 Years**
2	SPD – Zero Export Device with Accessories.	40,000/-	**40,000=00.** **(Rs. Forty Thousand Only)**	5 Years
Total (1+2) Rs. Fifteen lacs forty thousand only.				**Rs.15,40,000=00**

13.4.2 RESIDENTIAL HOUSING

Plant Capacity	Area Required	Model	Costing.
3 KW	240 Sq.Foot	Net Metering & Subsidy	1,80,000=00

3KW Power Generation					
Sr.No	Months	Agra Irradiance/Month	Average 3KW plat units/day	units/months	Monthly units/ 10 Rupee Savings / Month

1	Jan	4.00	12	360	3600
2	Feb	4.10	12.3	369	3690
3	Mar	4.18	12.54	376.2	3762
4	Apr	4.35	13.05	391.5	3915
5	May	4.30	12.9	387	3870
6	Jun	4.28	12.84	385.2	3852
7	Jul	4.10	12.3	369	3690
8	Aug	4.11	12.33	369.9	3699
9	Sep	4.25	12.75	382.5	3825
10	Oct	4.20	12.6	378	3780
11	Nov	4.00	12	360	3600
12	Dec	3.90	11.7	351	3510
	Year	4.15	149.31	4479.3	Rs.44793



BOOK OF MATERIAL. (3 KW)

Sr.No.	Description	Quantity	1Make
1	Mono Crystalline 540 Watts Solar Panels MNRE Approved IEC Certified	6 Nos	Warree/ Renewsys/Panasonic
2	Fabricated Galvanized Steel Structure	AS per Design	ISO 9002
3	Solar Grid Inverter	3 KW, Three Phase Transformer less with Remote Monitoring.	Delta / ABB

4	Online Monitoring	LAN Cable WiFi Based 25 Mtrs.	ABB
5	Zero Export Device	Nil	
6	AC Solar Cable & Accessories	120 Meters (4 Core 120 Sq.mm Insulated)	Polycab/ KEI/Finolex
7	DC Solar Cable & Accessories	Single core 4 Sq mm. As per Design	Siechem
8	AC Side Breaker 3 Phase ACDB	Input Terminal 100 Amp, Encloser with IP65 Protection.	SPD - Phoenix Contract. MCB – ABB / Hager
9	DC Side Breaker with 3 phase DCDB	Positive terminal 10 with Amp, Encloser with IP65 Protection, 2 In 2 Out DCDB.	SPD - Phoenix Contract. Fuse – Ferraz
10	Junction Box, Lighting Arrestor, Earthing with Accessories, With rods, Chemical, Pipe etc	As Required	True Power etc
11	MC4 Connectors	As Required	Branded ISO Standards
12	Earthing & LA Cable	As Required	Polycab or Equivalent
13	Cable Tie, Clamps & Pole Box	As Required	Branded
14	Generation / Energy Meter	1 No	HPL / L&T UPPCL Approved.

COMMERCIALS:

SUPPLY INSTALLTION TESTING COMMISSIONG OF 3 KW SOLAR PLANT WITH ONE YEAR AMC.

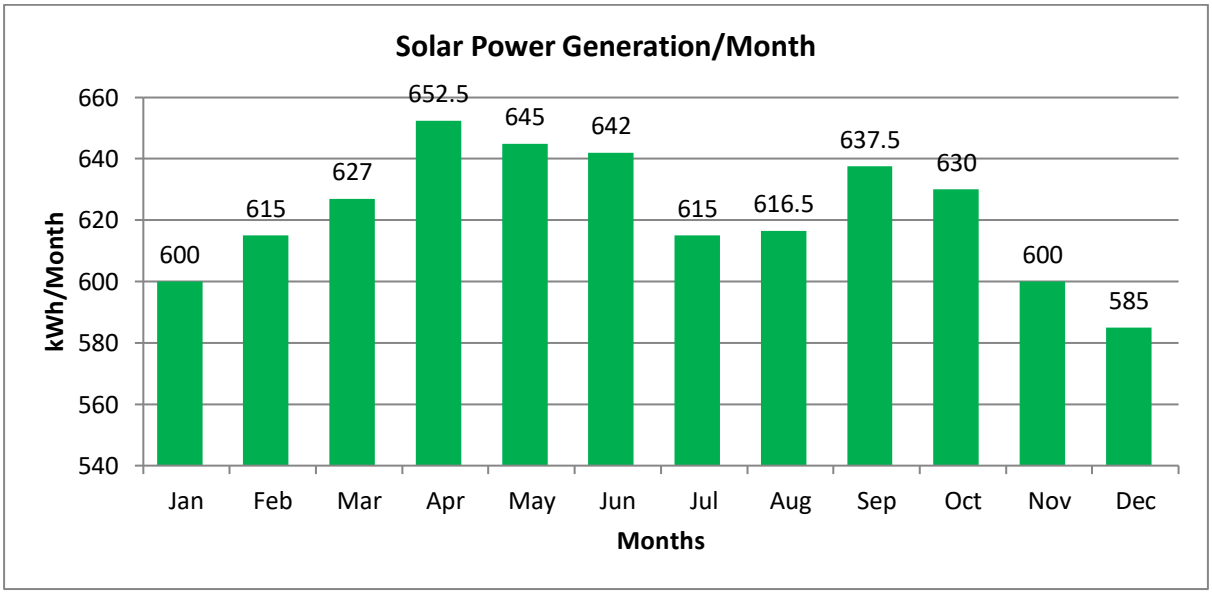
Detailed Engineering, Designing, Procurement & Installation as per plant size & load. (EPC)

Sr.No	Description	Rate	**Amount**	Warranty
1	Supply & Installation of 3 KW Solar Plant	Rs. 60 PER WATT.	**1,80,000 =00** **(Rs. One lacs eighty thousandOnly)**	For Panels – Product Warrant **10 Years**, Performance Warranty – **25 Years.** **Inverter – 5 Years.** Others – **2 Years**

13.4.3 RESIDENTIAL HOUSING

Plant Capacity	Area Required	Model	Costing.
5 KW	400 Sq.Foot	Net Metering & Subsidy	3,00,000=00

5KW Power Generation					
Sr.No	Months	Agra Irradiance/Month	Average 4KW plat units/day	units/months	monthly units/ 10 Rupee
1	Jan	4.00	20	600	6000
2	Feb	4.10	20.5	615	6150
3	Mar	4.18	20.9	627	6270
4	Apr	4.35	21.75	652.5	6525
5	May	4.30	21.5	645	6450
6	Jun	4.28	21.4	642	6420
7	Jul	4.10	20.5	615	6150
8	Aug	4.11	20.55	616.5	6165
9	Sep	4.25	21.25	637.5	6375
10	Oct	4.20	21	630	6300
11	Nov	4.00	20	600	6000
12	Dec	3.90	19.5	585	5850
Total	Year	4.15	248.85	7465.5	74655=00



BOOK OF MATERIAL. (5 KW)

Sr.No.	Description	Quantity	1Make
1	Mono Crystalline 540 Watts Solar Panels	10 Nos	Warree/ Renewsys/Panasonic

	MNRE Approved IEC Certified		
2	Fabricated Galvanized Steel Structure	AS per Design	ISO 9002
3	Solar Grid Inverter	5 KW, Three Phase Transformer less with Remote Monitoring.	Delta / ABB
4	Online Monitoring	LAN Cable WiFi Based 25 Mtrs.	ABB
5	Zero Export Device	Nil	
6	AC Solar Cable & Accessories	120 Meters (4 Core 120 Sq.mm Insulated)	Polycab/ KEI/Finolex
7	DC Solar Cable & Accessories	Single core 4 Sq mm. As per Design	Siechem
8	AC Side Breaker 3 Phase ACDB	Input Terminal 100 Amp, Encloser with IP65 Protection.	SPD - Phoenix Contract. MCB – ABB / Hager
9	DC Side Breaker with 3 phase DCDB	Positive terminal 10 with Amp, Encloser with IP65 Protection, 2 In 2 Out DCDB.	SPD - Phoenix Contract. Fuse – Ferraz
10	Junction Box, Lighting Arrestor, Earthing with Accessories, With rods, Chemical, Pipe etc	As Required	True Power etc
11	MC4 Connectors	As Required	Branded ISO Standards
12	Earthing & LA Cable	As Required	Polycab or Equivalent
13	Cable Tie, Clamps & Pole Box	As Required	Branded
14	Generation / Energy Meter	1 No	HPL / L&T UPPCL Approved.

COMMERCIALS:

SUPPLY INSTALLTION TESTING COMMISSIONG OF 3 KW SOLAR PLANT WITH ONE YEAR AMC.

Detailed Engineering, Designing, Procurement & Installation as per plant size & load. (EPC)

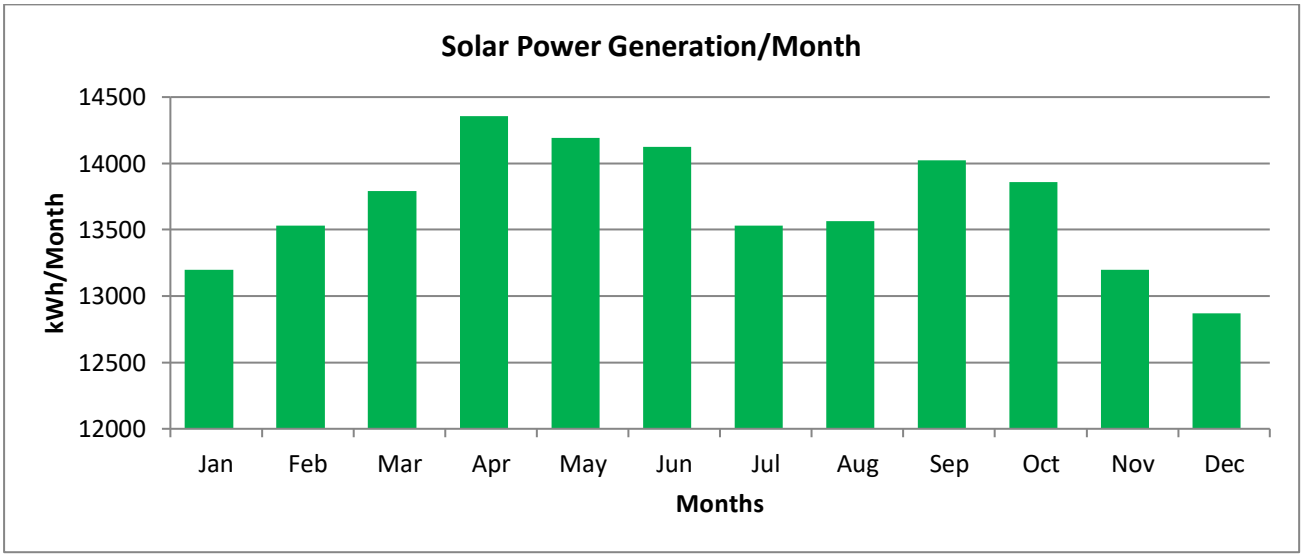
Sr.No	Description	Rate	**Amount**	Warranty

1	Supply & Installation of 5 KW Solar Plant	Rs. 60 PER WATT.	**3,00,000 =00** **(Rs. Three lacs Only)**	For Panels – Product Warrant **10 Years**, Performance Warranty – **25 Years.** **Inverter – 5 Years.** Others – **2 Years**

13.4.4 FLOATING POWER PLANT AT RAMGANGA RIVER FRONT

Plant Capacity	Area Required	Model	Costing.
100 KW	8000 Sq.Foot	CAPEX /PPA	6.000.000-00

Months	Irradiation	Units/day	Units/months	10.rs /unit
Jan	4.00	440	13200	132000
Feb	4.10	451	13530	135300
Mar	4.18	459.8	13794	137940
Apr	4.35	478.5	14355	143550
May	4.30	473	14190	141900
Jun	4.28	470.8	14124	141240
Jul	4.10	451	13530	108240
Aug	4.11	452.1	13563	135630
Sep	4.25	467.5	14025	140250
Oct	4.20	462	13860	138600
Nov	4.00	440	13200	132000
Dec	3.90	429	12870	128700
	4.15		**164241**	**1642410=00**
				Total amount Saved per year.



BOOK OF MATERIAL. (100 KW)

Sr.No.	Description	Quantity	1Make

1	Mono Crystalline 540 Watts Solar Panels MNRE Approved IEC Certified	185 Nos	Warree/ Renewsys/Panasonic
2	Fabricated Galvanized Steel Structure. (Normal Height)	AS per Design	ISO 9002
3	Solar Grid Inverter	100 KW, Three Phase Transformer less with Remote Monitoring.	Delta / ABB
4	Online Monitoring	LAN Cable WiFi Based 25 Mtrs.	ABB
5	Zero Export Device	100 KW	Intello / Solar Log
6	AC Solar Cable & Accessories	120 Meters (4 Core 120 Sq.mm Insulated)	Polycab/ KEI/Finolex
7	DC Solar Cable & Accessories	Single core 4 Sq mm. As per Design	Siechem
8	AC Side Breaker 3 Phase ACDB	Input Terminal 100 Amp, Encloser with IP65 Protection.	SPD - Phoenix Contract. MCB – ABB / Hager
9	DC Side Breaker with 3 phase DCDB	Positive terminal 10 with Amp, Encloser with IP65 Protection, 2 In 2 Out DCDB.	SPD - Phoenix Contract. Fuse – Ferraz
10	Junction Box, Lighting Arrestor, Earthing with Accessories, With rods, Chemical, Pipe etc	As Required	True Power etc
11	MC4 Connectors	As Required	Branded ISO Standards
12	Earthing & LA Cable	As Required	Polycab or Equivalent
13	Cable Tie, Clamps & Pole Box	As Required	Branded
14	Generation / Energy Meter	1 No	HPL / L&T UPPCL Approved.

COMMERCIALS:

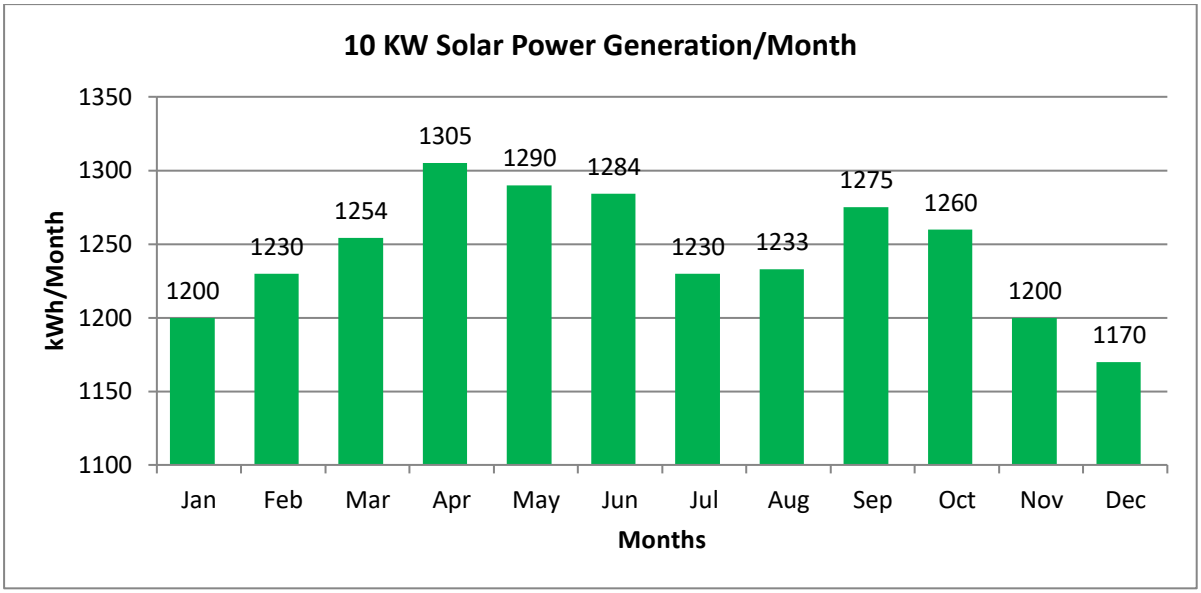
SUPPLY INSTALLTION TESTING COMMISSIONG OF 100 KW SOLAR PLANT WITH ONE YEAR AMC.

Detailed Engineering, Designing, Procurement & Installation as per plant size & load. (EPC)

Sr.No	Description	Rate	Amount	Warranty
1	Supply & Installation of 100 KW Solar Plant	**Rs.60 PER WATT.**	**6,000,000 =00 (Rs. Fifty-Seven Lacs Only)**	For Panels – Product Warrant **10 Years**, Performance Warranty – **25 Years.** **Inverter – 5 Years.** Others – **2 Years**
2	SPD – Zero Export Device with Accessories.	**82,000/-**	**82000=00. (Rs. Eighty-Two Thousand Only)**	5 Years
Total Rs. Sixty lacs eighty two thousand only.				

13.4.5 SOLAR POWER PLANT AT GPO

Plant Capacity	Area Required	Model	Costing.
10 KW	800 Sq.Foot	Net Metering	6.00,000=00



BOOK OF MATERIAL. (5 KW)

Sr.No.	Description	Quantity	1Make
1	Mono Crystalline 540 Watts Solar Panels MNRE Approved IEC Certified	19 Nos	Warree/ Renewsys/Panasonic
2	Fabricated Galvanized Steel Structure	AS per Design	ISO 9002
3	Solar Grid Inverter	10 KW, Three Phase Transformer less with Remote Monitoring.	Delta / ABB
4	Online Monitoring	LAN Cable WiFi Based 25 Mtrs.	ABB
5	Zero Export Device	Nil	
6	AC Solar Cable & Accessories	120 Meters (4 Core 120 Sq.mm Insulated)	Polycab/ KEI/Finolex
7	DC Solar Cable & Accessories	Single core 4 Sq mm. As per Design	Siechem
8	AC Side Breaker 3 Phase ACDB	Input Terminal 100 Amp, Encloser with IP65 Protection.	SPD - Phoenix Contract. MCB – ABB / Hager

9	DC Side Breaker with 3 phase DCDB	Positive terminal 10 with Amp, Encloser with IP65 Protection, 2 In 2 Out DCDB.	SPD - Phoenix Contract. Fuse – Ferraz
10	Junction Box, Lighting Arrestor, Earthing with Accessories, With rods, Chemical, Pipe etc	As Required	True Power etc
11	MC4 Connectors	As Required	Branded ISO Standards
12	Earthing & LA Cable	As Required	Polycab or Equivalent
13	Cable Tie, Clamps & Pole Box	As Required	Branded
14	Generation / Energy Meter	1 No	HPL / L&T UPPCL Approved.

COMMERCIALS:

SUPPLY INSTALLTION TESTING COMMISSIONG OF 10 KW SOLAR PLANT WITH ONE YEAR AMC.

Detailed Engineering, Designing, Procurement & Installation as per plant size & load. (EPC)

Sr.No	Description	Rate	**Amount**	Warranty
1	Supply & Installation of 10 KW Solar Plant	Rs. 60 PER WATT.	**6,00,000 =00** **(Rs. Three lacs Only)**	For Panels – Product Warrant **10 Years**, Performance Warranty – **25 Years.** **Inverter – 5 Years.** Others – **2 Years**

13.4.6 TERMS & CONDITIONS:

Taxes – 12% GST Extra.

Cost of AC Cable from Inverter to LT panel will be extra at actual.

AMC – Cleaning of panels is not in our scope.

SCHEDULE OF PAYMENTS:

25 % Advance with work order	**Will give layout design & drawings for approval, Supply & Install Structure.**
50 % 2nd Installment	**Will Supply & Install Panels with AC,DC wiring, Inverter & BOM.**
20 % 3rd Installment	**Will Supply XPD & live the plant.**
05% 4th Installment	**Immediate after tests & trails.**

13.5 SOLAR STREET LIGHTS & HIGH MASTS.

As Nagar Nigam & PWD spends huge amount on paying electricity bills on lights at main streets, chavurah, gardens & public utility places.

This can be minimized by replacing standalone atomized semi integrated or fully integrated LED solar street lights. Centralizes off grid solar plants or on grid solar plants can be good suggestion for dedicated power to such lights.

Same can be incorporated with high masts, hoardings & flood lights.

CALCULATIONS

Project	Latest Tariff	Total Consumption	Savings after solar
Street Lights	Rs.4200 / KW + 20 % demand value of bill.	3850 KW	16,170.000=00
High Mast	Rs.4200 / KW + 20 % demand value of bill.	105 KW	4,41,000=00
Flood Lights	Rs.4200 / KW + 20 % demand value of bill.	905 KW	3,801,000=00
Traffic Signals	Rs.4200 / KW + 20 % demand value of bill.	622 KW	21,62,400=00

PROJECTS PROJECTIONS

The suggested projects are categorized as below & the capacity is in megawatts.

Project A (Solar Power Plant)	**Short Term (2022- 2028)**	**Medium Term (2028 - 2037)**	**Long Term (2037 - 2071)**
Govt. Offices	1.5	2 - 10	10 - 25
Finance Required	90,000,000	600,000,000	1,500,000,000
Schools	0.5	1	1.5
Finance Required	30,000,000	60,000,000	90,000,000
Collages & University	0.8	1.2	5
Finance Required	48,000,000	72,000,000	300,000,000
Residentials (Subsidy)	2	8	15
Finance Required	120,000,000	480,000,000	900,000,000
Project B Street Lights	0.5	1.2	3.5
Finance Required	55,00,000	127,00,000	295,00,000
Project C : High Mast	0.2	0.8	2.8
Finance Required	42,00,000	108,00,00	210,00,000
Project D : Solar Tree	0.05	0.08	0.2
Finance Required	6,00,000	9,00,000	22,00,00
Project E : Solar EV Charging Station	0.03	0.08	0.2
Finance Required	9,000,000	13,000,000	21,000,000

TRANSPORT INFRASTRUCTURE DEVELOPMENT PROJECTS

14. Project 12: Development of Integrated Freight Center / Logistics Hub

14.1 Introduction

In terms of the service requirements it must fulfil, the area it serves, and the quantities to be handled, the City logistic hub is a highly specialised facility created for a specific function and operating plan. It serves as an interface between facilities for intercity and local transportation, which manage the collection and distribution of goods inside the city. The main goal is to build a logistics hub with modern amenities, including a modern warehouse for storing goods, loading, and unloading, weigh bridges (50 T and 100 T capacity), restrooms, gas stations, a firefighting system, a solid waste management system, power supply and electrification, a boundary wall, and a storm water system. The multimodal logistics centre will be a piece of infrastructure that improves supply chain effectiveness.

14.1.1 National Logistic Policy 2016

14.1.1.1 Vision

To drive economic growth and trade competitiveness of the country through a truly integrated, seamless, efficient, reliable and cost-effective logistics network, leveraging best in class technology, processes and skilled manpower.

14.1.1.2 Objectives of the Logistics Policy

- Creating a National Logistics e-marketplace as a one stop market place. It will involve simplification of documentation for exports/imports and drive transparency through digitization of processes involving Customs, PGAs etc in regulatory, certification and compliance services
- Creating a data and analytics centre to drive transparency and continuous monitoring of key logistics metrics.
- Encouraging industry, academia and government to come together to create a logistics Centre of Excellence, and drive innovation in the logistics sector
- Creating and managing on an ongoing basis, an Integrated National Logistics Action Plan which will serve as a master plan for all logistics related development.
- Providing an impetus to trade and hence economic growth by driving competitiveness in exports
- Doubling employment in the logistics sector by generating additional 10-15 million jobs and focus on enhancing skills in the sector and encouraging gender diversity
- Improve India's ranking in the Logistics Performance Index to between 25 to 30
- Strengthening the warehousing sector in India by improving the quality of storage infrastructure including specialized warehouses across the country Reducing losses due to agri-wastage to less than 5%through effective agri-logistics
- Providing impetus to MSME sector in the country through a cost-effective logistics network
- Promoting cross regional trade on e-commerce platforms by enabling a seamless flow of goods
- Encouraging adoption of green logistics in the country.

14.1.2 Existing Transport Nagar

The Bareilly city has only one dedicated existing transport nagar at Lucknow road. This transporter nagar was prepared 20 years ago by the Bareilly development Authority on 24.89 hectares of land to keep out the transporters and big vehicles of the city. It has 1074 transporters plots, 12 shops and 15

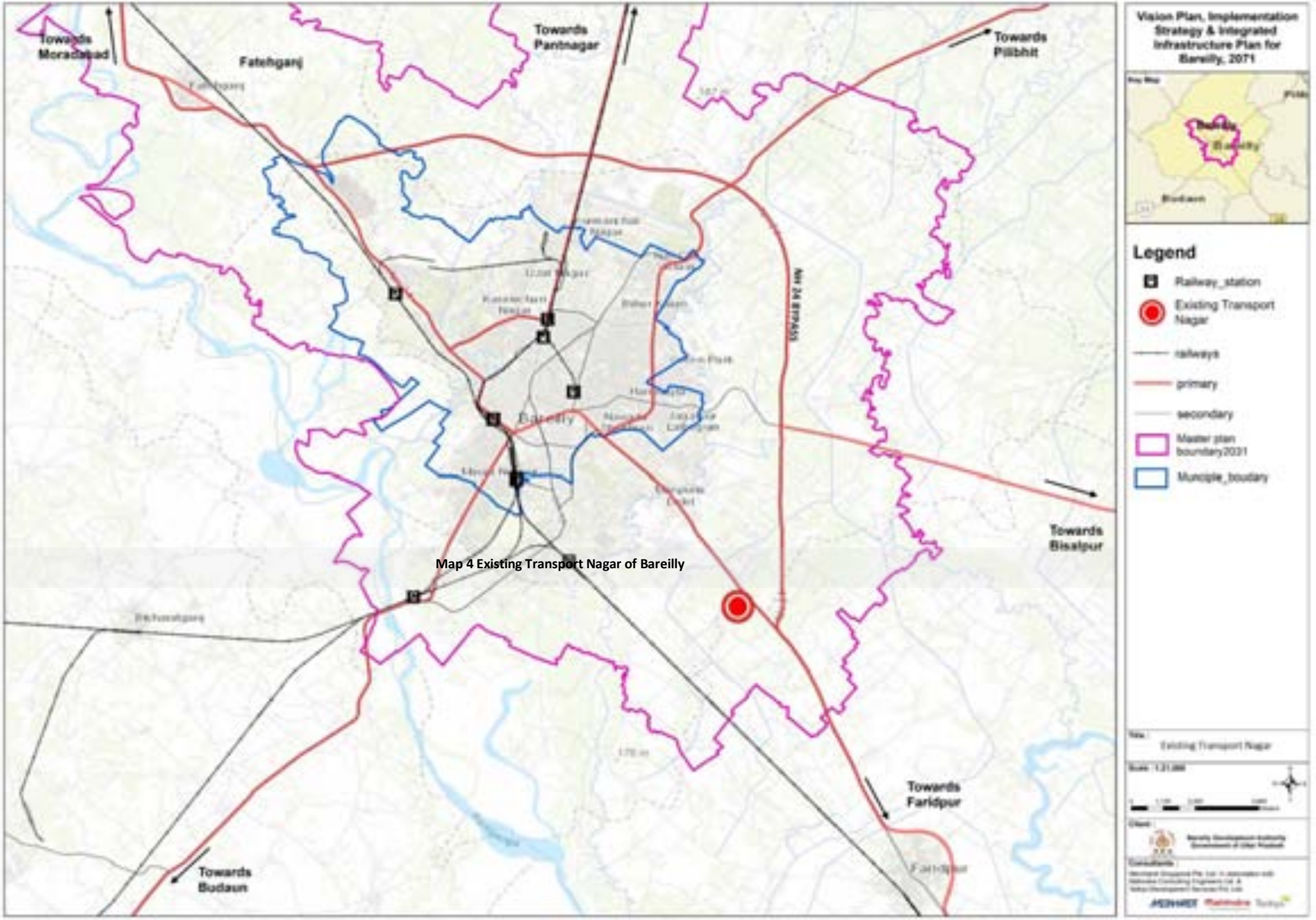
commercial plots in Transport Nagar. There was also a plan to shift government and private offices including fire station, business service centre, dispensary, police station, community hall and RTO office to the transport nagar.

- **Existing Transport facility available at:** Transport Nagar, along NH 19
- **Located in an area:** 150 acres (approx.)
- **Connectivity:** NH 19
- **No of Plots:** 2414 plots
- **Truck Entry restriction in Agra city**: 5 AM to 11 PM
- **Existing Transport Terminals/Nagar**: 59.56 (Hectares)
- **Current handling capacity**: 200 ECS
- **Break-up of trucks by axle type entering Transport Nagar**

Sl No	Type and Vehicles Common Names	Total Axels	GVW (kgs)	GVW (T)
1	6 Axel truck	2	19000	**19**
2	10 Axel Multi Axel truck	3	28500	**28.5**
3	12 Axel Single Chassis Rigid Truck	4	36000	**36**
4	14 Axel Single Chassis Rigid Truck	5	43500	**43.5**
5	14 Axel semi-trailer	4	40000	**40**
6	**18 Axel semi-trailer**	**5**	**46000**	**46**

- **Trucks unload cargo at these terminals**: Trucks unloading at transport Nagar are majorly agro based, food processing and household goods. (*Operators survey)
  - 2-axle: 20-25 tonnes
  - 3-axle: 25-30 tonnes
  - MAV: 35- 45 tonnes

  The unloaded Goods are Carried into the city with the help of small trucks like, LCVs, Tata Ace, E-rickshaws etc. as per the interview it is found that the most type of goods which are carried into the city are fruits, vegetables, sugar cane and Bamboo products.
- **Total tonnage of goods and commodities transferred by these trucks to the city**: With full capacity of trucks depending on their size, approximately 500-700 tonnes.
- **Break-up of the freight tonnage by type (grains, vegetables, fruits, etc.)**:
  - **Vegetables**: 300-400 tonnes (including green vegetables)
  - **Fruits**: 200 tonnes
  - **Goods (Hardware, Sanitary, Leather, etc)**: 300 tonnes approximately (Per day)
- **Existing parking demand versus current handling capacity (if there is a gap):**
  At Transport Nagar there is no dedicated Parking Spaces but they parked on street in transport nagar mostly.
- **Unloaded goods carried into the city using smaller trucks**: Mini-LCV, tata magic will distribute within the Agra city (*Operator Survey)
- **Warehousing space in Agra**: At transport Nagar, truck terminal Does not have any integrated ware house facility but the individual traders built their own personal small warehouses with an area of 1000-1500 sq.ft.



Map 4 Existing Transport Nagar of Bareilly

14.1.3 Existing Transportation issues at Bareilly

- On-street parking of the commercial vehicles
- Auto & 2-wheeler parking
- Night time safety issue between fast/slow moving vehicles
- Average journey speed in city: 21-30 km/hr
- Yearly 4% of Commercial vehicles registered in Bareilly

14.1.4 Approach and Methodology for Assessing Demand

Estimating Demand for the proposed Integrated Freight centre cum Logistic hub comprises assessing movement of trucks in the city.

- Studying the key industries and truck movement
- Assessment of similar and upcoming facilities
- Assessing truck movement routes and nearness of the proposed trucking hub
- SWOT Analysis of site-Assessing condition

14.1.5 Need of Integrated freight center cum logistic Hub

Bareilly is a well-known industrial hub and a centre for the trading of cotton, sugar, and cereal as well as furniture. The food processing, plastic products, plywood, paper and packaging materials are produced and supplied in the state and across the country. The city has also served as a hub for Manjha and Zari-Zardosi handicrafts. The well-known Bareilly Industries exports its goods to the UK, Malaysia, Singapore, the Gulf States and many Indian states. National brewery firm, match factory, ice factory and a sugar mill run by UP Sugar Corporation are just a few of the businesses in the city. Given the city's economic makeup and advantageous location numerous regional-level freight facilities are present. On the Bareilly-Lucknow National Highway in Bhindaulia, notable freight facilities include transport nagar and freight hubs like Parkhasera and CB Ganj Industrial area.

14.1.6 Area requirement for Integrated freight center cum logistic Hub

Industries require logistics support to facilitate the transfer of finished goods and raw materials. Currently, Transport Nagar on Lucknow road is the major facility for logistics support which lies opposite the Paraskhera industrial area.

Integrated Freight Center cum Logistic hub are proposed in two different locations one at Faridpur for the Lucknow Road Industrial area and another one at close proximity to Kurtara. These two locations are proposed in order to assist the currently existing and newly projected industrial areas on Delhi Road and ensure efficient movement of goods and products. The area of the proposed Integrated Freight Center cum Logistic hub will be approximately 35 hectares each.

Table 6: Broad Costing of Kurtara Integrated Freight Centre cum Logistic Hub

S.no	Components	%	Development Cost (in INR)
1	Plumbing sewerage STP and all	30	1,050,000
2	Electricity ESS and all	30	1,050,000
3	Roads and landscaping	40	1,400,000
	Sub Total	**100**	**3,500,000**
4	Land Cost	100 Ha	3,360,000,000
	Total		**3,363,500,000**

Table 7 Broad Cost of Faridpur proposed Integrated Freight Centre cum Logistic Hub

S.no	Components	%	Development Cost (in INR)
1	Plumbing sewerage STP and all	30	1,050,000
2	Electricity ESS and all	30	1,050,000
3	Roads and landscaping	40	1,400,000
	Sub Total	**100**	**3,500,000**
4	Land Cost	100 Ha	1,680,000,000
	Total		**1,683,500,000**

For the broad cost estimation of the proposed Integrated Freight Centre cum Logistic Hub the land rate is assumed to be four times the actual rate of the land. The broad project cost for the development of proposed Integrated Freight Centre cum Logistic Hub is mentioned above.

14.1.7 Truck Terminal Parking

- Parking Space requirement for Truck: 55-60 sqm.
- Truck parking Size: 7.1 m x 2.6 m
- Equivalent Car Space (Truck): 2.50

Table 8: Proposal locations for Integrated Freight Center cum Logistic Hub

Sl No	Proposed Location	National Highway Connectivity	Nearest Railway Station	Distance from Agar
1	Kurtara	6 kms from NH 530	Near Persakheda Railway Station	32 km
2	Faridpur	On NH 730C	Near Pitambarpur Railway Station	37 km

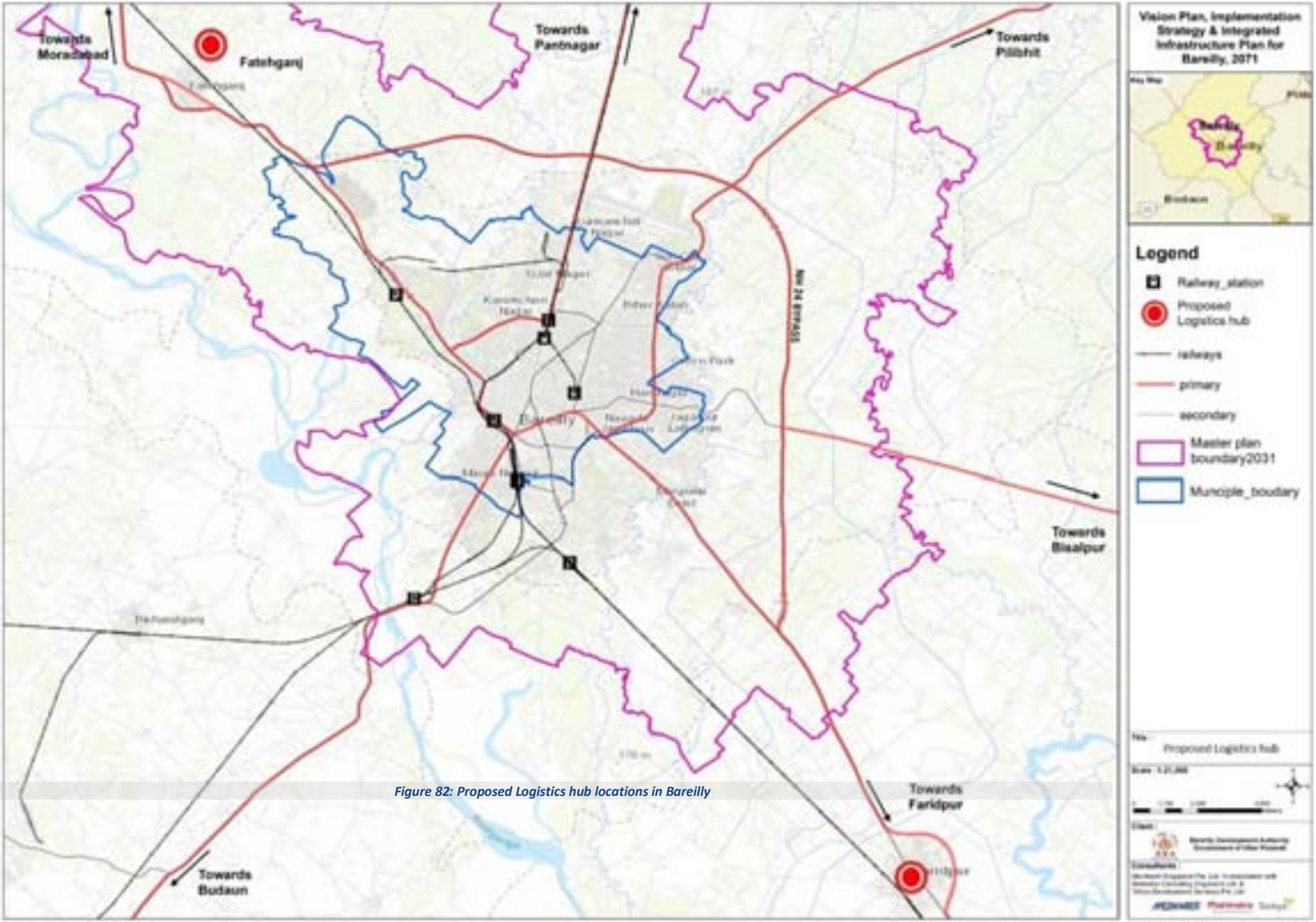


Figure 82: Proposed Logistics hub locations in Bareilly

14.1.8 Major Features at proposed Integrated Freight Centre cum Logistic Hub

- **Advantage:** Connectivity with nearest Railway station and NH 19
- **Area required:** 86.49 acres per location
- **Parking space**: 500-600 Trucks at given time
- **Additional parking space**: 50 - Car & 100 two-wheeler parking
- **Warehouse & Cold Storage:** 3000 MT
- **Other Infrastructure**: Warehouse for Storing goods, Loading and unloading, weighbridges (50 T & 100 T Capacity), rest rooms and Petrol Pumps.
- **Mode of Selection/setup**: PPP basis
- **Estimated Cost**: 150 to 200 Cr (Approx.)
- **Functioning of Truck Hub:** Parking lot, Warehousing and support facilities, Storage Location, commercial Complex, Boundary Wall, Road Network, Water Supply & Distribution system, Storm Water Drain system, Sewerage system, Power Supply & Electrification, Firefighting system, Solid Waste management system, Landscaping, Social Infrastructure (Restaurant, Public Convenience), Bank, Transport Agencies, Circulation, Toilets, Administrative Office, Fire Station, Dispensary, Electric Sub-station, Spare Parts shop.

14.1.9 Facilities within the Integrated Freight Centre cum Logistic hub

a. Truck Terminal

A Trucking Hub facilitates both domestic freight movement and also acts as Logistic Hub with facilities like warehouses, wholesale markets and mandis. Some of the basic facilities that form the skeleton structure of a Trucking Hub are as follows.

i. Transportation Facility

Based on the project location and its access to the different modes of transportation the following facilities can be proposed in a Trucking Hub.

ii. Truck Parking

Parking for multi axle trucks, two / three axle trucks and light commercial vehicles will be provided. To justify a parking facility's infrastructure costs, the lot size should be no smaller than three acres. Three acres will accommodate approximately 25 to 30 trucks with the necessary circulation lanes. A lot between 7 and 10 acres would be more suitable in high freight traffic areas.

iii. Warehousing Facility – Storage

Storage is an important function of a Trucking Hub and the warehousing component of the park takes care of the same. Based on the products to be stored, the following storage facilities are planned within the park.

- Customized Warehouse
- Cold Storage

iv. Support and Social Infrastructure facilities

The support and social infrastructure facilities include both essential infrastructure facilities for the effective functioning of the Trucking Hub and other facilities that address the environmental and land-use regulations within the park. The main facilities for which area allocation needs to be made in Trucking Hub are:

• Transport Agencies	• Circulation
• Parking	• Open Space
• Petrol Pump	• Service Centre
• Toilets	• Police Station
• Restaurant	• Shops
• Godowns	• Weigh Bridge
• Stalls / Dhabas	• Administrative Office
• Post Office, Dispensary	• Bank / ATM

• Cold Storage	• Spare Parts Shops
• Electric Sub station	

The facilities such as Power back-up, Power Transmission & Distribution network, Water Distribution Network, Telecom network, etc. are necessary for the effective functioning of the Trucking Hub are part of the Support Infrastructure facilities.

v. Common Facility

The common facilities in a trucking hub include the following:

• **Terminal Buildings –Truck,**	• **Internal Roads**
• **Central Admin Facility**	• Power Transmission & Distribution Network
• **Telecom Network**	• Water Distribution Network

b. Functioning of a Trucking Hub

The functioning of a Trucking Hub can be explained on the same lines on which the basic components of the park are formulated.

a. Parking Lot

The Truck Parking area is one of the important components in the Trucking hub, The entire truck parking area will be divided into several parts viz. (i) Parking Bay for Trucks (ii) Parking Bay for Trailers. There will be suitable wide driveway adjacent to above said each type of parking bay and all the concerned driveways will be connected by common driveway ultimately leading to arterial road / trunk road.

b. Warehousing and Support facilities

- **Inbound / Outbound operations**

  The handling of goods at the warehousing facility is termed as the Inbound/ Outbound operations of the facility. The handling includes both loading and unloading of goods from/ to the warehouse.

- **Storage Location**

  The storage locations are of two types. They are Climate Controlled Storage Spaces and Non-Climate Controlled Storage Spaces.

  - **Climate Controlled Storage space**
    Warehouses offer climate controlled spaces for items that require storage in a climate controlled environment.
  - **Humidity Control**
    Items that are sensitive to high humidity are generally stored in rooms with humidity at levels that are below 55 RH (Relative Humidity). Molds and mildew can grow on most surfaces and can spread easily as the spores can become air borne however mold and mildew growth is inhibited at 55 RH.
  - **Temperature Control**
    Goods require storage in cold conditions and temperature controlled storage is the suitable option. Especially Food products need this kind of temperature controlled storage.
  - **Humidity and Temperature Control**
    Certain kind of goods need both temperature and humidity control.

- **Traditional Storage – Non Climate Controlled Storage Space**

Traditional storage offers no control over humidity and temperature. The space is basically maintained at whatever temperature and humidity levels as the remainder of the warehouse. Warehouses are generally maintained at a temperature a few degrees above the outside temperature in the winter and a few degrees below the outside temperature in the summer and the humidity level is dependent on outside humidity levels.

- **Cold Storage**

Cold storages are generally centrally located warehouses built to cater to multiple production zones and pre-cooling centres. Here, depending on factors like how long the product needs to be stored and what use it is going to be put to, the product is stored at a sub-zero temperature using methods like chilled storage, deep freezer storage, controlled atmosphere storage, gas controlled cold storage, etc. A cold storage unit essentially incorporates a refrigeration system to maintain the desired room environment for the commodities to be stored. In a refrigeration system, refrigerants are used to pick up heat by evaporation at a lower temperature and pressure from the storage space and give up the heat by condensation at a higher temperature and pressure in a condenser. Freon used to be a common refrigerant but as it causes environmental degradation, its use is banned. Therefore, Ammonia is being increasingly used and preferred for horticultural and plantation produce cold storage units. All the sides of the cold storage room need to be insulated in order to maintain the required temperature inside. Refrigerated storage helps in eliminating sprouting, rotate and tuber moth damage and in reducing weight loss of the agricultural produce. There is high demand of cold storage for perishable products. The edible products are generally not stored for more than one year.

- **Mandi – Agro-commodity Shops**

An efficient market place where sellers, buyers, and end customers converge, our state-of-the-art 'mandis' will provide a modern shopping-mall-like infrastructure that is not available in traditional markets. With clean, hygienic and green environments, modern 'mandis' will provide one-stop services with the quality and transparency of international standards. There will be agro-products shop, wholesale area and assortment shed etc.

- **Common Facilities**

The common facilities provided in the Trucking hub are those parts of a building providing shared facilities that typically do not change over time, including for example, circulation areas, stairs, escalators, lifts/elevators and motor rooms, toilets, cleaners' cupboards, plant rooms, fire refuge areas, maintenance rooms and unallocated parking spaces.

a. Gate Complex

There will be two nos entry/exit gates for the entire Trucking hub, Each gate will have a vehicular entry and a pedestrian entry. The main entry gate will have signature architecture to reflect the unique identity of the Logistics Hub and will integrate local architectural elements. All the entry / exit gates will have provisions for security, CCTV, access control to monitor and control movement of vehicles through the Trucking hub.

b. Administrative Building

There will be a three storied administrative office building inside the Trucking hub premises. In ground floor of the administrative building, there will be post office, bank / ATM counters, STD / ISD booth, Xerox shop, medicine shop etc. In first floor, there will be the administrative office and conference hall. Guest house will be there in the second floor.

c. Canteen Building

There will be a canteen building with eating arrangement of 100 persons at a time. Inside the canteen building, there will be kitchen, pantry, dining hall and wash area.

d. Rest House

For Truck driver's rest-house, there will be a double storied building with a number of rest-rooms with attached toilet facilities. These are the essential and important facility for transit movement.

- **Budget Hotels**
  For all the truck drivers and cleaners, there will be a three storied budget hotel building of dormitory type with common toilet facilities and veranda.
- **Canteen**
  In addition to the General Canteen building, there will be a separate canteen building exclusively for truck drivers and cleaners. In the said canteen building, there will be kitchen, pantry, dining hall and wash area.
- **Office Building for Clearing & Forwarding agents**

There will be a three storied office building inside the Trucking hub premises. In ground floor of the said building, there will be ATM counters, STD / ISD booth, Xerox shop etc. In first floor, there will be the office and conference hall. Guest house will be there in the second floor.

- **Commercial Complex**
  Inside the Trucking hub, there will be a commercial complex comprising of a number of shops. Essential commodities, STD/ISD booth, Xerox, Medicines and office stationeries will be available in those shops.
- **Signage's**
  Signage is integrated with road cross sections and landscaping features. A uniform system of colour, placing and text is proposed to avoid confusion in on-goers. Advertisement boards and hoardings should be located suitably, integrating with the landscaping.
- **Security**
  A centralized security office is proposed at the main entrance of the Trucking hub. In addition, a security is to be provided at the entry and exit points. The logistics hub will have provisions for close circuit (CC) cameras placed at all strategic locations. All these CC cameras will be connected to the central security office.

a) Support Infrastructures

Support infrastructure will consist of (i) Boundary wall, (ii) Road Network (iii) Water Supply & Distribution system, (iv) Storm water drainage system, (v) Sewerage system, (vi) Power Supply & Electrification, (vii) Fire Fighting System, (viii) Solid waste management (S.W.M) system, (ix) Landscaping and (x) D.G set

- **Boundary Wall**
  The Boundary wall will consist of RCC columns placed @ 2.5M c/c interval. The columns will have their respective individual foundations and those foundations will be connected with tie-beams. Brick work of height 1.8M will be constructed above the tie-beams in between the columns. R.B.T (Reinforced Barbed Tape) Concertina fencing will be provided throughout on the top of boundary wall.
- **Road Network**
  There will be a trunk road and arterial roads in the Trucking hub. The trunk roads will be of 14.5M R.O.W. It will be (1 + 1) motorized undivided vehicle lanes, pedestrian pathway, green strips and utility corridors. The arterial and sub-arterial road will be 12.4m and 8.5m ROW respectively.
- **Water Supply & Distribution System**
  Water will be sourced from the under-ground aquifer by sinking several bore-wells. There will be primary treatment and the treated water will be stored into RCC Over Head Reservoir. The treated water will then be supplied to the consumption points through the network of G.I pipelines of varying diameters along with valves, specials and accessories.
- **Storm Water Drainage system**
  Brick-built covered surface drains (longitudinal) will be constructed parallel to both flanks of all types of roads which will carry the storm water of adjoining areas. Along the arterial roads, the drains will be of smaller sections and along the trunk road; it will be of larger sections. Covered cross-drains will be provided across the roads wherever necessary for changes in directions of flow. The drains will have a longitudinal bed slope leading to the ultimate outfall point. The covers of all types of drains will be made of either pre-cast or cast-in-situ concrete slabs.
- **Sewerage system**
  The sewage will be generated mainly consists of household wastes and will be treated in the septic tank. Every building will have their own respective septic tanks and soak

pits to treat the domestic sewage.

- **Power Supply & Electrification**
  There is a 220 KV Sub-Station of M.P. Power Transmission Co. Ltd near the site. So, availability of power will not be problem here. There will be proper street lighting and High Mast at strategic locations. Street lights will be placed @ 30M c/c on both sides of the road in a staggered way.
- **Fire Fighting system**
  The fire-fighting system will consist of several semi under-ground fire-fighting reservoirs, fire-fighting pump houses, fire hydrants, network of G.I pipelines and network of electrical cables with valves and accessories etc. In the fire-fighting pump house, there will be a centrifugal pump, a diesel pump and a jockey pump.
- **Solid Waste Management (S.W.M) system**
  For solid waste management system, litter bins will be placed at strategic locations inside the Trucking hub for primary collection. From the litter bins, the solid waste will then be segregated and collected into larger containers. In this trucking hub, a vermi-composting plant for recycling compostable organic wastes can be made which will help converting wastes to products. Solid waste, other than compostable organic wastes may be disposed of with the help of nearest municipality.
- **Landscaping**
  A green buffer of trees has been proposed all along the periphery of the Trucking hub thus taking care of the environmental aspect. In addition, vertical and horizontal stretches of greens in the form of avenue plantations and greenways will be made along the road.

b) Social Infrastructure

- **Dhaba**
  In the Trucking hub, there will be several Dhabas located in different zones. Food and beverages facilities along with eatery will be available there.
- **Public Convenience**
  There will be several toilet blocks comprising of bathing and water-closet facilities along with change rooms located at some strategic locations for both males and females.

a. Area distribution and Landuse Breakup for Logistic Hub

Based on the site assessment, planning approach and facilities required in a Logistic Hub complex, the finalized Land use breakup and area distribution is summarized in below table;

Table 9 Land use Breakup for Logistic Hub

S. No	Particulars	Percentage (%)
1	Wholesale Market	35%
2	Warehousing	8%
3	Booking Agencies	2%
4	Commercial & Public /Semi-Public	5%
5	Utilities and services	3%
6	Services Industry	4%
7	Parking	12%
8	Circulation	25%
9	Others	6%
	Total	**100%**

Table 10 Area Breakup Required in Logistic Hub

S. No	Items	Capacity
1	**STORAGE**	

	Warehouse	5000 MT
	Cold Storage	5000 MT
2	**MANDI**	
	Platform	2 Nos
	Storage Rooms	4 Nos
3	**PARKING**	
	Cars	50 Nos
	Two-Wheeler	50 Nos
	Truck	500 Nos
	Trailer	20 Nos
4	**COMMERCIAL**	
	Transport Operator Office	10 Nos
	Retail cum Shopping Store	
	Medical Facility	
	Banking Facility (ATM)	2 Nos
	Public Telephone Booth	
	Fuel Pump Station	
	Post Boxes	2 Nos
5	**BUILDING**	
	Administrative Building	
	Dormitory with Sanitary Facility (Toilet, Bathroom, Washing & Drinking Area)	
	Truck Maintenance & Service Yard with Spare Shop	
6	**ROADS**	
	Administration	20%
	Truck Parking	20 %
7	**OTHER FACILITIES**	
	Weigh Bridge (50 Tonne)	1 Nos
	Weigh Bridge (100 Tonne)	1 Nos
	D.G. Set, Pump Room, Electrical Room	
8	**OPEN/ GREEN AREA**	
	Administrative Zone	
	Parking Zone	
9	**SITE UTILITIES AREA**	
	Ground Water Storage	
	Electric Substation	

c. List of Stakeholders

- Bareilly Development Authority
- Bareilly Nagar Nigam
- PWD, Bareilly
- NHAI,
- UPSWC

d. Financial Analysis

- Estimated Cost: 150 to 200 Cr/location
- Mode of Selection: PPP Basis

e. Project Time-line

The proposed city logistic hub at Bareilly city with construction time: 3-4 years

Figure 83: Broad Conceptual Layout of Integrated Freight Centre cum Logistics Hub at Faridpur

Figure 84: Broad Conceptual Layout of Integrated Freight center cum Logistics Hub at Kurtara

15. Project 13: Strengthening of Radial Road connectivity from Bareilly city to Ganga Expressway

15.1 Background of the study:

To provide better facilities in terms of road infrastructure and a faster connectivity from Bareilly city towards proposed Ganga Expressway.

15.2 Need of the Project:

a. Smooth and uninterrupted traffic movement for all modes of transport moving along the NH 530B section from Bareilly city towards proposed Ganga Expressway.
b. Consideration of present and future transportation proposals along and around the influence zone of the NH 530B till Ganga Expressway.
c. To provide faster intra-state public transport system connectivity for the influence zones.
d. Propose a comprehensive solution for truck parking lay-byes along the NH 530B road.
e. Provision of street furniture like way-finding signboards, road signages, road markings, emergency services along road, public conveniences.

15.3 Road Connectivity to Bareilly

Bareilly has a radial pattern of road network. National Highways in Bareilly is well connected with its surrounding urban agglomeration, 4 major NH sections pass through Bareilly city are NH-30, NH 530, NH 530-B, NH 730-B and SH 37. The NH 30 is part of Bareilly Bypass section connects Sitarganj on the north and Lucknow, Allahabad on the south. NH 530 connect Bareilly to Rampur Road, NH 530-B connecting Bareilly to Mathura highway, NH 730-B connects (Bareilly to Bisalpur highway. UP state highway no 37 starts from Bareilly to Nainital Road. Bareilly Bypass section starts at Dhantiya village to Rajau Paraspur with total length of 30.1 km.

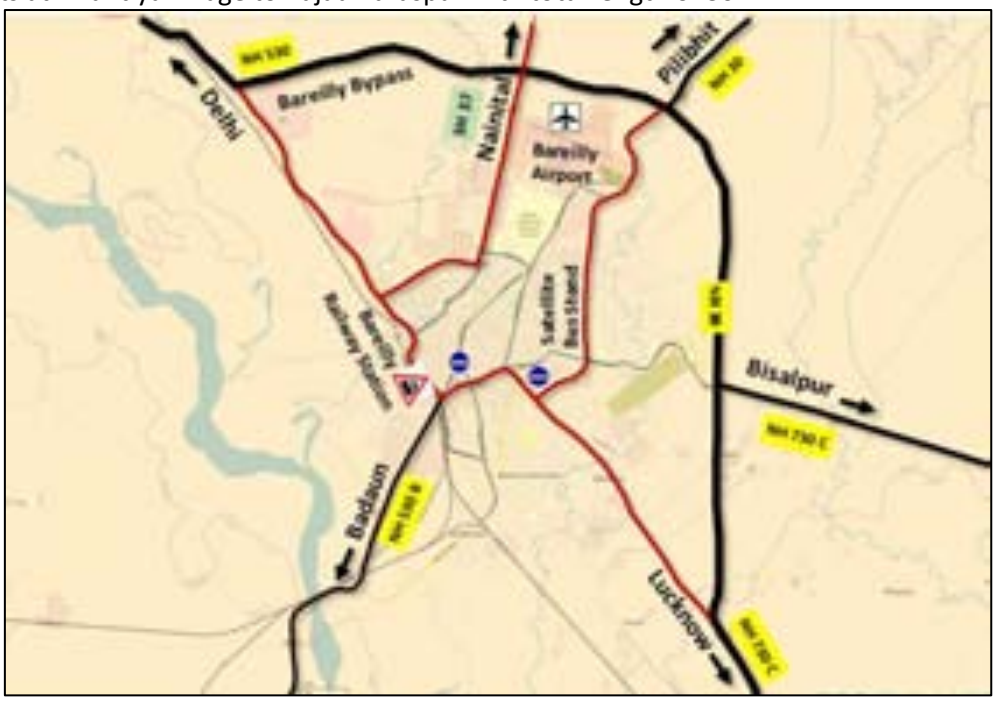


Figure 85: Major Connecting Roads in Bareilly city

15.4 Introduction to proposed Ganga Expressway

The proposed Ganga Expressway is a greenfield project with 6 lane connecting western part with eastern part of the UP with total length of 594 km. The Ganga Expressway will cover major destinations like Meerut, Bulandshahr, Hapur, Amroha, Sambhal, Badaun, Shahjahanpur, Hardoi, Unnao, Rae Bareli, Pratapgarh and Prayagraj. The Ganga Expressway will link-up with other expressways in the state like Lucknow-Agar Expressway, Purvanchal Expressway, Ballia Link Expressway.

The following are the features of the Ganga Expressway

- **Proposed Greenfield Project:** Ganga Expressway
- **RoW of Ganga Expressway Road**: 120 m
- **No of Lanes:** 6 Lanes
- **Length of the corridor:** 594 km
- **Terrain:** Plain & Flat
- **Air Strips provision**: No Air Strips provided
- **Abutting Landuse on both-sides of Ganga Expressway**: Agricultural
- **Major Connecting cities:** Meerut, Bulandshahr, Hapur, Amroha, Sambhal, Chandausi, Budaun, Tilhar, Bangarmau, Unnao, Raebareli, Pratapgarh and Prayagraj.
- **Implementation Authority:** Uttar Pradesh Expressways Industrial Development Authority (UPEIDA)
- **No of Packages:** 12 nos.

Table 11: Ganga Expressway Packages

Sl No	Package	Length (km)
1	Bijauli (Meerut)–Chandner (Hapur)	48.9
2	Chandner (Hapur)–Mirzapur Dungal (Amroha)	30.0
3	Mirzapur Dungal (Amroha)–Nagla Baraha (Budaun)	50.7
4	**Nagla Baraha (Budaun)–Binawar (Budaun)**	52.1
5	**Binawar (Budaun)–Dari Gulau (Shahjahanpur)**	46.7
6	Dari Gulau (Shahjahanpur)–Ubariya Khurd (Hardoi)	52.9
7	Ubariya Khurd (Hardoi)–Iksai (Hardoi)	52.4
8	Iksai (Hardoi)–Raiya Mao (Unnao)	50.2
9	Raiya Mao (Unnao)–Sarson (Unnao)	53.1
10	Sarson (Unnao)–Terukha (Raebareli)	51.8
11	Terukha (Raebareli)–Naudhiya (Pratapgarh)	52.0
12	Naudhiya (Pratapgarh)–Judapur Dandu (Prayagraj)	53.0
Total Length		**594**

Figure 86: Ganga Expressway and other competing corridors in UP

15.5 List of nodes developed along Ganga Expressway

The Ganga Expressway is access controlled with only entry/exit at Nodes (intersecting points of National Highway or State Highways or Major District Roads – crossing with the proposed Expressway Alignment).

Table 12: Node Development along Ganga Expressway

Toll Nodes	Chainage	Details of the Intersecting Roads	Road Category	Type of Interchange
A	0+100	Delhi - Meerut Expressway	Expressway	Dummy Node
B	8+920	Meerut – Hapur	NH-334	Trumpet
C	35+270	Hapur - Garhmukteshwar	NH-24	Diamond
D	54+640	Bulandshahr - Garhmukteshwar	SH-65	Diamond
E	74+181	Hasanpur-Anupshahar	MDR-162W	Diamond
F	102+427	Anupshahr - Moradabad	ODR	Diamond
G	123+288	Babrala - Chandausi	NH-509	Double Trumpet
H	173+454	Chandausi - Budaun	SH-125	Diamond
I	**189+394**	**Budaun - Bareilly**	**NH 530B**	**Double Trumpet**
J	255+167	Farukkhabad - Shahjahanpur	SH-29	Double Trumpet
K	282+845	Farukkhabad - Shahbad	SH-138	Diamond
L	329+945	Kannauj– Hardoi	SH-21	Double Trumpet
M	378+136	Agra - Lucknow Expressway	Agra Lucknow Exp	Double Trumpet
N	420+932	Kanpur - Lucknow	NH-27	Diamond
O	487+285	Lalganj - Raebareli	NH-31	Double Trumpet
P	517+708	Raebareli–Unchahar	NH-30	Double Trumpet
Q	554+951	Manikpur - Bela Pratapgarh	MDR-102E	Diamond
R	600+457	Prayagraj Bypass	NH-19	Trumpet

15.6 NH 530B & Connectivity

NH in India are a network of trunk roads owned by the MoRTH. NH 530B, completely runs in the state of UP with total length of 265 km, starting from Bareilly and ends at Mathura and connecting to major settlements like Budaun, Kasganj, Hathras. The NH 530B is a part of State Highway 33 and notified as NH in March 2018.

15.7 Details of Radial Road connecting from Bareilly city to Ganga Expressway

The improvement section details of radial road connecting from Bareilly city to Ganga Expressway

Table 13: Identified Radial Roads from Bareilly City to Ganga Expressway

Sl No	Road Section		Length
1	**Bareilly - Badaun Road (NH 530B)**	**NH 530B:** Ramganga Bridge to Binawar (Near Badaun)	26.0 km
2		**Bareilly South Bypass:** Parsakhera - Ramganga Bridge - Tilhar Mod	31.0 km

Figure 87: Ganga Expressway alignment and connectivity to Bareilly city

15.8 Existing Situation of Project specification

a. **Ramganga Bridge to Binawar section (NH 530B)**: The Ramganga Bridge to Binawar (near Budaun) is part of NH 530B and currently it is a 4-lane divided carriageway in good condition. Construction of flyover is in progress at Lal Phatak Railway Crossing, near Bareilly city. The total length between Ramganga Bridge to Binawar is about 26.0 km (Approx.), considered for the radial road connectivity between Bareilly city to Ganga Expressway link.
   - **Road Type:** NH 530B (Ramganga Bridge to Binawar (near Budaun)
   - **Existing Lanes:** 4 lane road
   - **Length from Ganga Expressway to Ramganga Bridge:** 26.0 km (Approx.)
   - **Major Bridge & River:** Ramganga Bridge
   - **Cantonment Area:** Near Circuit House Chauraha, Bareilly


Figure 88: NH 530B near Circuit House road


Figure 89: Flyover construction at Lal Phatak Railway Crossing


Figure 90: Major Bridge along Ramganga River (left) NH 530B near Binawar (right)

b. **Bareilly South Bypass (Parsakhera-Ramganga Bridge-Tilhar Mod**): The proposed new greenfield alignment 'Bareilly South Bypass' section starting from Parsakhera Industrial Area to Ramganga Bridge to Tilhar Mod (near Rajau Paraspur) with total length of 31.0 km (Approx.)
   - **Road Type**: Bareilly South Bypass (Greenfield Road as per Master Plan 2031*)
   - **Connectivity:** Parsakhera – Ramganga Bridge – Tilhar Mod (Near Rajau Paraspur)
   - **Proposed Length:** 31.0 km (Approx.)
     - **Section 1: NH 530B:** Parsakhera to Ramganga Bridge**:** 18 km
     - **Section 2: Bareilly South Bypass:** Ramganga Bridge to Tilhar Mod (Near Rajau Paraspur): 13.0 km


Figure 91: Jumkha Chauraha, near Parsakhera Industrial Area (left), Agricultural land, near Balla Kotha (near Clutterbuck Ganj Railway Station) (right)

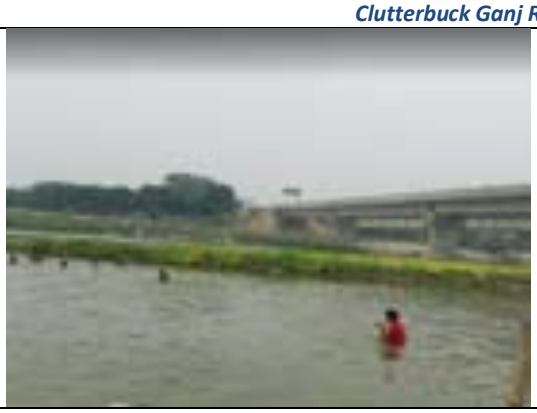



Figure 92: Major Bridge near Ramganga River (left), Agricultural land, Bund Road near Jallapur Ram Dayal (right)

15.9 Vehicular Growth in Bareilly

In Bareilly, the registered vehicles have been increased moderately over the past decade. It is significant to note that about 14 to 19% of the vehicle's growth in the past decade. The increase of two-wheelers could be attributed to the comparatively better economic status of people and lack of city-wide good PT system. The increase of private modes demands more road space and has resulted in dense concentration of traffic on roads with limited right of ways.

Figure 93: Vehicular Growth in Bareilly

Table 14 Vehicle registration data for Bareilly

Year	Two-Wheeler	Car	Bus	Truck	Others	Total
2014-2015	47932	5329	72	981	1203	**55,517**
2015-2016	47440	6155	79	998	1135	**55,807**
2016-2017	54016	7146	144	1235	1210	**63,751**
2017-2018	62757	8592	323	1773	2727	**76,172**
2018-2019	64439	7963	137	4054	2450	**79,043**
2019-2020	63195	7985	123	4034	2743	**78,080**
2020-2021	50203	7175	51	3318	1090	**61,837**

Source: Bareilly RTO

15.10 Base-year Traffic in Bareilly city

i. **Average Daily Traffic at Major Junctions**: To capture traffic flow characteristics and travel pattern of users passing through the Bareilly city and network characteristics. The intensity of average daily traffic at major intersection in Bareilly city and it is observed that Sood Dharm Kanta handles the maximum daily traffic of 29,488 PCUs followed by Bisalpur Chauraha and Selection Point Chauraha with 27,190 PCUs and 25,951 PCUs respectively. The minimum traffic is observed at Sheel Chauraha with 13,977 PCUs.

Table 15 Average Daily Traffic in Bareilly City

Average Daily Traffic			
S. No.	**Junction Name**	**Average Daily Traffic (Vehicles)**	**Average Daily Traffic (PCU)**
1	**100 Foota Tiraha**	24640	**21092**
2	**Circuit House Chauraha**	26874	**23004**
3	**Dohra Mod**	27313	**23380**
4	**Izzat Nagar Tiraha**	23199	**19858**
5	**Kargil Chowk**	20751	**17763**
6	**Maliyo Ki Puliya Tiraha**	16033	**13724**
7	**Mini Bypass**	24031	**20571**
8	**Satellite Tiraha**	20447	**17503**
9	**Selection Point Chauraha**	30317	**25951**
10	**Sheel Chauraha**	16328	**13977**
11	**Sood Dharam Kanta**	34449	**29488**
12	**Bisalpur Chauraha**	31764	**27190**

ii. **Peak hour Traffic at Major Junctions**: To capture traffic flow characteristics and travel pattern of users passing through the city road and network characteristics. The intensity of average daily traffic at major intersection in Bareilly city and it is observed that Sood Dharm Kanta handles the maximum daily traffic of 29,488 PCUs followed by Bisalpur Chauraha and Selection Point Chauraha with 27,190 PCUs and 25,951 PCUs respectively. The minimum traffic is observed at Sheel Chauraha with 13,977 PCUs.

Table 16 Peak Hour Traffic in Bareilly City

Peak Hour Traffic				
S.No.	Junction Name	Peak Hour Traffic (Vehicle)	Peak Hour Traffic (PCU)	Peak Hour Time
1	**100 Foota Tiraha**	1975	**1691**	10:00-11:00
2	**Circuit House Chauraha**	3500	**2996**	11:00-12:00
3	**Dohra Mod**	2758	**2361**	11:00-12:00
4	**Izzat Nagar Tiraha**	2396	**2051**	10:00-11:00
5	**Kargil Chowk**	2577	**2206**	10:00-11:00
6	**Maliyo Ki Puliya Tiraha**	1293	**1107**	09:00-10:00
7	**Mini Bypass**	2700	**2311**	09:00-10:00
8	**Satellite Tiraha**	2161	**1850**	16:00-17:00
9	**Selection Point Chauraha**	3113	**2665**	11:00-12:00
10	**Sheel Chauraha**	1505	**1288**	10:00-11:00
11	**Sood Dharam Kanta**	4531	**3879**	16:00-17:00
12	**Bisalpur Chauraha**	3823	**3272**	16:00-17:00

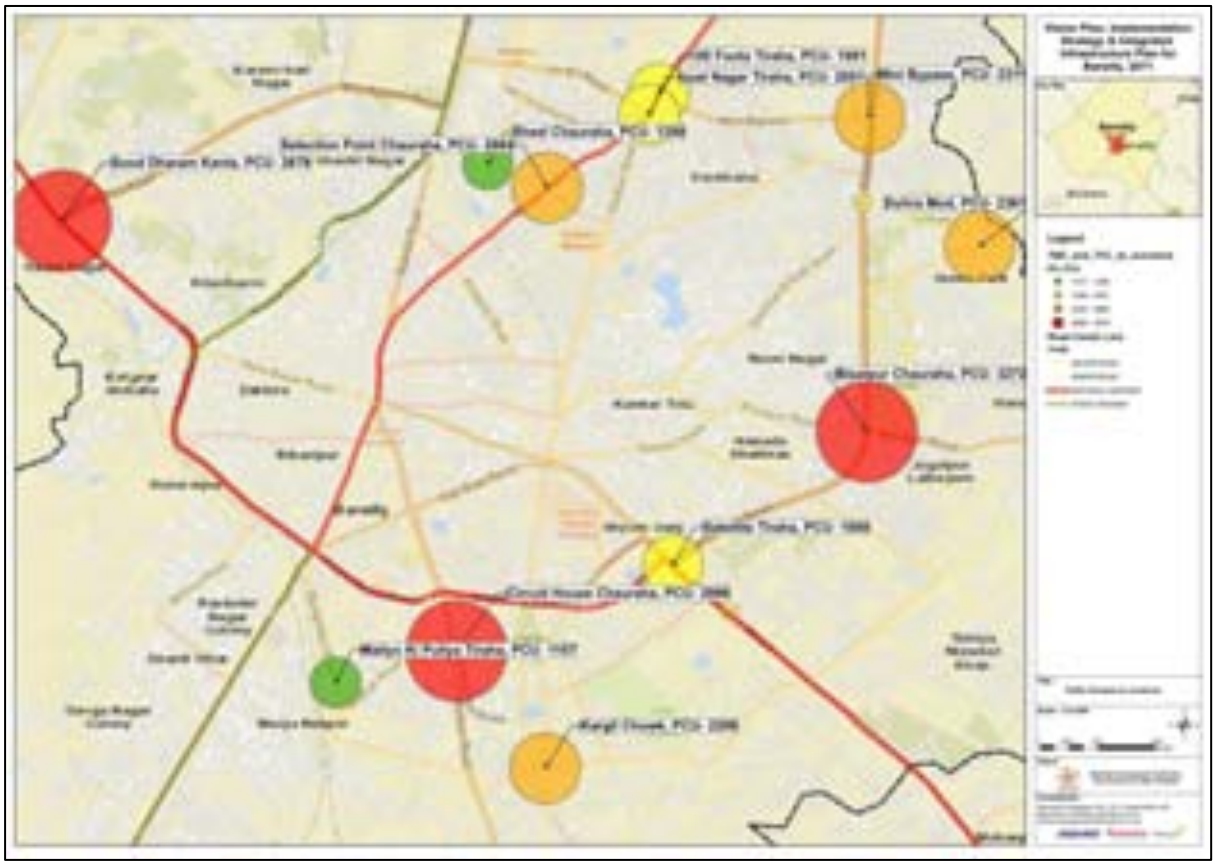


Figure 94: Peak Hour Traffic at Major Intersection in Bareilly City

15.11 Vehicular distribution at Junction

Vehicle wise distribution at 12 no of junctions, with an average share of 70-75% are 2-wheelars share and 20-25% LMV, 2% Autos and 1% MAV

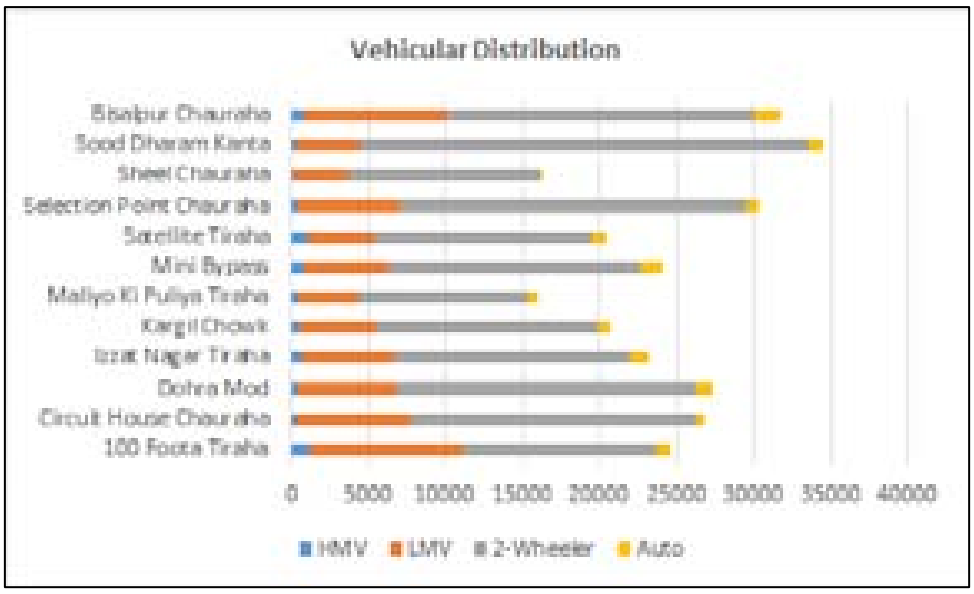


Figure 95: Vehicular distribution at 12 no of Junctions

Table 17 Vehicular distribution at junction

Sl No	Location	Vehicle Type				
		2-Wheeler	Auto	LMV	HMV	Total
1	100 Foota Tiraha	12609	959	9806	1266	**24,640**
2	Circuit House Chauraha	18538	642	7366	328	**26,874**
3	Dohra Mod	19385	1082	6422	424	**27,313**
4	Izzat Nagar Tiraha	15271	1253	6014	661	**23,199**
5	Kargil Chowk	14390	835	5017	508	**20,751**
6	Maliyo Ki Puliya Tiraha	11118	645	3877	393	**16,033**
7	Mini Bypass	16349	1439	5430	813	**24,031**
8	Satellite Tiraha	14127	915	4286	1111	**20,439**
9	Selection Point Chauraha	22587	733	6603	400	**30,323**
10	Sheel Chauraha	12405	213	3583	127	**16,328**
11	Sood Dharam Kanta	29109	904	4070	366	**34,449**
12	Bisalpur Chauraha	20064	1689	9194	817	**31,764**

15.12 Growth Rate for External Trips

Based on the econometric model (elasticity value between NSDP and vehicle registration of past data), the following traffic growth rates have been estimated for the external trips.

Table 18 Vehicle registration data for Bareilly

Year	Two-wheelers	Cars	Trucks
FY 2021-25	7.8%	10.8%	10.4%
FY 2026-30	6.5%	9.3%	8.6%
FY 2031-35	5.3%	7.9%	6.9%
FY 2036-40	4.3%	6.6%	5.5%
FY 2041-45	3.4%	5.4%	4.2%

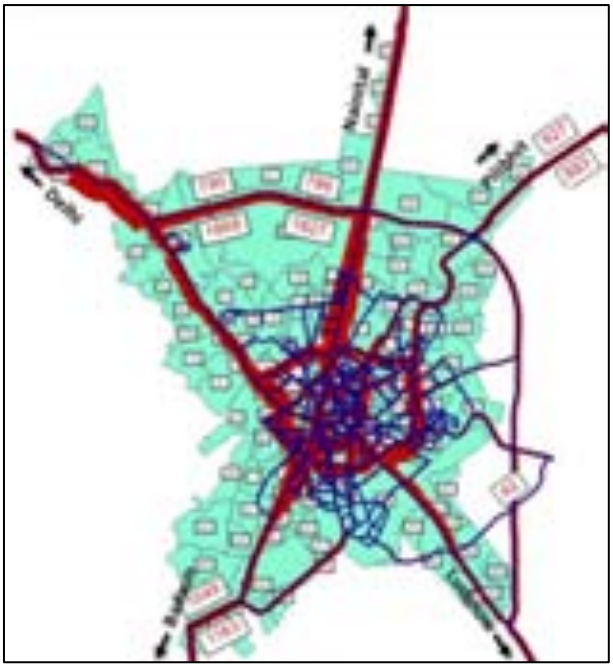


Figure 96: Peak Hour Traffic at the Outer Cordon

15.13 Capacity Analysis

Capacity analysis for the project corridor is carried out in order to assess the Level of Service (LOS) offered by NH 530B road sections under prevailing traffic conditions. Capacity and Design Service Volumes (DSV) specified in IRC-64-1990 & IRC-106-1990, the project corridor runs through Plain terrain only.

Table 19 Capacity and Design Service Volume

Type of Carriageway	Total Design Service Volume for Different categories of Urban Road		
	Arterial	Sub-arterial	Collector
2 Lane (one-way)	2400	1900	1400
4 Lane Undivided (Two-way)	3000	2400	1800
4 Lane Divided (Two-way)	3600	2900	
6 Lane Divide (Two-way)	5400	4300	

15.14 Traffic Projections on to NH 530B

Traffic on the 12 no of major junctions are comprise within the Bareilly city for the base-year. Normal traffic comprises traffic that is presently observed in the Bareilly city and will continue to use the junctions in the future.

Table 20 Projected Traffic at Major Junctions in Bareilly city

S. No.	Junction Name	2022	2032	2042	2052
1	100 Foota Tiraha	1,691	5,495	14,260	36,993
2	Circuit House Chauraha	2,996	9,738	25,265	65,540
3	Dohra Mod	2,361	7,672	19,907	51,639
4	Izzat Nagar Tiraha	2,051	6,669	17,302	44,886
5	Kargil Chowk	2,206	7,172	18,608	48,270
6	Maliyo Ki Puliya Tiraha	1,107	3,603	9,353	24,265
7	Mini Bypass	2,311	7,517	19,502	50,591
8	Satellite Tiraha	1,850	6,018	15,617	40,511

S. No.	Junction Name	2022	2032	2042	2052
9	Selection Point Chauraha	2,665	8,661	22,473	58,297
10	Sheel Chauraha	1,288	4,191	10,881	28,229
11	Sood Dharam Kanta	3,879	12,603	32,699	84,819
12	Bisalpur Chauraha	3,272	10,635	27,591	71,572

15.15 Strengthening of Radial Road to 6 lanes

Width of 6 lane National Highway as per IRC: As per the rules & guidelines of IRC code, total RoW of NH is about 60m (200 feet) wide for 6 Lane Road. This includes width of 33.0 m for roadways or built-up area those comprise of 6 lane carriage width of about 21.0 m wide, median of 5.0 m wide along with kerb shyness, paved shoulder width of 3.5 m wide and rest about 27.0 m will be used for future extension and development of Highway facilities.

Figure 97: Typical Cross-section of 6 lane road

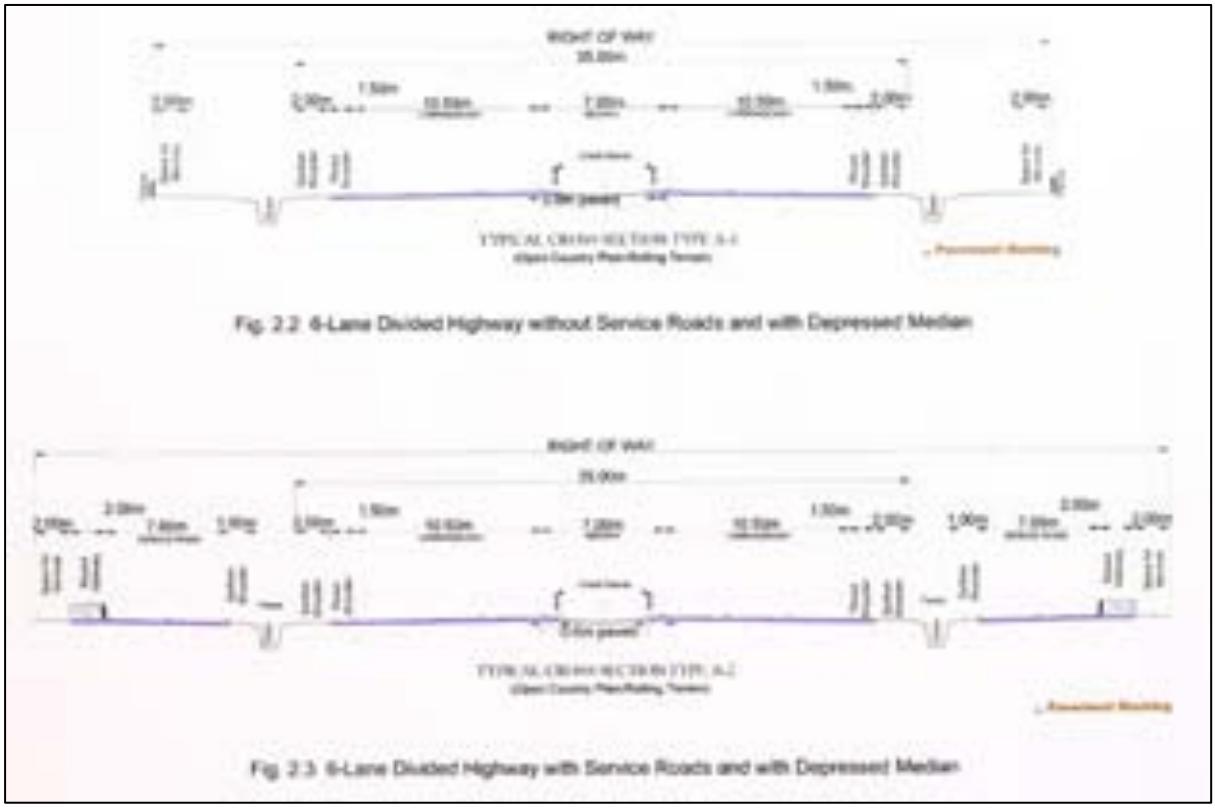


Figure 98: Typical Cross-section of 6 lane road with Depressed Median

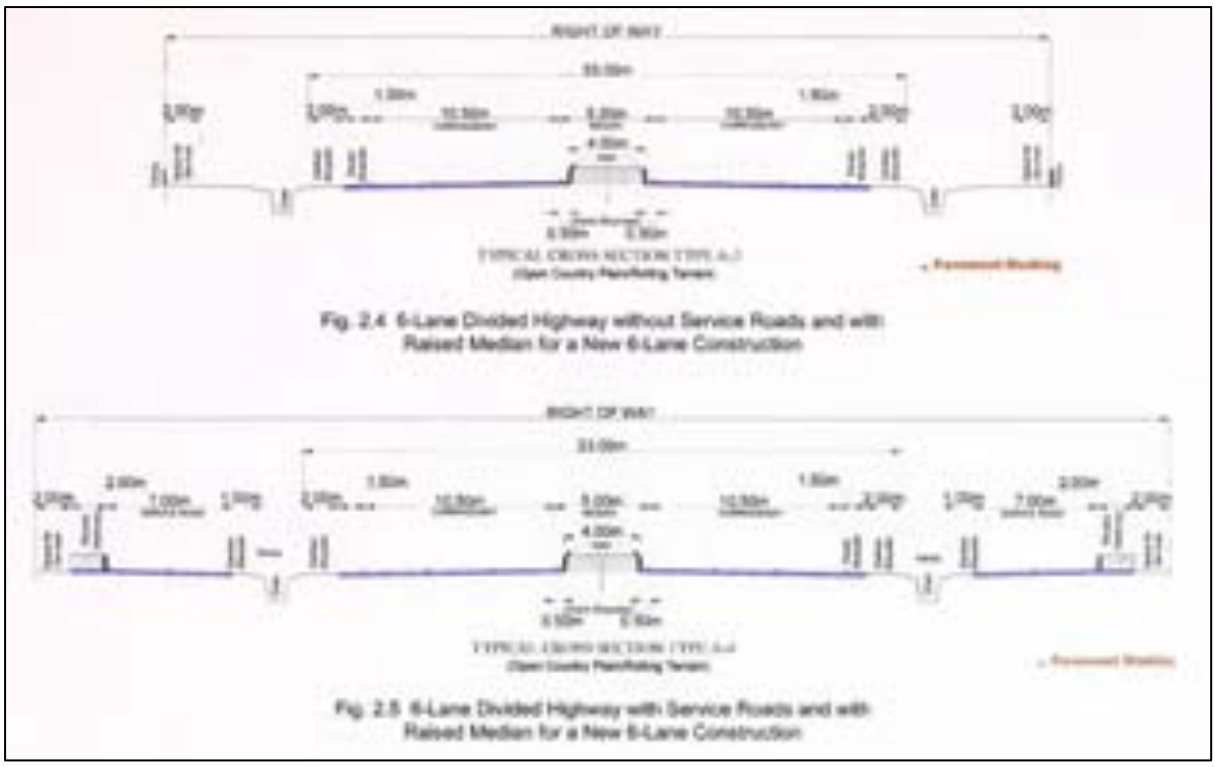


Figure 99: Typical Cross-section of 6 lane road with Raised Median

15.16 Black Spots along NH 530B

SL. NO.	Location 1	Location 2	Location 3
Name of District	Bareilly District		
National Highway Number	NH-530B		
Location of the Black Spot	Sindholi Chauraha	Avantika Petrol Pump Chauki Anuvis	Labhari Chauki
Location Jurisdiction al Police Station	Meerganj	Meerganj	Meerganj
Road Chainage /Km	27 KM	30 KM	29 KM
Latitude	28.54432	28.53851	28.56844
Longitude	79.21279	79.22247	79.18871
Number Of Accidents Fatal Accidents	9	8	2
Grievously Injured Accidents	10	4	3
Number Of Persons Injured	1	0	0
Minor Injured	9	4	3
No. of fatalities	9	8	2
Reasons for frequent accidents	over Speed	over Speed	over Speed

15.17 Improvement Proposals listed along the sections (a & b)

15.17.1 Ramganga Bridge to Binawar section (NH 530B)

Corridor improvement plan	Ramganga Bridge to Binawar Section
Total length	26.0 km
Road Category	NH 530B
No of Lanes (proposed)	6 Lane Road

Major Junctions	• Sardarnagar • Devchara • Bhamora • Binawar
Proposed Improvement	• Widening of the road from 4 lane to 6 lane • Improvement of Service Road at major Settlements with pedestrian grill • Junction Improvement Plan at o Sardarnagar o Chandpur o Makrandpur o Devchara o Kheda o Bhamora o Binawar • Road Marking & Signages • Proposed Foot-over-Bridge o Sardarnagar o Chandpur o Makrandpur o Kheda o Bhamora • Public Convivences (Provision of Toilets)
Proposed Grade separated flyovers at	• Grade Separated Flyover at o Sardarnagar o Binawar

Figure 100: Proposed Grade Separators along NH 530B

15.17.2 Bareilly South Bypass (Parsakhera – Ramganga Bridge – Tilhar Mod (Near Rajau Paraspur))

Corridor improvement plan	Parsakhera – Ramganga Bridge – Tilhar Mod

Total length	**Total Length: 31.0 km** Section 1 = 18.0 km Section 2 = 13.0 km
Road Category	Bareilly South Bypass
No of Lanes (Proposed)	6 Lane Road
Major Junctions	• Parsakhera Industrial Area • Ramganga • Mirjapur • Tilhar Mod
Proposed Improvement	• **New Greenfield alignment** • Road Improvement to 6 lanes • Junction Improvement Plan at o Parsakhera Industrial Area o Ramganga o Tilhar Mod • Public Convivences (Provision of Toilets)

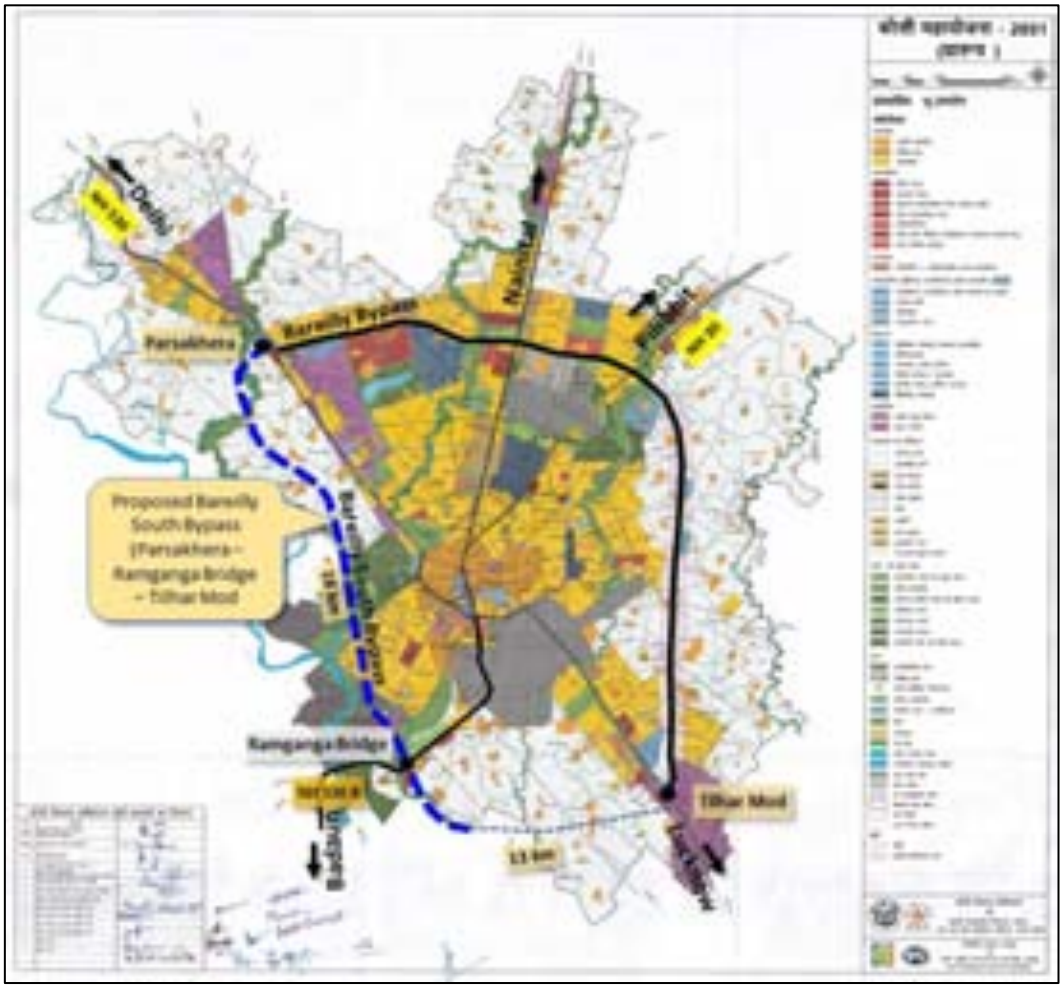


Figure 101: Proposed Bareilly South Bypass Road alignment mentioned in Master Plan-2031

Figure 102: Ganga Expressway alignment and Bareilly South Bypass Road

15.18 Double Trumpet Interchange

A Double-trumpet interchange version can be provided, where a toll road meets another toll road or a highway road. They are also useful when most traffic on the terminating highway is going the same direction. The turn that isn't used often would get the slower loop ramp. Area required for Trumpet interchange is about 44,000 sq. m (Approx.).

Figure 103: Typical layout design of Double Trumpet Interchange

15.19 Financial Analysis

15.19.1 Cost estimates for Ramganga Bridge to Binawar Section

S. No.	WORK	Amount
1	SITE CLEARANCE	₹ 28,15,80,000
2	EARTH WORK	₹ 8,07,60,069
3	SUB-BASE AND BASE COURSES	₹ 85,32,99,213
4	BITUMINOUS WORKS	₹ 94,09,58,655
5	PAVED SHOULDER	₹ 23,45,32,610
6	TRAFFIC SIGNAGES, ROAD MARKING AND OTHER APPURTENANCES	₹ 5,17,71,654
	TOTAL AMOUNT – A	**₹ 2,44,29,02,201**

15.19.2 Cost estimates for Bareilly South Bypass (Parsakhera – Ramganga Bridge – Tilhar Mod)

S. No.	WORK	Amount
1	SITE CLEARANCE	₹ 33,57,30,000
2	EARTH WORK	₹ 9,62,90,852
3	SUB-BASE AND BASE COURSES	₹ 1,01,73,95,216
4	BITUMINOUS WORKS	₹ 1,12,19,12,243
5	PAVED SHOULDER	₹ 27,96,35,035
6	TRAFFIC SIGNAGES, ROAD MARKING AND OTHER APPURTENANCES	₹ 6,16,95,616
	TOTAL AMOUNT - B	**₹ 2,91,26,58,960**

- **Total Cost (A+B)**: ₹ 5,35,55,61,162.00 (Rs. 535.55 Crores)

15.20 List of Stakeholders

a. Bareilly Development Authority
b. Bareilly Nagar Nigam
c. PWD-Bareilly
d. State Highways-Bareilly
e. NHAI-Bareilly

15.21 Project Time-line

- The strengthening of Radial Road connectivity from Bareilly city to Ganga Expressway with construction time: 5-6 years

16. Project 14: Development of proposed metro-lite rail system connectivity in Bareilly city

16.1 Background of the study:

Bareilly is a fast-growing city with the population of more than 10 lakhs. The city is expending in terms of commercial, educational, medical, industrial and transit activities. Bareilly serves a major population of nearby areas like Kumaun region, Budaun, Shahjahanpur, Pilibhit etc. which results increasing movement of traffic of the city. The proposed Metro-lite rail system in Bareilly city will be sustainable public transport system to provide hassle-free journey between Bareilly Junction Railway Station, Chowki Chauraha, Parsakhera, Izzatnagar, Satellite Bus Stand, Gandhi Udhyan and Phoenix Mall in Bareilly. It is also important factor to consider such as, the mobility of passenger's movement, available right-of-way in city, mobility system, environmental and social impact assessment.

16.2 Objective:

a. To provide safe, fast and eco-friendly rail-based mass transit services to the public at affordable rates while simultaneously catalysing dense and orderly urban growth.

Figure 104: Existing Road condition at Chowki Chauraha

Figure 105: Existing Carriageway opposite Gandhi Udhyan

16.3 Air Connectivity

At present, the Bareilly airport is a civil terminal located in Izzat Nager, which is located 6 km from north of Bareilly city. The terminal building is 2500 sqm, and can handle 150 passengers during the peak hours. In future, a new apron 9500 m provides parking space and 150 cars parking is expanded. A new terminal building was inaugurated in 2021 as a part of airport expansion. The building is spread over 3020 sqm and has a capacity to accommodate over 300 passengers. At present, Bareilly is connected with Delhi, Bangalore, Mumbai.

Table 21 Passenger Traffic & Aircraft Movement

Year	Passenger Traffic	Aircraft Movement
2020-21	1,641	150
2021-22	1,03,667	1,086

Source: AAI annual report

16.4 Rail Transport system in Bareilly

Bareilly Junction railway station is the major railway station serving city. Bareilly railway station connects the Lucknow-Moradabad line and Lucknow-Sitapur-Lakhimpur-Pilibhit-Bareilly-Kasganj Line. The Bareilly Railway station is well connected to Lucknow, New Delhi, Amritsar, Ambala,

Jalandhar, Pathankot, Gorakhpur, Howrah and other major destinations. Other railways station like Bareilly Cantt, Bareilly City, Bhojipura Junction, CB Ganj, Bohna, Izzatnagar, Parsakhara, Ramganga Bridge secondary railways stations in Bareilly area.

Table 22 Passenger movement at Bareilly Railway Station

Location	Daily Passengers			Peak Hour Passenger		
	In	Out	Total	In	Out	Total
Bareilly Junction	3460	4960	**8420**	145	175	**320**
Izzat Nagar Railway Station	3035	2580	**5615**	190	230	**420**

Passenger demand at the Bareilly Junction Railway Station and Izzat Nagar Railway Station, at current scenario is 8,500 and 5,500 passengers/day were observed, with about 300 and 400 passengers at the two junctions during the peak hour. Most of the passengers preferred to use auto-rickshaws as the access, with a very high share of 69% and 65%, as most of the trips are in the range of 5-10 km, mainly from residential areas in the vicinity, such as Karam Chari Nagar, Sahukara, Katghar, Qureshi Nagar, civil lines, Priyadarshini Nagar and Dwarika Puram Colony.

16.5 Vehicular Growth in Bareilly

In Bareilly, the registered vehicles have been increased moderately over the past decade. It is significant to note that about 14 to 19% of the vehicle's growth in the past decade. The increase of two-wheelers could be attributed to the comparatively better economic status of people and lack of city-wide good PT system. The increase of private modes demands more road space and has resulted in dense concentration of traffic on roads with limited right of ways.

Figure 106: Vehicular Growth in Bareilly

Table 23: Vehicle registration data for Bareilly

Year	Two-Wheeler	Car	Bus	Truck	Others	Total
2014-2015	47932	5329	72	981	1203	**55,517**
2015-2016	47440	6155	79	998	1135	**55,807**
2016-2017	54016	7146	144	1235	1210	**63,751**
2017-2018	62757	8592	323	1773	2727	**76,172**
2018-2019	64439	7963	137	4054	2450	**79,043**
2019-2020	63195	7985	123	4034	2743	**78,080**
2020-2021	50203	7175	51	3318	1090	**61,837**

Source: Bareilly RTO

16.6 Road Connectivity

Bareilly has a radial pattern of road network. National Highways in Bareilly is well connected with its surrounding urban agglomeration, 4 major NH sections pass through Bareilly city are NH-30, NH 530, NH 530-B, NH 730-B and SH 37. The NH 30 is part of Bareilly Bypass section connects Sitarganj on the north and Lucknow, Allahabad on the south. NH 530 connect Bareilly to Rampur Road, NH 530-B connecting Bareilly to Mathura highway, NH 730-B connects (Bareilly to Bisalpur highway. UP state highway no 37 starts from Bareilly to Nainital Road. Bareilly Bypass section starts at Dhantiya village to Rajau Paraspur with total length of 30.1 km.

Figure 107: Major Connecting Roads in Bareilly city

16.7 Process of Network Development

- **Road Network Survey:** Total length of individual Roads, width, RoW
- **Documentation:**
  - Activity pattern of the road
  - Pedestrian Flow
  - Land-use pattern, Heritage, Public & Semi-public
  - Building Character
- **Identifying present issues**: Encroachments, Informal activities, hawkers, vehicular movements, Traffic Signals, footpath and parking locations
- **Involving the citizens**: Public participation through social media survey, campaigning
- **Traffic Management**: Involving the authorities and smart techniques, variable display sign boards
- **Designing the streets**: Incorporating pedestrian pathways, dedicated lane for cycle tracks, street furniture, bollards, smart LED street lights, Signages, Parking Spaces.

16.8 Existing RoW in Bareilly

The road stretch in Bareilly city has been surveyed and it has been found that the right-of-way varies from 12m to 40m at different sections, all the roads have been classified in the category of 12m, 15m, 18m, 24m, 30m and 40 m road stretches. Master plan 2021 of Bareilly, however states only three ROW i.e. 12m, 18m and 30m.

Sl No	Road Section	Length (Km)	RoW
1	Gandhi Udyan to Shyamganj	1.20	30
2	Chowki Chauraha to Gandhi Udhyan	1.00	30
3	Choupla Chauraha to Chowki Chauraha	1.18	24
4	Choupla Chauraha to Bareilly junction	1.52	18
5	Chowki Chauraha to Bareilly Junction	1.53	18
6	Chowki Chauraha to Head Post Office	1.11	30
7	Head Post Office to BSNL Office Chowk	0.374	18
8	Hotel Bareilly Palace to Head Post Office	0.966	12
9	Chowki Chauraha to Bareilly College Chowk	0.951	18
10	Ghanta Ghar to Novelty Chowk	0.65	18
11	Novelty Chowk to Patel Chowk	0.33	40
12	Shyamganj to Bareilly College	0.736	18
13	Bareilly College to Patel Chowk	0.419	30
14	Shyamganj to Satellite Junction	1.065	30
15	Ghanta Ghar to Chaupla Chauraha	1.43	30
16	Novelty to Siklapur Chowk	0.51	12
17	Novelty Chowk to Khalil UPS Road	0.452	15
18	Patel Chowk to Siklapur Chowk	0.333	15
19	Baijal Hospital to Akshar Vihar	1.074	18
20	BSNL Office to Battalion Gate	1.347	24
21	Circuit House Chowk to Gandhi Udhyan (Gate 2)	0.49	15
22	Gandhi Udhyan to UPPCL Old Power House Road	0.416	15
23	Patel Chowk to Chowki Chauraha	0.75	30
24	Battalion Gate to Satellite Junction	0.9	18
25	Malio Ki Puliya to Biabani Kothi	0.674	12
26	Chowki Chauraha to Rampur Garden Chowk	0.41	15
27	Patel Chowk to Choupla Chauraha	0.86	40

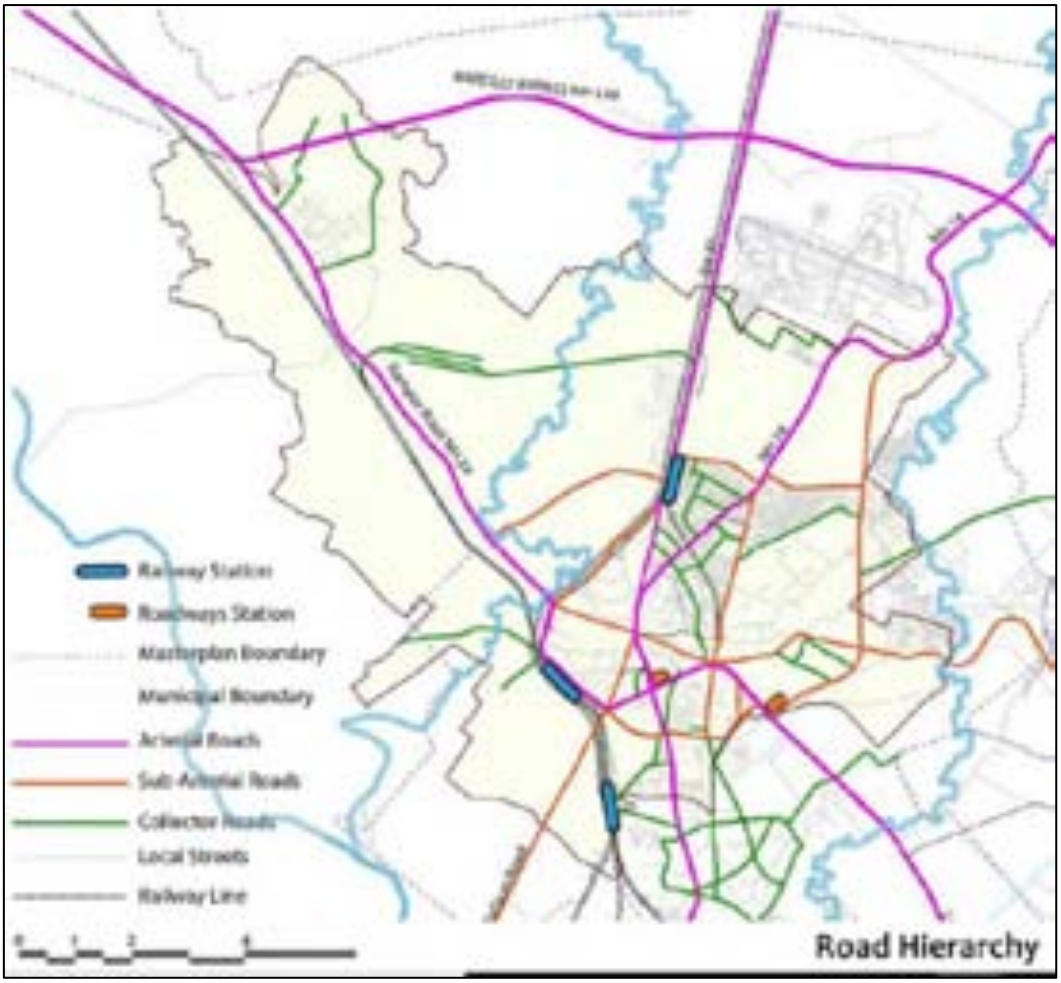


Figure 108: Existing RoW in Bareilly City

16.9 Public Transport system in Bareilly

At present in Bareilly city has, 2 no of bus stands (Old bus stand and Satellite Bus Stand). Both the Bus Stand are in functional, as most of the Bus frequency is from Satellite Bus Stand. The old Bus stand is located in civil lines cater bus plying on routes towards Moradabad, Haldwani, Delhi, Naintal, Dehradun, Agra, Jaipur areas. Satellite bus station caters the bus services towards long distance to Kanpur, Lucknow, Prayagraj, and others.

Table 24 Satellite Bus Stand in Bareilly

Figure 109: Existing condition of Satellite Bus Stand

Table 25: Passenger movement at Bus Terminal

Location	Daily Passengers	Peak Hour Passenger

	In	Out	Total	In	Out	Total
Old Bus Stand	3630	3870	**7500**	60	25	**85**
Satellite Bus Stand	5555	6040	**11595**	35	40	**75**

- The commuters boarding and alighting at the both bus terminals, 50% travel for work, while 23% of the boarding passengers and 25% of the alighting passengers travel for business-related actives.
- Auto-rickshaws is the preferred access mode at the both the terminals, with a very high share of 64% and 69%.

UP State Transport Department has commissioned project for provisioning of electric buses in Bareilly city under FAME 2 Scheme, which will be taken up in two phases where phase 1 will house 23 locations for bus shelters and phase 2 will house 30 locations for bus Shelters. The Intra city bus route have been identified and passes throughout the Bareilly area.

Table 26 Proposed City Bus routes in Bareilly

City Transports Services Ltd						
Route Name	**Route Descriptions**	**Distance (KM)**	**Running Time (Min)**	**Layoff Time**	**Frequency Headway (Min)**	**Number of Buses required**
Bareilly Junction to Phonix Mall	Bareilly Junction to Air Force Station via Chowki Chauraha, Gandhi Udhyan, Satelite Bus Stand, Bisalpur Chauraha, Ruhelkhand University, Phonix Mall	11.9	60	320	20	5
Bareilly Junction to Cental Jail Colony via Swale Nagar	Bareilly Junction to Nagarya Prikshit via Chopla Chauraha, Dulha Miyan Mazar, Qila Pul, Swale Nagar Mini Bypass, Izzat Nagar Railway Station, Central Jail Colony	12.5	65	320	20	4
Bareilly Junction to Persakhada via Qila Pul	Bareilly Junction to Parsakhada via Chopla Chauraha, Dulha Miyan Mazar, Qila Pul, Satya Prakesh Park, CB Gunj Police Station	13.6	70	280	20	5
Bareilly Junction to Fruit Mandi via Delapir Chauraha	Bareilly Junction to peerbhora Air Force Station via Chowki Chauraha, Gandhi Udhyan, Vikas Bhavan, Shyam Ganj Flyover Bridge, Eit Pajaya Chauraha, Bareilly Stadiam, Delapir Chauraha, Fruit Mundi	10.8	55	280	20	6
Bareilly Junction to Badaun Road Patel Vihar	Bareilly Junction to Badaun road Hindustan Petrol Pump via City Mall Godown, Chopla Chauraha, Chaurasi Ganta Mandir	5.1	25	320	20	5

16.10 Base-year Traffic in Bareilly city

i. **Average Daily Traffic at Major Junctions**: To capture traffic flow characteristics and travel pattern of users passing through the Bareilly city and network characteristics. The intensity of average daily traffic at major intersection in Bareilly city and it is observed that Sood Dharm Kanta handles the maximum daily traffic of 29,488 PCUs followed by Bisalpur Chauraha and Selection Point Chauraha with 27,190 PCUs and 25,951 PCUs respectively. The minimum traffic is observed at Sheel Chauraha with 13,977 PCUs.

Table 27 Average Daily Traffic in Bareilly City

Average Daily Traffic

S. No.	Junction Name	Average Daily Traffic (Vehicles)	Average Daily Traffic (PCU)
1	**100 Foota Tiraha**	24640	**21092**
2	**Circuit House Chauraha**	26874	**23004**
3	**Dohra Mod**	27313	**23380**
4	**Izzat Nagar Tiraha**	23199	**19858**
5	**Kargil Chowk**	20751	**17763**
6	**Maliyo Ki Puliya Tiraha**	16033	**13724**
7	**Mini Bypass**	24031	**20571**
8	**Satellite Tiraha**	20447	**17503**
9	**Selection Point Chauraha**	30317	**25951**
10	**Sheel Chauraha**	16328	**13977**
11	**Sood Dharam Kanta**	34449	**29488**
12	**Bisalpur Chauraha**	31764	**27190**

ii. **Peak hour Traffic at Major Junctions**: To capture traffic flow characteristics and travel pattern of users passing through the city road and network characteristics. The intensity of average daily traffic at major intersection in Bareilly city and it is observed that Sood Dharm Kanta handles the maximum daily traffic of 29,488 PCUs followed by Bisalpur Chauraha and Selection Point Chauraha with 27,190 PCUs and 25,951 PCUs respectively. The minimum traffic is observed at Sheel Chauraha with 13,977 PCUs.

Table 28 Peak Hour Traffic in Bareilly City

Peak Hour Traffic				
S.No.	Junction Name	Peak Hour Traffic (Vehicle)	Peak Hour Traffic (PCU)	Peak Hour Time
1	**100 Foota Tiraha**	1975	**1691**	10:00-11:00
2	**Circuit House Chauraha**	3500	**2996**	11:00-12:00
3	**Dohra Mod**	2758	**2361**	11:00-12:00
4	**Izzat Nagar Tiraha**	2396	**2051**	10:00-11:00
5	**Kargil Chowk**	2577	**2206**	10:00-11:00
6	**Maliyo Ki Puliya Tiraha**	1293	**1107**	09:00-10:00
7	**Mini Bypass**	2700	**2311**	09:00-10:00
8	**Satellite Tiraha**	2161	**1850**	16:00-17:00
9	**Selection Point Chauraha**	3113	**2665**	11:00-12:00
10	**Sheel Chauraha**	1505	**1288**	10:00-11:00
11	**Sood Dharam Kanta**	4531	**3879**	16:00-17:00
12	**Bisalpur Chauraha**	3823	**3272**	16:00-17:00

Figure 110: Peak Hour Traffic at Major Intersection in Bareilly City

16.11 Vehicular distribution at Junction

Vehicle wise distribution at 12 no of junctions, with an average share of 70-75% are 2-wheelars share and 20-25% LMV, 2% Autos and 1% MAV

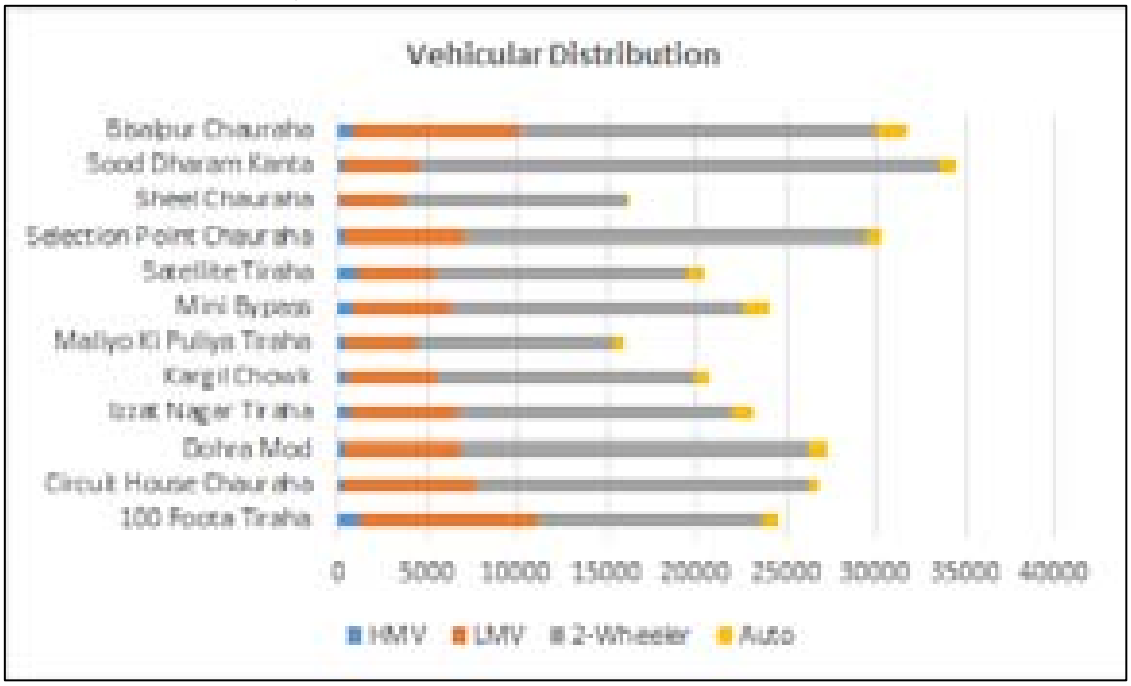


Figure 111: Vehicular distribution at 12 no of Junctions

Table 29 Vehicular distribution at junction

Sl No	Location	Vehicle Type				
		2-Wheeler	Auto	LMV	HMV	Total
1	100 Foota Tiraha	12609	959	9806	1266	**24,640**
2	Circuit House Chauraha	18538	642	7366	328	**26,874**
3	Dohra Mod	19385	1082	6422	424	**27,313**
4	Izzat Nagar Tiraha	15271	1253	6014	661	**23,199**
5	Kargil Chowk	14390	835	5017	508	**20,751**
6	Maliyo Ki Puliya Tiraha	11118	645	3877	393	**16,033**
7	Mini Bypass	16349	1439	5430	813	**24,031**
8	Satellite Tiraha	14127	915	4286	1111	**20,439**
9	Selection Point Chauraha	22587	733	6603	400	**30,323**
10	Sheel Chauraha	12405	213	3583	127	**16,328**
11	Sood Dharam Kanta	29109	904	4070	366	**34,449**
12	Bisalpur Chauraha	20064	1689	9194	817	**31,764**

16.12 Guidelines for Choice of Different Modes

The working group of Urban Transport has set the guidelines for the choice of different modes as

System	PHPDT in 2022	Population in 2021	Average Trip Length
Metro Rail	>= 15,000 for at least 5 km continuous length	More than 20 lakhs	More than 7 km
LRT System	=<10000	More than 10 lakhs	More than 7 km
Mono-Rail system	=<10000	More than 20 lakhs	About 5-6 km
BRTS	>=4,000 upto 20,000	More than 10 lakhs	>5 km
City Bus Services		>1 lakhs	>2-3 km

16.13 Proposed Metro Routes in Bareilly

The proposed metro routes identified are

Sl No	Route Name		Length (km)
1	**Blue Line**	Bareilly Jn. Railway Station to Airport & Pilibhit Bypass	15.0 km
2	**Red Line**	Bareilly Jn. Railway Station to Parsakhera & Jumkha Chowk	16.0 km
3	**Green Line**	Mini bypass to Izzat Nagar to Gandhi Udhyan Chauraha	10.0 km
4	**Violet Line**	Satellite Bus Stand to Bisalpur Chauraha to Pilibhit Bypass to Bilwa to Jumkha Chowk	30.0 km
Total Proposed Metro Length			**71.0 km**

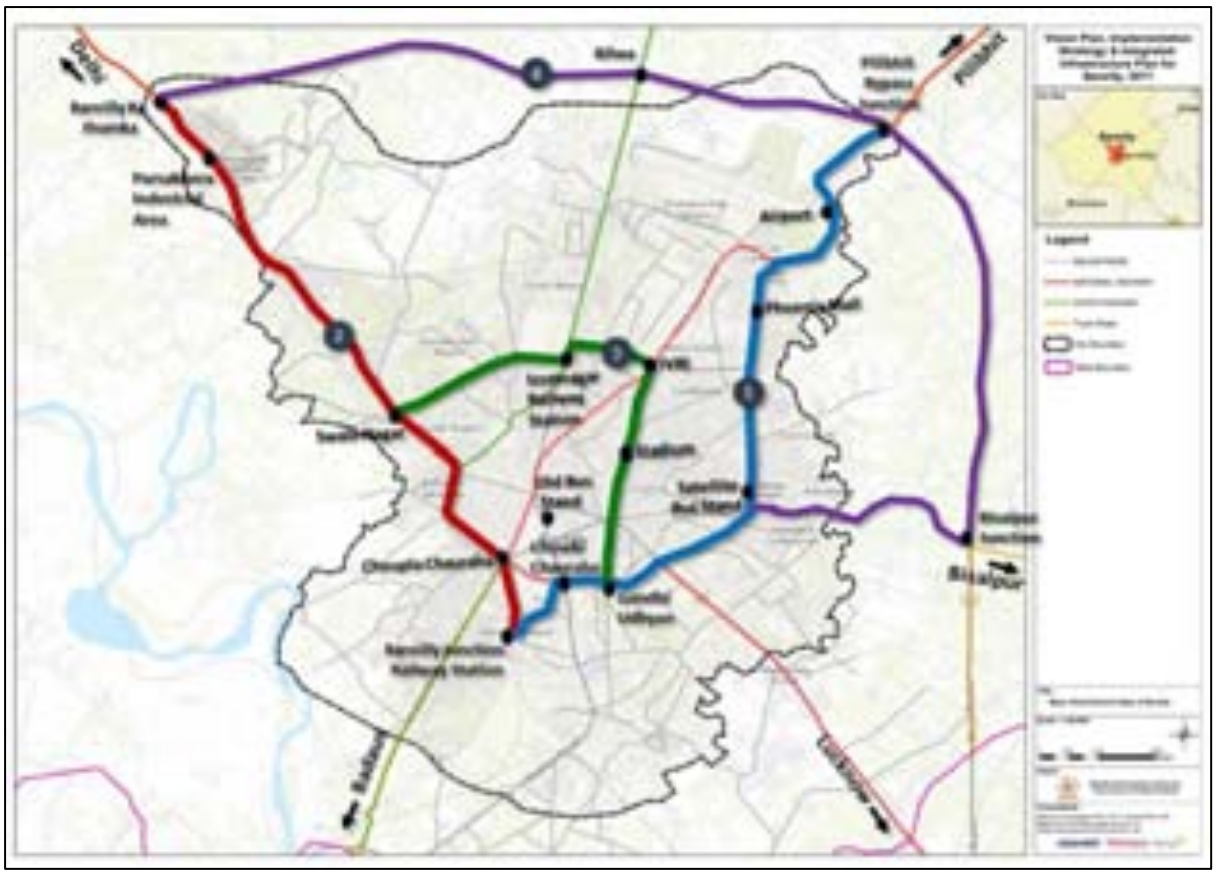


Figure 112: Proposed Metro Routes in Bareilly City

Figure 113: Typical view of the Bareilly Metro near Satellite Bus Stand & Gandhi Udhyan

16.14 Financial Analysis

Cost Estimates for Proposed Metro for 4 lanes

Sl No	Particulars	Section 1 Cost (Rs in Cr.) Blue Line	Section 2 Cost (Rs in Cr.) Red Line	Section 3 Cost (Rs in Cr.) Green Line	Section 4 Cost (Rs in Cr.) Violet Line	Total Cost (Rs in Cr.)
1	**Alignment and Formation**	7,50,00,00,000	8,00,00,00,000	5,00,00,00,000	15,00,00,00,000	35,50,00,00,000
2	**Station Building**	6,00,00,00,000	6,40,00,00,000	4,00,00,00,000	12,00,00,00,000	28,40,00,00,000
3	**Depot**	3,90,00,00,000	4,16,00,00,000	2,60,00,00,000	7,80,00,00,000	18,46,00,00,000
4	**Rolling Stock**	3,00,00,00,000	3,20,00,00,000	2,00,00,00,000	6,00,00,00,000	14,20,00,00,000
5	**Others**	15,19,50,00,000	16,20,80,00,000	10,13,00,00,000	30,39,00,00,000	71,92,30,00,000
Total		**35,59,50,00,000**	**37,96,80,00,000**	**23,73,00,00,000**	**71,19,00,00,000**	**1,68,48,30,00,000**
Contingencies@3%		1,06,78,50,000	1,13,90,40,000	71,19,00,000	2,13,57,00,000	5,05,44,90,000
Gross Total		**36,66,28,50,000**	**39,10,70,40,000**	**24,44,19,00,000**	**73,32,57,00,000**	**1,73,53,74,90,000**

Total Cost of the project for each section

Sl No	Route Name		Length (km)	Cost (Rs in Cr.)
1	**Blue Line**	Bareilly Jn. Railway Station to Airport & Pilibhit Bypass	15.0 km	3,666.28 Cr
2	**Red Line**	Bareilly Jn. Railway Station to Parsakhera & Jumkha Chowk	16.0 km	3,910.70 Cr
3	**Green Line**	Mini bypass to Izzat Nagar to Gandhi Udhyan Chauraha	10.0 km	2444.19 Cr
4	**Violet Line**	Satellite Bus Stand to Bisalpur Chauraha to Pilibhit Bypass to Bilwa to Jumkha Chowk	30.0 km	7332.57 Cr
Total Proposed Metro Length			**71.0 km**	**17,353.74 Cr**

16.15 List of Stakeholders

a. Bareilly Development Authority
b. Bareilly Nagar Nigam
c. PWD-Bareilly
d. State Highways-Bareilly
e. NHAI-Bareilly
f. UP Metro Rail Corporation
g. UP State Road Transport Corporation
h. UP Traffic Police

16.16 Project Time-line

- The Development of proposed metro-lite rail system connectivity in Bareilly city with construction time: 5-6 years