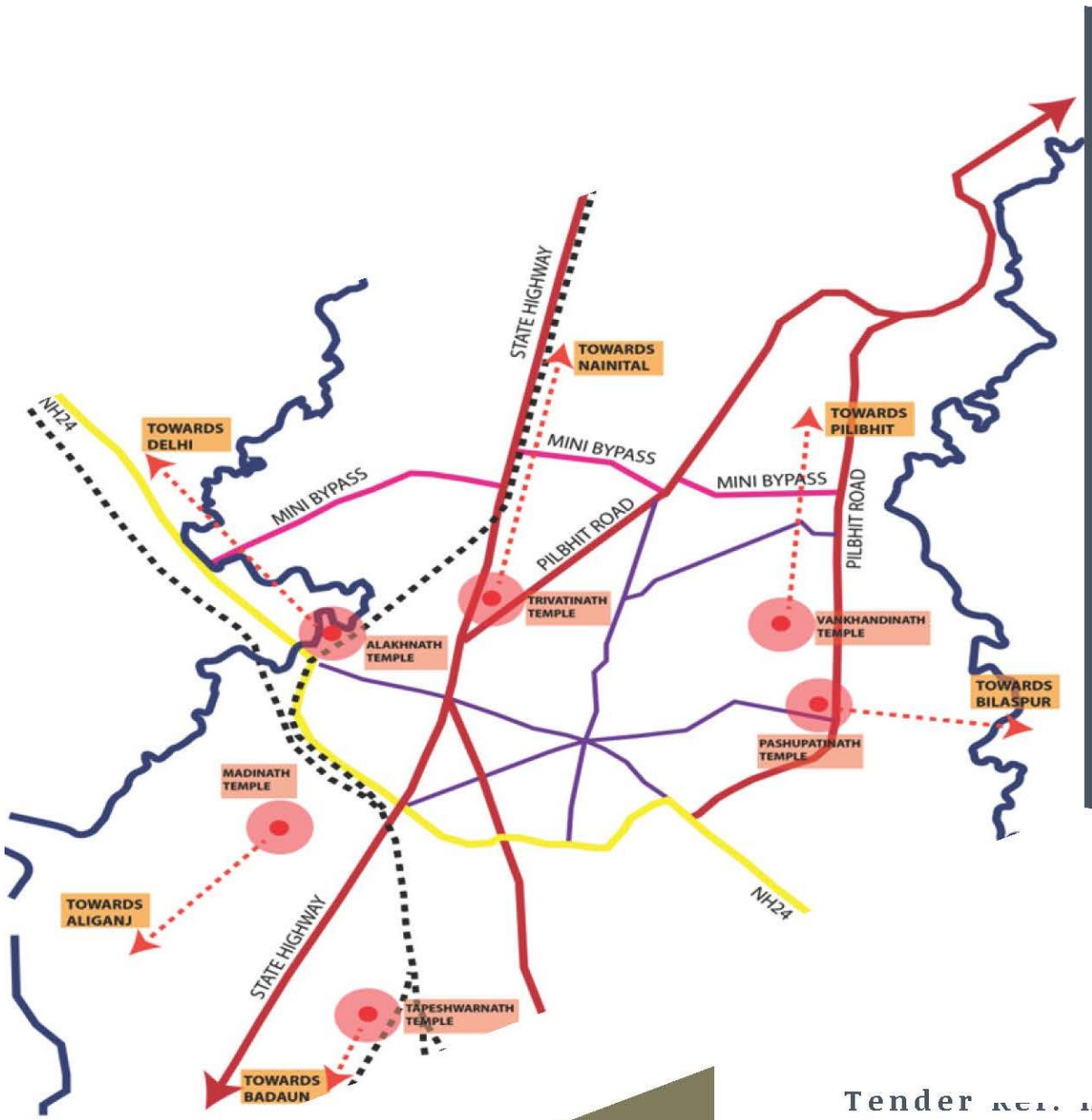
BAREILLY DEVELOPMENT AUTHORITY

BDA

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

VISION PLANNING REPORT



D – 4: Final Report

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MEINHARDT SINGAPORE PTE. LTD.

in association with

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Ernst & Young Global Ltd

Tethys Development Services Pvt. Ltd.

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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

Chapter 1. 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.

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

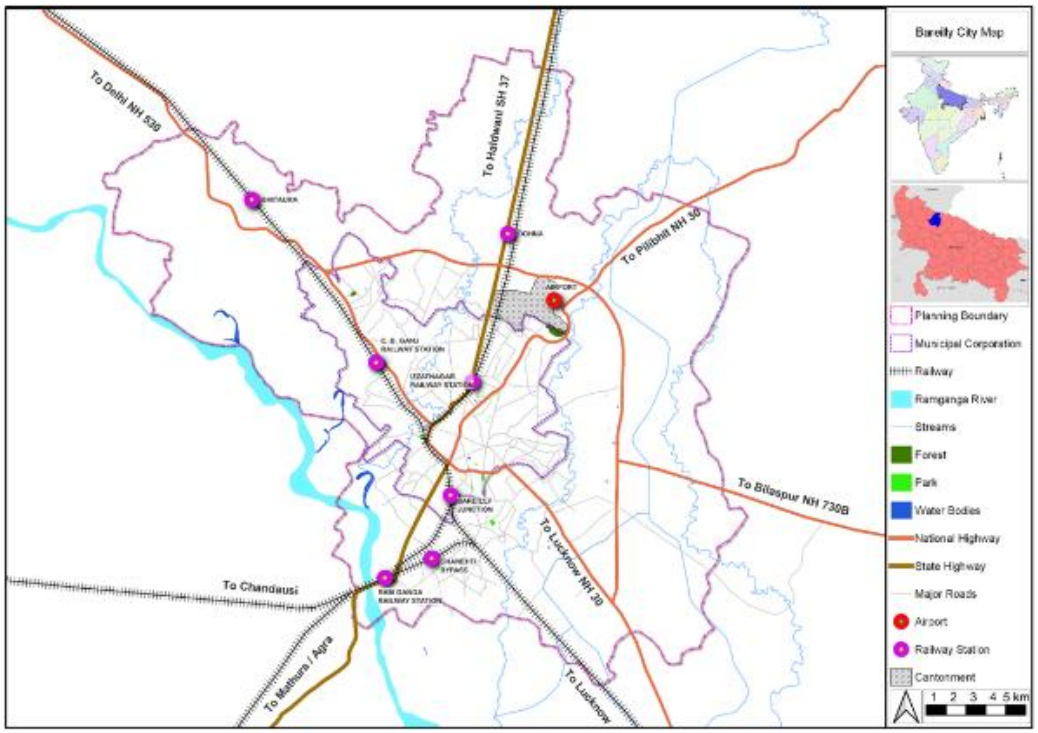


Figure 1-1 : Study Area Map

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

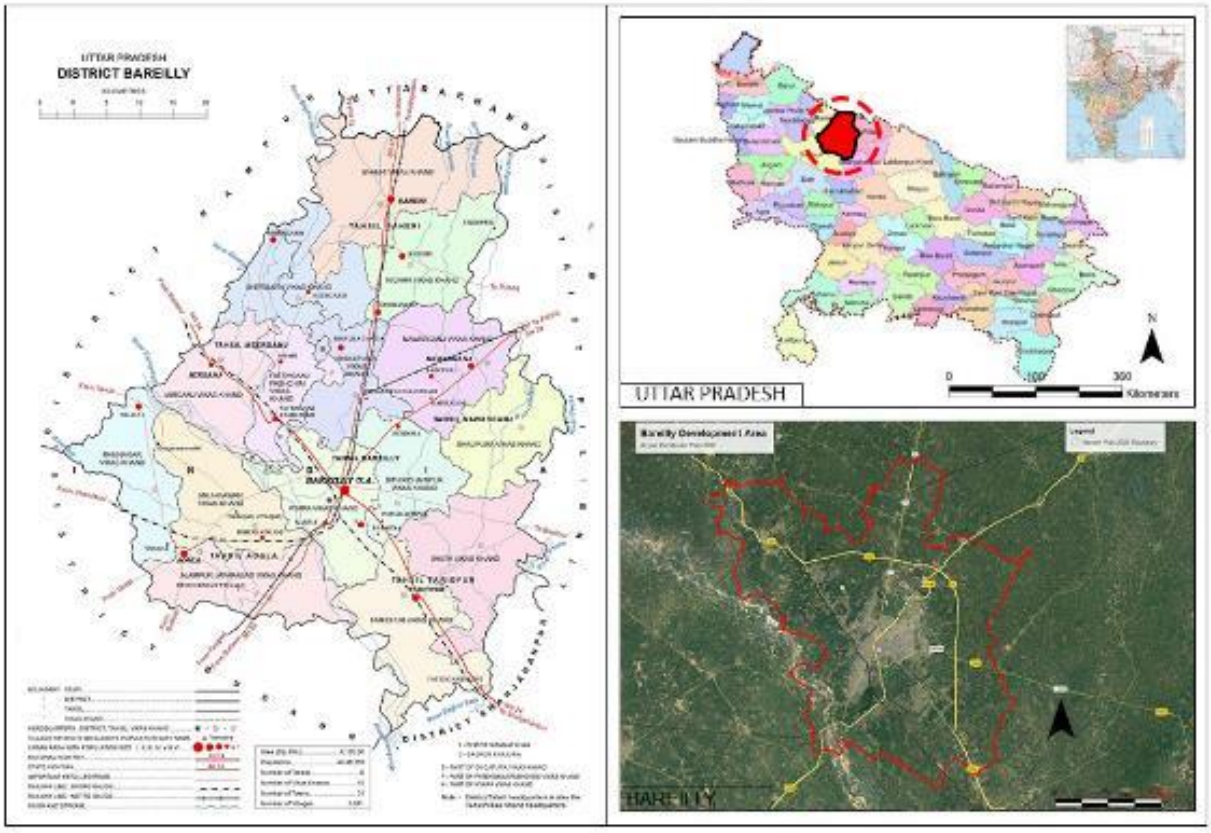


Figure 1-2: Regional Setting of Bareilly

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

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 finalizing a vision for the development of Bareilly. This vision is defined by analyzing the Existing Situation and assessing the demand 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.

Chapter 2. POLICY CONSIDERATION

2.1 Planning Boundary and Area

2.1.1 Bareilly Development Authority

To govern the development and expansion of the city under proper planning, on November 1, 1971, regulated area of Bareilly city was declared under the Uttar Pradesh (Regulation of Construction Works) Act, 1958. This was enacted to limit the unauthorized use and development of land, as well as the increasing tendency of unplanned construction of buildings and low-level colonies. Bareilly development area boundary included the area of municipality and 198 surrounding revenue villages outside the municipality. Aggregately, an area of 36,558.70 hectare was included in the limits of the development authority. In May 2008, the development area of Bareilly was expanded to include an additional 66 revenue communities. As a result, the Bareilly development area encompasses a total of 264 revenue villages.

2.1.2 Bareilly Nagar Nigam

In the year 1858, Bareilly Municipal Board was constituted with the purpose to provide basic services. Now, Bareilly Nagar Nigam (Municipal Corporation) is spread in an area of 106.41 sq.km. or 10641 hectares. For efficient performance and better administration, it is divided into 4 zones, these zones are sub divided into 80 wards.

2.1.3 Bareilly Smart City

Bareilly Smart City works under two heads, Area Based Development and Pan City Development. Bareilly Municipal Corporation in consultation with citizens identified an area of 50 acres for redevelopment. This redevelopment will result in the replacement of the present built-up environment, as well as the co-creation of a new layout with improved infrastructure through the use of mixed land use and higher density. Pan City Development which focuses to strengthen city wide infrastructure covers an area of 276 sq.km.

2.1.4 Bareilly Cantonment Board

Bareilly Cantonment Board is an organization under Ministry of Defense which was established in 1811 for administrative and civil representation purposes. It covers 4259.42 acres, with a notified civil area of 139.5026 acres included. The board has been divided into seven wards.

2.2 Past and Current Planning Initiatives

2.2.1 Statutory Master Plan

Master Plan which acts as the statutory document to guide the regulated development of area and to develop different sectors have been formulated and are listed as follows:

Bareilly Master Plan 2001

The first master plan of Bareilly was made in 1971 for the year 1999 which was later revised in the year 1986 and was proposed for year 2001. Before this, the development of the city took place in small pockets all across the city. Development area for the proposed Master Plan 2001 was proposed for 10,500 Hectares to accommodate the projected population of 9.10 lakhs.

Bareilly Master Plan 2021

Master Plan 2021 which was enacted in 2008 was proposed for the year 2021. It aims to facilitate projected population of 14.21 lakhs and covers a total area of 16721.83 hectares (as per Master Plan 2021) and area of 20563.82 (as per the GIS Survey carried out for making Master Plan 2031). This Master Plan was prepared by Town and Country Planning Department and Bareilly Development Authority.

Bareilly Master Plan 2031 (Draft)

Master Plan 2031 for Bareilly development area is proposed for a population of 18,94,211. Proposed Master Plan covers an area of 22815.76 Hectares.

2.2.2 Other Planning Initiatives

Apart from the Master Plan there are several other planning initiatives which focuses on different sectors.

City Development Plan (2003-2023)

City Development Plan with a horizon year 2023 was prepared in association with Bareilly Development Authority.

Slum Free City Plan of Action (Bareilly)

The Indian government launched the "Rajiv Awas Yojana" (RAY) to envision a slum-free India. Under this scheme Slum Free city plan of Bareilly city was prepared Regional Centre for Urban and Environmental Studies – OU, Hyderabad. The plan of action included line estimates for housing and infrastructure shortages, as well as civic amenities proposed in accordance with RAY principles. The report also requested approval and action to produce DPRs.

City Wide Sanitation Plan

The National Urban Sanitation Policy launched during 2008 envisages “All Indian cities and towns become totally sanitized, healthy and livable and ensure and sustain good public health and environmental outcomes for all their citizens with a special focus on hygienic and affordable sanitation facilities for the urban poor and women.” In the same line City wide sanitation plan have been prepared by Administrative Staff College of India in partnership of Uttar Pradesh Government and Nagar Nigam Bareilly.

2.2.3 Infrastructure Development Schemes

The following are the various infrastructure development schemes for various sectors:

Atal Mission for Rejuvenation and Urban Transformation (AMRUT):

AMRUT was established in June 2015 with the goal of establishing infrastructure that would allow for appropriate and reliable sewage networks and water supplies for urban transformation through the implementation of urban revival projects.

Smart Cities Mission: It was launched on June 25, 2015, with the goal of promoting cities that use 'smart solutions' to offer basic infrastructure, a clean and sustainable environment, and a reasonable quality of life for their residents.

Housing Schemes:

- Pradhan Mantri Aawas Yojna (Housing for All)
- Manyawar Shri Kanshiram Ji Shahri Garib Awas Yojna
- Asra Yojna
- Ramganga Nagar Awasiya Yojna
- Rajiv Awas Yojna (RAY)

Commercial Schemes:

- Transport Nagar, Bareilly
- Commercial area in Ramganga Nagar Scheme

2.2.4 Industrial Development Scheme

The different industrial development schemes are listed below:

- One District One Product (ODOP)
- Mukhyamantri Yuva Swarojgar Yojana, U.P
- Prime Minister's Employment Generation Programme (PMGEP)
- District Skill Development Plan for Bareilly

2.3 Stakeholder Mapping

2.3.1 Statutory Agencies

State Urban Development Agency (SUDA)

The State Urban Development Body (SUDA) has been established as the nodal agency in the Uttar Pradesh government under the Urban Employment and Poverty Alleviation Program Department. With effect from November 20, 1990, this agency is registered under the Societies Registration Act. At the district level, District Urban Development Agencies (DUDAs) have been established.

Various initiatives are being undertaken for the social and economic upliftment of the urban poor. The District Magistrate serves as the ex-officio chairman of the district's Urban Development Agency. Its members are the presidents of all of the district's municipal authorities.

Bareilly Development Authority

Bareilly Development Authority (BDA) Established in 19th April 1977 under the Uttar Pradesh Urban Planning & Development Act 1973. BDA is the principal agency of the Government of Uttar Pradesh responsible for taking ahead the tradition of planned and sustainable development of Bareilly.

Bareilly Development Authority is responsible for preparation and implementation of master plan for the development area. It takes up the infrastructural and basic amenity development for Bareilly besides environment conservation and development of rural areas around the mother city.

Bareilly Nagar Nigam

BNN (Bareilly Nagar Nigam) is a local government entity dedicated to delivering essential community services such as health care, sanitation, education, and housing. The city is organized into four zones and 80 wards, each of which has its own councilor.

Bareilly Cantonment Board

Under the provisions of the Cantonment Act, 2006, the Bareilly Cantonment Board is an autonomous organization under the Ministry of Defense of the Government of India that performs mandatory and discretionary functions such as education, water supply, birth and death registration, etc.

2.3.2 Urban Development and Infrastructure development agencies

National Highway Authority of India

The Ministry of Road Transport and Highways manages the National Highways Authority of India (NHAI), which was founded in 1988 by an Act of Parliament. The National Highways Authority of India (NHAI) was founded by the Indian government as a central authority to build, maintain, and manage the National Highways entrusted to it. In February of 1995, the authority, on the other hand, commenced activities. Major highways passing from the Bareilly city are under the jurisdiction of NHAI.

Uttar Pradesh State Highway Authority (UPSHA)

U.P. State Highways Authority (UPSHA) works for the development, maintenance and management of state highways and related works. U.P. State Highways Authority is constituted by Uttar Pradesh under UP act no. 19 of 2004 dated Aug'13, 2004. All the state highways passing from Bareilly are under UPSHA.

Bareilly Smart City, Bareilly

Smart City, Bareilly is a Special purpose vehicle established as a company incorporated under the companies Act, 2013 and works under MoHUA. The SPV main function is to plan, appraise, approve, release funds, implement, manage, operate, monitor and evaluate the Smart City development projects. Smart City, Bareilly works as a SPV which is headed by a full time CEO and have nominees of Central Government, State Government and ULB on its Board.

UP Housing and Development Board

The UP Housing and Development Board is in charge of enacting and enforcing housing and some urban planning laws and policies. The board is also in charge of providing affordable housing to those in need through the Uttar Pradesh Housing and Development Board.

UPRERA (Uttar Pradesh Real Estate Regulatory Authority)

As a government agency, the State Real Estate Regulatory Authority aims to protect homebuyers while also assisting in the growth of the real estate business. It makes recommendations to the appropriate government on issues concerning the development and promotion of the real estate industry.

2.3.3 Industrial Development

District Industries Centre

The District Industries Centre (DIC) is a government relevant government aimed at fostering small village and cottage industries in a certain area. The DIC was founded in 1978. The District Industries Centers, which are located at the district level, provide all of the required services and support to help entrepreneurs develop MSMEs (Micro, Small and Medium enterprises).

Uttar Pradesh State Industrial Development Authority

The Uttar Pradesh State Industrial Development Authority (UPSIDA), originally the Uttar Pradesh State Industrial Development Company, is a government-owned corporation that supports industry and builds industrial infrastructure in Uttar Pradesh. The Uttar Pradesh State Industrial Development Authority is a Government of Uttar Pradesh Public Sector Undertaking. It fosters the development of industrial infrastructure in Uttar Pradesh, as well as assisting in the development of industrial zones and delivering iconic industrial locations. UPSIDA's mission is to enable entrepreneurs establishing enterprises and factories in Uttar Pradesh with modern infrastructure facilities and services.

2.3.4 Tourism Development

Archaeological Survey of India

The Archaeological Survey of India (ASI), which is part of the Ministry of Culture, is the country's leading archaeological research and preservation body. The ASI's primary focus is the preservation of ancient monuments, archaeological sites, and national-historical relics. Furthermore, it governs all archaeological operations in the country in accordance with the rules of the Ancient Monuments and Archaeological Sites and Remains Act, 1958, as amicable under the AM & ASR (Amendment & Validation Act 2010). The Antiquities and Art Treasure Act of 1972 is also governed by it. ASI for its effective work is branched into various circles. Bareilly city is currently part of newly formed Meerut ASI Circle.

Airport Authority of India

The Airports Authority of India (AAI) is a statutory agency that is controlled by the Directorate General of Civil Aviation of the Ministry of Civil Aviation of the Government of India. It is in charge of developing, improving, maintaining, and managing India's civil aviation infrastructure. Bareilly civil airport which is a wing of Trishul Air Base is governed by Airport Authority of India.

UP Tourism

Uttar Pradesh Tourism Department is a state government body in India that is responsible for tourism promotion in the state of Uttar Pradesh. The department is also in charge of designing and implementing Uttar Pradesh's tourism policies, which include heritage, air service, and eco-tourism regulations.

2.3.5 Private Sector Associations

Indian Industries Association

The Indian Industries Association (IIA) is a powerful representative organization for Micro, Small, and Medium Enterprises (MSME). It works with business, governmental, academic, and other thought leaders to influence global, regional, and industry agendas. In today's ever-changing and increasingly competitive industrial climate, IIAs focuses on creating an enabling environment for the development of MSMEs. In Bareilly, there IIA functions through its local chapter which has 360 registered units. Bareilly chapter actively participates in works related to industrial development. It also supports its member in getting finance, incentives through state and central policies, advocacy, etc.

Indian Medical Association

The Indian Medical Association is the only body in Bareilly which is a national level volunteer organization of doctors practicing the Modern Scientific System of Medicine. Its primary function is to promote and enhance medical and allied sciences in all of their forms, as well as to improve public health and medical education in India.

Confederation of Real Estate Developers' Associations of India (CREDAI)

The Confederation of Real Estate Developers' Associations of India (CREDAI) is India's top association of private real estate developers. This is an organization which is working in Bareilly to promote with the goal of changing the face of the real estate business with a mandate to promote housing and habitat.

Part - 1

Vision Planning

Chapter 3. VISION FOR THE CITY

3.1 Vision Framework

Government of Uttar Pradesh envisions to promote "Bareilly" of the state by enhancing city's comprehensive development of physical, institutional, social and economic infrastructure in accordance with modern and innovative Urban Planning principles. Since every city beholds unique characteristics and challenges, the Vision plans will provide the development direction by understanding these characteristics of the city.

The purpose of Vision Plan is to drive economic growth, improve the quality of life of people by strengthening city's inherent potentials. augmenting existing infrastructure and plan its growth which is sustainable and resilient in nature.

Key objectives of the Vision Plan are:

- Preparation of Vision plan to promote long term growth & development of the city.
- Adopting comprehensive development approach for the city to Improve quality of life, creation of employment, boost regional development. improved socio-economic and financial planning to guide city's planned expansion in the future.
- Preparation of City's Business Plan and identification of projects of importance that can be developed through private sector participation.
- Identification of programmes, stakeholders, institutional arrangements and resource requirements adopting project structuring mechanism.

In order to undertake such envisaged development of the city and create a blueprint to meet the objectives of holistic, sustainable and planned development, Government of Uttar Pradesh envisages to prepare the Vision, Implementation strategy and integrated infrastructure plan for "Bareilly" in Uttar Pradesh which will pave the way in further for Project Development, Management & Project implementation support.

3.2 Vision Statement

"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."

Bareilly's Vision

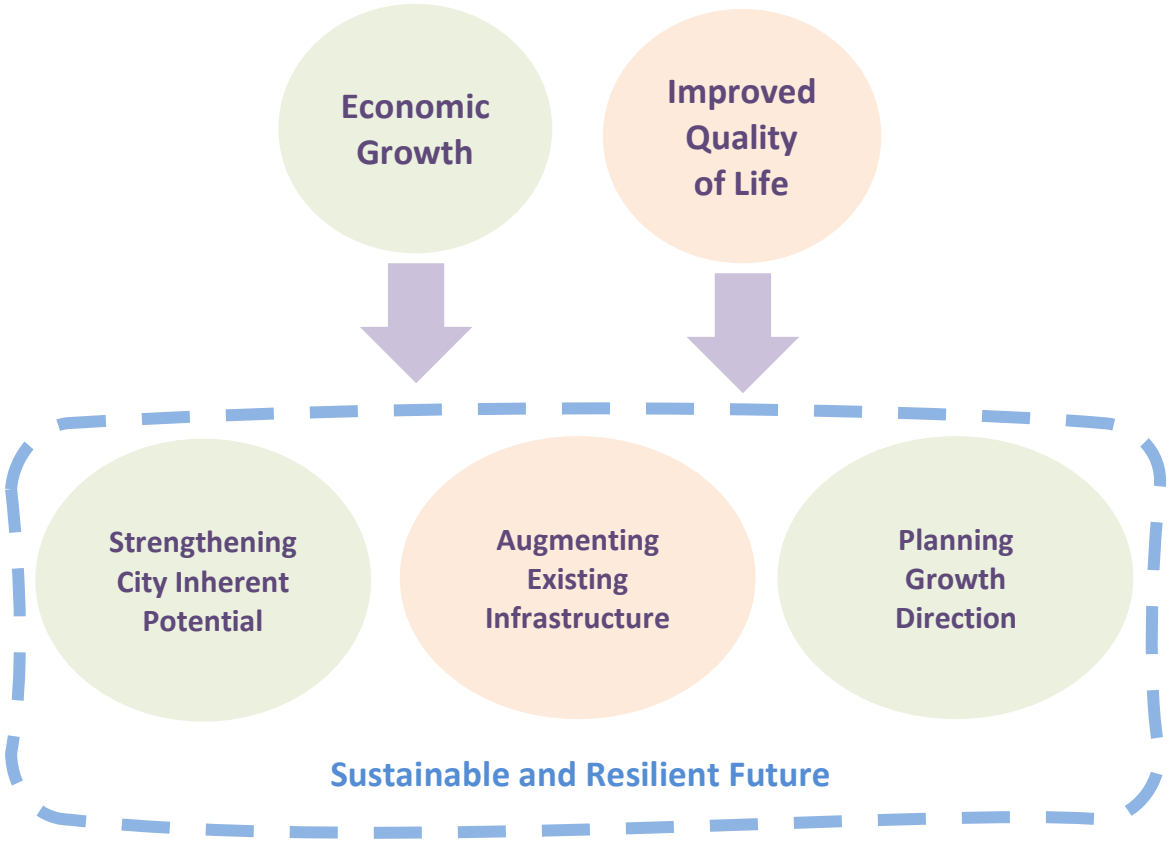


Figure 3-1: Bareilly's Vision

3.3 Proposals focusing Bareilly's Vision Statement:

Economic Growth	Quality of Life
• Industrial Growth Centers • Development of Global Zari and Zardozi Design and Development Center • Development/ extension of industrial area in Bareilly City – multi – product	• Residential Housing Node • "Medicity" – designated area with multiple health business and activities • Ramganga riverfront development • Development of National Level Naturopathy Center

Strengthening City Inherent Potential	Augmenting Existing Infrastructure	Planning Growth Direction
• Ahichchhatra - Tourism infrastructure upgradation of A.S.I site • Development of Handicraft Cluster/ Common Facility Centre (CFC) – Zari & Bamboo • Bareilly District Jail land parcel monetization through redevelopment. • Developing trade cum business expo centers near transit nodes • Rejuvenation of Zari - Zardozi (Shyam Ganj market) - One district one product	• parking policy and construction of off-street parking lots • Strengthening of Radial Road connecting to Ganga Expressway • Development of new solid waste treatment plant • Development of new Tertiary Sewage Treatment Plant (STP) • Riverfront and ghat development for Ramganga and Chowbari • Urban Renewal of all Seven Nath Temples	• Industrial Growth Centers • Development medical infrastructure for naturopathy and eco-tourism • Development of Lite Metro Rail network for Bareilly

3.4 Bareilly's Vision Aim:

- Evaluating the state of the city's development and the current situation of Bareilly.
- Directing towards the solution to the identified issues, focusing on reaching goals for the optimum development of Bareilly.

To achieve above-mentioned Vision Statement, the Vision was defined for all the following domains of the city defined in the RFP.

- Urban Planning
- Urban Design
- Heritage and Tourism
- Economic Development
- Infrastructure Development
- Renewable / Solar Energy.

For the domain wise vision statements refer the upcoming chapters of this report.

Chapter 4. URBAN PLANNING VISION

4.1 Vision Statement for Urban Planning

"Inclusive city that is driver of economic growth with enhanced quality of life for citizen through large scale planned land development."

4.2 Approach and Methodology

To achieve successful demand assessment for vision planning and development, these components will be studied in detail and form a part of our approach:

- Population Projections until 2051
- Land Requirements for various uses
- Land use implications of Industrial and Economic Base
- Tourism sector infrastructure proposals
- Recommendations on Draft Master Plans
- Proposed shelf of Projects
- Convergence of proposed Urban Sector projects with existing programs/schemes and strategies:

4.3 SWOC of Urban Planning

It is crucial to carefully study all aspects of the city and evaluate them from the standpoint of urban design in order to move on with the creation of the Vision plan and the shortlisting of projects for Bareilly. The analysis of the city from the perspective of urban land use planning is provided below, taking into account stakeholder consultations and data from the city survey:

STRENGTHS

- **Location of Bareilly and its identification as Counter Magnet of National Capital Region**

Bareilly city is well connected to the region and prominent locations with road and rail networks. It is located on the National Highway 30, which connects Uttarakhand's Sitarganj with Andhra Pradesh's Vijaywada. The 2040-kilometer (1267.5-mile) highway begins at the NH 9 junction at Sitarganj and runs through Bareilly. Bareilly is connected to Pilibhit by National Highway NH30 and Shahjahanpur by NH730C on the east. National Highway 530B passes to the west of the city and connects the Badaun district. It is connected to the national capital New Delhi with NH530 till Rampur and with NH9 from Rampur to New Delhi passing through Moradabad. In the north lies Nainital which is connected with State Highway 39 till Kichha and with National Highway 109 hereafter.

- **Bareilly is an economic center and employment generator for people due to wood carving, hosiery, foundry and other industries.**

Bareilly is an important economy and employment generator in the Bareilly district due to the presence of industries delivering various services and products both nationally and worldwide. Due to the paucity of mineral resources in the region unlike other districts in Uttar Pradesh, the district developed agro-based industries. The agro based industries plays a significant role in not generating revenue and employment but also establishing a unique identity of the city in the international

market. A variety of industrial enterprises are located here including chemicals, food manufacturing, beverages etc.

- **Only Municipal Corporation in the district**

Bareilly city has grown to be a major city in the Region. The city expansion has taken place along the major roads and led to urban sprawl and the presence of many vacant pockets closer to the cohesive developed area. Hence the availability of opportunities in the city, have pulled in the population influx from the neighboring villages as well. Other than the burgeoning population, the major reasons for the urban expansion and increasing migration in the city.

WEAKNESS

- **Lack of planned residential spaces**

Urban sprawl is a common issue in most of the urban developments and similar situation is being seen in Bareilly also, city requires planned residential areas for the influx and future population.

- **Lack of planned industrial areas**

As per the stakeholder consulatation there are many privately developed industrial areas in Bareilly but it lacks facalities and aminities which can throtle the growth of the industries in the city. Even areas which are setup by UPSIDA such as Parsakhera also don't score very well in the infastructure avalibilty matrix that is why city needs planned industrial areas.

- **Lack of supporting infrastructure for cane and bamboo industry**

Any industry or skill requires upgradation, exposure with time which lacks in the case of cane and bamboo industry of Bareilly. A common facility centre is been set-up under ODOP scheme but it requires exposure by making people aware of the historic craft.

OPPORTUNITIES

- **To develop Bareilly as the major industrial city in the state**

Bareilly has a strong historcial industrial background and has a strong base of cane and bamboo furniture which with the help of enabling infrastructure and exposure can be developed as a major economic driver of the city. Zari and Dardozi industry is also flourishing on a wide scale in the city so its potential can also be harnessed.

- **To develop Bareilly as a major educational and medical hub**

Major opportunity for Bareilly is that it lies on the base of Kumayun region (Hilly area) and serves as a major healthcare and educational service provider in the region. Its potential can be harnessed and can be developed as a major service provider in the city.

- **To provide residents of Bareilly a better quality of life**

By providing planned residential zones and decongested core area there is an opportunity to provide better lifestyle to the residents of the city.

CHALLENGES

- **Lack of industrial growth impacting economic growth**

The existing industrial landuse of 2021 has been estimated at 336.84 which is 3.30 % of the total existing landuse. Although, 1057.42 ha (6.32%) was proposed in the Bareilly Masterplan 2021, only

31.85 % have been achieved till now. In the same line, the distinctive cane and bamboo of the city may deteriorate as a result of improper native art exhibition and craftsman facilitation. Additionally, the youth will get disengaged from this cultural treasure, which could lead to the eventual loss of the skilled workmanship.

- **Congested core areas**

Core area is congested because of dense commercial set-up. Existing situation of the core poses threats to lives as there is little scope of fire vechile movement.

- **Lack of transport infrastructure**

The city's growth has not been able to accommodate the increasing needs of transport infrastructure thus creating congestion and parking issues at various places through out the city.

Chapter 5. URBAN DESIGN VISION

In order to formulate the Vision, Implementation Strategy and Infrastructure plan for Bareilly, detailed city study and survey has been carried out by the Urban Design team. The study consisted of data collection and documentation of **Socio-cultural profiling, regional connectivity, mobility network, existing condition of the civic, tourism and transport infrastructure** from primary sources and secondary sources. It also included collation of maps and information including existing and proposed Master plans/development plans/ district level plans, satellite imageries, Socio-economic characteristics of city and surrounding region along with analysis and understanding of existing, on-going or proposed city infrastructure development initiatives/projects undertaken by BDA, Smart city or any other city authority. Furthermore, all urban design aspects of the city such as **History, Ecology, Morphology, Open space network, Activity pattern, Social and physical infrastructure and Tourism** have been thoroughly studied and documented.

To understand and analyze the existing situation of the city, a detailed city survey has been done by employing various **urban design tools**, both quantitative as well as qualitative to understand the city's design aspects as well as its **perceptual, morphological, temporal, behavioral and functional dimension**.

The extensive city survey comprised of character mapping and documentation of the following areas:

- **Ecological systems of the city such as rivers, forests and open spaces -** Rivers present and edge conditions for Devraniya, Nakatiya & Ram Ganga were studied and analyzed.
- **Transportation hubs -** Bareilly city railway station, Bareilly Junction railway station, Izzatnagar Railway Station, Satellite bus stand, Old city bus stand and Bareilly Airport.
- **Markets -** Bada Bazaar, Kutubkhana market, Kohrapeer market, Shyam market, Bareilly sabzi mandi
- **Chowks and Chaurahas -** Jhumka Tiraha, Chaupla chauraha, Ghantaghar, Darzi Chowk, Novelty Chowk, Patel Chowk, Chowki Chauraha, Chaupla Chauraha, Virangana Chowk.
- **City built-use districts and major arterial streets -** City core area, Industrial area, Cantonment area, Institutional areas, Pilibhit Bypass and Stadium Road.
- **Religious and cultural precincts -** Nath temples, Dargah e Ala Hazrat, Colonial churches, Ramganga River and their associated fairs and festivals.
- **Public places (old & new) -** Bareilly Fort, Akshar Vihar Lake, Gandhi Udhyan, Phoenix mall, Urban haat, Fun city, Manoranjan sadan, Sanjay Gandhi Pond and Phool Bagh.

In order to gain an insight of the existing scenario of the city's economic, social and physical infrastructure, multiple **Stakeholder meetings** have been conducted with the city residents, business owners, Zari craftsmen, market retailers and wholesalers, wood craftsmen and development authority personnel. The discussion with the stakeholders has provided the team an edge to understand the on-ground situation of the city from various aspects and a direction to formulate the Vision for the city.

5.1 Urban Design Intent

"Envisioning Bareilly as a trade & craft destination, a place for spiritual tourism and an environment resilient city, to enhance the overall city identity, encourage growth & embrace the city's culture".

The vision aims to develop Bareilly with a holistic approach by integrating the ecological, economic, cultural & social aspect of the city. Considering the city data, it is witnessed that the city of Bareilly has a strong infrastructure in terms of trade and industry along with a strong religious identity owing to the seven Nath temples, the Not only that, but the city is also rich in terms of medical and educational infrastructure as well. The city is also enriched with many natural assets which completely go unnoticed due to lack of legibility.

In order to develop the Vision plan and shortlisting appropriate projects for Bareilly, the way forward is to conclude the data and SWOT analysis and picking specific sectors/ dimensions that possess a higher potential for City's future growth. Thus, the vision focuses development of all the dimensions that the city of Bareilly possesses through the following objectives:

- Strengthening the religious identity of 'Nath Nagri', the Dargah & associated public events for better tourism.
- Revival of City's essence along its trade & commerce infrastructure
- Establishing environmental resilience by integrating the blue-green assets with the city fabric
- Proposals that foster Socio-economic development for city residents.

5.2 SWOC of Urban Regeneration - Urban Design

To proceed further with the development of Vision plan and shortlisting of the projects for Bareilly, it is essential to observe all the aspects of the city precisely and examine them with respect to urban design perspective. Taking the **city survey data** and **stakeholder consultations** into consideration, following is the analysis of city from urban design perspective:

STRENGTH

- **NATH NAGRI -** Presence of Seven Nath temples envelope the seven major routes of the city, giving it the identity of Nath Nagri
- **TRADE AND BUSINESS -** With massive market infrastructure, the city is also well known for its trade to all its neighboring cities.
- **RELIGION AND CULTURE -** The city of Bareilly portraits a very strong religious & cultural identity.
- **ZARI ZARDOZI-** Bareilly is very well renowned for its native craft of Zari-Zardozi all over the country which initiates commerce & trade to the city.

WEAKNESS

- **LACK OF IDENTITY -** The city lacks the identity in terms of entrance gateways.
- **NO IMAGEABILITY -** Loss of Imageability of the city is seen beyond the old city core.

- **RELIGION AND CULTURE-** Despite of having a very rich cultural background; the religious precincts still lack the sense of Identity
- **ZARI ZARDOZI -** The traditional craft work trade is declining due to lack of display infrastructure and tax systems.

OPPORTUNITY

- **NATH NAGRI -** Development of Nath temple circuit & reviving religious precincts as the symbolic identity of Bareilly.
- **NATIVE CRAFT-** Creating a platform to preserve & elevate the city's local manufacturing industries.
- **WORK OPPORTUNITIES –** Development of infrastructure that provides work opportunities & initiates startups for city's economic growth.

CHALLENGES

- **EXISTING MARKET INFRASTRUCTURE -** The mobility infrastructure in main markets like Bada bazaar, Kutubkhana & Shyam ganj relentlessly lacks management.
- **SAFETY ASPECT OF THE CITY -** The current street scenario lacks the safety & security aspect of the residents which further affects nightlife for women & children.
- **THREAT TO THE NATIVE CRAFT -** The local Zari-Zardozi art could vanish with time if there's no infrastructure proposed to revive it.

Chapter 6. HERITAGE AND TOURISM VISION

6.1 Vision Statement

At present the city of Bareilly is recognized as gateway to Kumaon Hills, but unfortunately has not been part of any tourist circuits of State. The Vision is to develop Bareilly as tourism destination by identification of the cultural and natural heritage, conservation and heritage sensitive development of the diverse Cultural Heritage Resource of the city and its nearby areas, developing infrastructure facilities for the tourists and local community aligning with the vision of Sustainable Development Goals 2030 adapted by the state of Uttar Pradesh.

6.2 SWOC of Heritage and Tourism

STRENGTH

- Bareilly is famous for Nath Temples and Dargah Ala Hazrat. Many people from the whole country to visit these religious sites and temples.
- The Heritage is a major attraction of Bareilly. Bareilly is an entry point for visiting Kumoun Region.

WEAKNESS

- Highly traffic congested urban area and lack of public and tourist facilities.
- Unmanaged public transport for visiting Heritage sites.
- Unauthorized development and Encroachment.
- Narrow connectivity to the Heritage site.
- Location is located in the dense city areas.

OPPORTUNITY

- Bareilly is located between national capital and state capital, also one of the counter magnets of NCR.

CHALLENGES

- Lack of celebrated public life and underutilized public assets.

Chapter 7. ECONOMY VISION

To assess the demand, the team has formulated a methodology which consists of three major components namely – (i) Secondary data analysis, (ii) Stakeholder consultations with various associations, federations, private entities, and representatives from various bodies, (iii) multi-stakeholder workshop held in BDA in the presence of various government and private bodies.

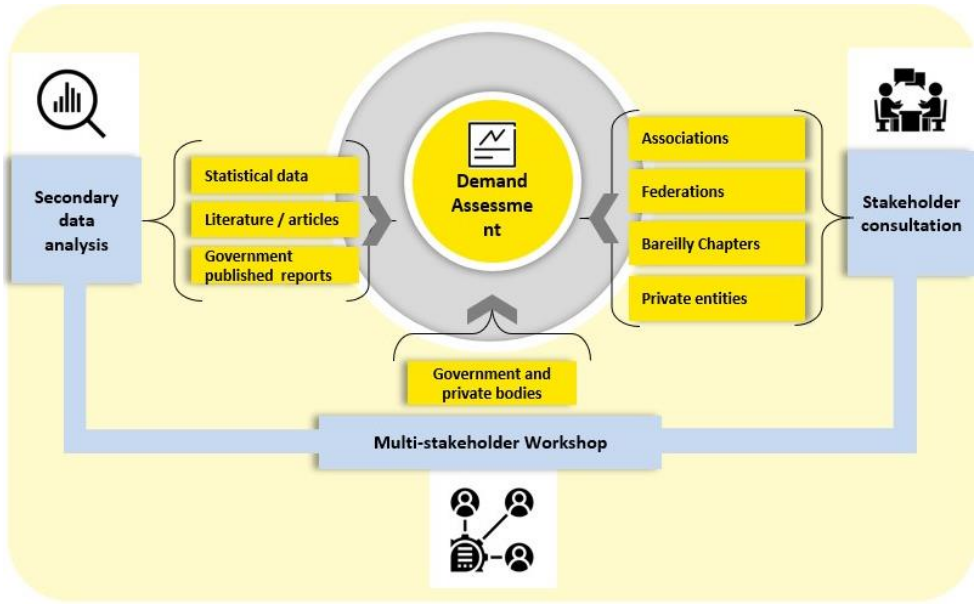


Figure 7-1: Demand assessment methodology

Multiple discussions with stakeholders e.g., representatives of various bodies like Central U.P. Chamber of Commerce, Office of Development Commissioner (Handicrafts), Dastkaar Bunkar Welfare Association, Office of medical officer and CREDAI Chapter of Bareilly; has been conducted at in order to analyze the qualitative and quantitative demand. The Multi – stakeholder workshop conducted had the representatives from Chamber of Commerce, Indian Industry Associations (IIA), Laghu Udyog Bharti, UP Nursing Home Council and Udhyog Mandal, etc.

For quantitative assessment, the team has utilized secondary data available in public domain including statistical data from district development indicators 2020, district industrial profile 2020, etc.

Figure 7-2: Stakeholder Meeting at BDA

In order to formulate the Vision, Implementation Strategy and Infrastructure plan for Bareilly, detailed city study and survey has been carried out by the team. The study consisted of data collection and documentation of sectors of economy from mainly secondary sources and stakeholder consultations. It also included analysis and understanding of existing, on-going or proposed city infrastructure development initiatives/projects undertaken by BDA, Smart city or any other city authority.

Based on assessment of handicraft, health, education as key sectors of economy, the team has identified a few projects for overall improvement and development of the Bareilly city in a wholistic manner in synchronization with exiting activities vis a vis potential of the city. These projects were agreed to take further in reference to meeting held on 13th July 2022.

This chapter elaborates the handicraft, health, and education sector in terms of interventions in Bareilly as presented in following sections.

7.1 SWOC of Economy

STRENGTHS

- Presence of well-known handicraft sector and artisans in Bareilly. There are approximately 1.7 lakh Zari Zardozi artisans in Bareilly
- Existing Medical infrastructure base and Medical Staff. 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 nearby areas as well as Kumaon, Rohilkhand, and West Nepal region.
- Two sectors namely Food Processing & packaging, Beverages, and Petroleum & Chemical Products are the major contributing sectors across the district.
- Presence of agricultural products for the raw material
- Proximity to upcoming Ganga Expressway

WEAKNESSES

- Lack of work sheds in hygienic condition with supporting infrastructure such as sanitation, lighting and appropriate place for their tools, equipment, raw and processed material as well as finished products etc.

- Discussions with Health Associations and health sector bodies, it has come up that there is a need of an organized healthcare facility in the Bareilly. As currently, the existing healthcare facilities are present in various parts of the city which are facing issues such as parking, traffic and proper access.

OPPORTUNITIES

- Potential for revival of existing handcraft ecosystem through cluster development
- Development of working shed for Zari Handicraft artisans along with supporting infrastructure.
- As per norms, there will be requirements of additional multi-specialty hospitals and specialty hospitals in Bareilly. The existing health facilities needs to be upgraded in terms of technologies, resources, and facility. Development of "Medi City" designated area with multiple health business and activities.
- Potential for Food Processing, Beverages, and packaging sector based on industrial output trend.
- Development of ring road for improved connectivity and development of southern area.

CHALLENGES

- Physical constraints of the city in southern direction with respect to presence of river Ram Ganga for physical growth of the city
- Unavailability of large vacant land parcels for development of infrastructure

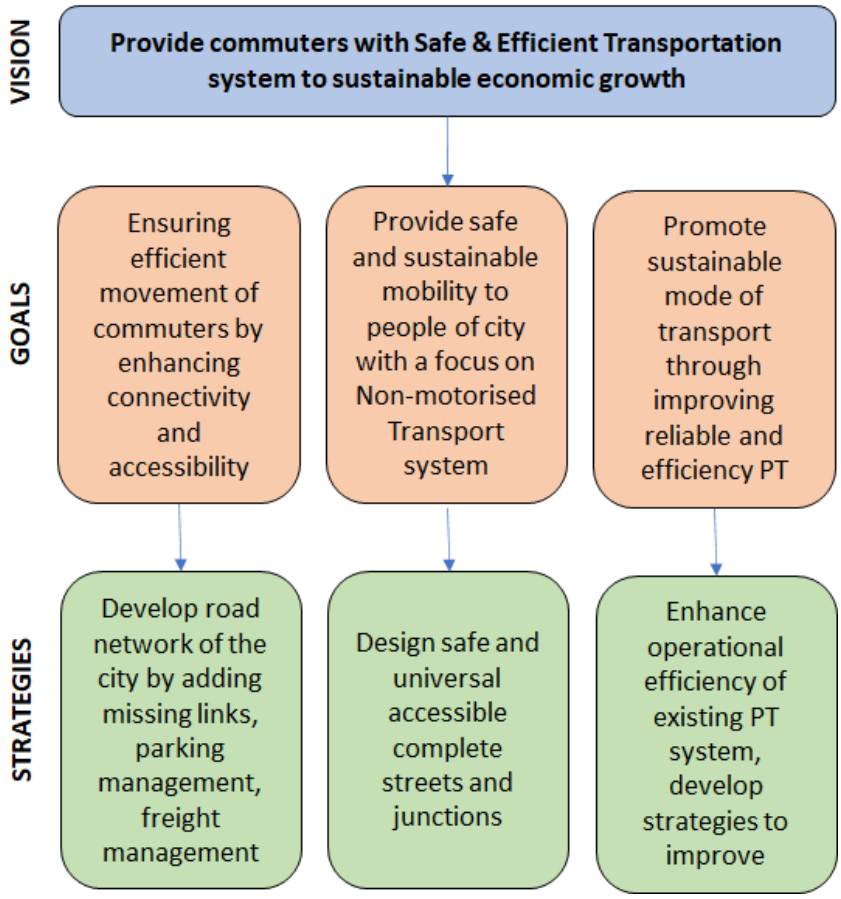
Chapter 8. TRANSPORTATION VISION

8.1 Vision Planning in Transport Sector

Bareilly (UP) envisions the comprehensive features to the user for provision of Intelligent Transport System, Sustainability and Safety features. The commuters/road users will have urban amenities as per norms/guidelines for transport facilities, road markings, street lighting, public transport, parking, street infrastructure, charging stations, bollards, vehicle registration system, junction improvement plan, comprehensive mobility plan, smart components on roads, Integrated Command and Control Centre, non-motorized vehicles stand, pods and signages. Towards a sustainable urban environment, the local development authority is committed to creating better transport infrastructure and connectivity to the city needs.

8.2 Approach

A system that informs every commuter with accurate information, when they need it, where they need it, and how they need it and contributes to a safe, seamless, secure and equitable transportation network.



Most of the cities in UP are being facing public transport problems for many years, affecting the mobility of people and economic growth of the area. These problems are due to inadequate transport infrastructure and its sub-optimal use, lack of integration between land use and transport planning, lack of mass transport system and little improvement in city bus services, which encourage a shift to personalized modes.

8.3 Critical Gaps and Issues in Transport Sector

The urban transport & infrastructure related departments face several challenges, such as lack of infrastructure in the department, paucity of funds, etc. Similarly, issues related to lack of adequate data, clarity in rules and procedures, implementation difficulties are being reported by the departments in terms of meeting the programme objectives.
To improve urban mobility certain measures would be taken, such as convert all buses into clean fuel and hybrid technology driven so as to reduce the pollution level. GPS and GPRS systems would be made mandatory in all buses. New routes will also be required to be formulated for better transportation in urban areas along with traffic regulation/management in the existing routes. Separate city bus track/multi-level parking/inter-state bus terminals (ISBT) and intrastate bus terminals will be developed by PWD/Development Authority and Nagar Nigam.

All encroachments on roads will be removed by coordinating with all departments concerned. Few other interventions required to provide sustainable urban transport services in the cities are:

- Providing radio taxis in every tourist city.
- Providing separate city bus track in all big cities and double decker buses on these routes.
- Urban transport services will be made disability and gender friendly.
- GPS/GPRS system, Wi-Fi facility, air conditioning and bio-toilets will soon be installed in public buses.
- Development of multi-level parking is going on in all big cities. ISBT and intrastate bus terminals are in the process of modernisation.
- Disaster management system proposed to be developed at all public transport facilities such as bus stations, petrol pumps and parking places.
- Conversion of all buses into clean fuel, ethanol and hybrid technology driven to reduce pollution levels.
- Solar panel enabled buses in big cities.
- Under the Smart City Mission, special transport system will be developed for promoting intracity tourism in heritage cities.
- State Road Transport Corporation (UPSRTC) will be developing special transport package to connect heritage cities.

8.4 SWOC of Transport of Bareilly

STRENGTHS

- **RoW details:** Most of the road stretches in the Bareilly city are between 12 to 24 m RoW and thus there is a lot of scope of Development.
- **Informal Sector:** It has been observed that several streets are vibrant in terms of informal sectors and there is a scope to facilitate such activities in efficiently planned manner without disturbing their order.
- **Condition of Carriageway:** Carriageway is in good condition at most of the road stretches and thus do not require intervention until it is necessary.
- **Junction Developments:** A Holistic development of the roads along with the junction development project which will create a consolidated and uniform urban infrastructure system.

WEAKNESS

- Encroachment of footpath area in present state by vendors and shop owners may put the proposal at risk if enforcement is not done properly
- **Irregular Parking Patterns:** Common pattern noticed in Bareilly is, the citizens prefer on-street parking over off-street parking primarily because the former is cheaper than the latter. This leads to irregular parking all over the road width especially during the peak hours. In addition to this there is lack of parking bays due to which the commuter parks the car on road.
- **Lack of Segregation of Traffic Modes:** It has been observed in the Bareilly city that a large no. of citizens commutes via two-wheelers and auto rickshaws though detailed survey of all the roads have not been done. These rickshaws tend to create a havoc on the road sides and regulate the fares according to their conveniences. Also, the citizens commuting by cars are not able to move freely due to hindrance caused by the e- rickshaws.
- **Congestion during Peak Hours:** The citizens generally park their vehicles on the roadsides. So, during peak hours, i.e., the morning and evening there is congestion on the roads creating unmanaged situation if not under policing.
- **Lack of Pedestrian Clarity due to hawking areas:** Footpaths do not exist, as they are either too narrow for people to walk on, or have been encroached by hawkers, forcing pedestrians onto the roads.
- Parking availability and the parking needs have huge gap and thus most of the roads are occupied by vehicles blocking the carriageway.

OPPORTUNITIES

- Spaces along the road carriageway could be made into public realm which will not force the pedestrian to use the roads and hence provide safety.
- There is a chance for provision for several activity zones respecting the local nature of the city and providing to all irrespective of class.
- With this proposals road can be envisioned more than just infrastructure for movement and can become one of the public spaces for the people of Bareilly
- Intelligent traffic management, clear crossings, foot over bridges, signage displays at every interval, street furniture such as dustbins bollards.

CHALLENGES

- As it is clear the sewer trunk line shall be made before the roads proposals and the carriage way shall be disturbed.
- Encroachment on the roads needs to be controlled through effective policing. Unavailability of which may lead to design failure
- Illegal parking may continue, if parking spaces provided are not enough to cater to the demand.

Chapter 9. INFRASTRUCTURE VISION

9.1 VISION FOR PHYSICAL INFRASTRUCTURE

This consultancy project is supported by the Government of Uttar Pradesh which envisions for betterment of the city of Bareilly by enhancing its comprehensive development of physical, institutional, social and economic infrastructure in accordance with modern and innovative urban planning principles.

The project envisages to prepare the Vision, Implementation Strategy and integrated infrastructure plan to support objectives of holistic, sustainable and planned development of Bareilly city. It requires to take a much broader view of planning to allow for more integrated land use and infrastructure development schemes. The project is expected to drive economic growth, improve the quality of life of people by strengthening city's inherent potentials and augmenting its existing infrastructure. It should also contribute to enhancing the resilience of the city by incorporating policies to enable the city in coping with urban risks and climate change mitigation and adaptation. The Vision, Implementation Strategy and integrated infrastructure plan for Bareilly in Uttar Pradesh will further pave the way for project development, management and project implementation support.

Vision Plan- "Clean Green City"

9.2 SWOC of Infrastructure

The geographical scope of the environmental improvement of the Bareilly city study shall be based access of basic Needs to all citizen in equal quantity, clean and green environment for sustainable development. Basic needs for all include:

- Water Supply
- Wastewater
- Storm Water Drainage
- Solid Waste management
- Power
- Environmental quality assessment

STRENGTH

- Bareilly City falls under semi-arid region where ground water is not sufficient, city seeks surface water facility to substantiate demand. Nearby reservoirs, Ramganga River are major surface source to substantiate demand with needful action.
- Subsequently waste management can be managed with technological intervention to wards 3R principle- Reduce, recycle and reuse.

WEAKNESS

- The growth pattern of city is not planned, so laid of new network in old area places are troublesome.

OPPORTUNITY

- Govt policy and Citizen charter makes city clean green city to sustain resilient city.

CHALLENGES

- New land acquisition policy restricts spatial growth of city to laid new world class infrastructure for new city. So, retrofitting in places will only make city clean city in core area and new parts may be substantiate requirement to achieve future goal.

Part - 2

Bouquet of Projects

Chapter 10. BOUQUET OF PROJECTS

After analyzing the existing situation, assessing demand and goals of the city's development and discussions held with higher government authorities, architects, planners, experts and consultants, several projects were identified focusing on each domain for the development of the city.

10.1 Identified Project List

Sr. No.	Domain	Vision Proposed	What is Proposed	Location	Area
URBAN PLANNING					
1	Urban Planning	Development of Regional Trade and Commerce Hub	Development of Mixed-use Sub-City Center	1. Kandharpur 2. Bye Pass Road to be developed in Phases	100 hectares each
2	Urban Planning	Planned Expansion of City	Residential Housing Node	1. Ghanghora Piparia 2. Nekpur 3. Kargaina 4.Sri Jankipuram 4. Tahtajpur to be developed in Phases	More than 100 hectares each
3	Urban Planning	Development of Agro-Processing and Food Packing Hub	Industrial Growth Centers	1. Kurtara 2. Paraskhera 3. Rajau Paras to be developed in Phases	More than 100 hectares each
4	Urban Planning	Integration to Regional Logistics Infrastructure	1. Integrated Freight Center 2. Multi-Modal Logistics Hub	1. IFC- Faridpur 2. MMLH- Kurtara	35 hectares each
5	Urban Planning	Leverage Historic Craft	Development of Global Zari and Zardozi Design and Development Center	Pardholi	10 hectares
6	Urban Planning	Leverage Strategic Regional Location	Development of National Level Naturopathy Center	Mohrania Bye Pass	10 hectares
TRANSPORTATION					
7	Transportation	Provision of Parking facilities.	A parking policy and construction of off-street parking lots in major market and commercial areas to accommodate the parking demand for nearly 12000 E.C.S.	Multiple locations like Civil Lines, Rajendra Nagar Market etc.	As per footfall.

Sr. No.	Domain	Vision Proposed	What is Proposed	Location	Area
8	Transportation	Radial Road Improvements	Strengthening of Radial Road connecting to Ganga Expressway	Bareilly-Badaun Road	Survey is required
9	Transportation	Smart Bus Shelters	Interactive Bus Stop at various locations	Major location of the Bareilly city	
10	Transportation	Cycle Track	Development of Cycle Track Corridor	Pan city to be identified after detailed survey	NA
11	Transportation	Freight Logistic Hub	Establishment of Freight Logistic Hub for efficient distribution of inter & intra urban freight movement in Bareilly	Freight Logistic Hub at Screen-line points of Bareilly	4 Hectares
12	Transportation	Charging Station along the Highway for Cars	Electric Vehicle Charging Station along the National Highway for Cars	Along the National Highway locations	5.5 m x 13.5 m = 75 sq m
13	Transportation	Connection with nearby area and within the city	Lite Metro facility	Pan City	Survey is required
ECONOMY					
14	Economy	Industrial Development	Development/ extension of industrial area in Bareilly City – multi – product	Probable nearby Paraskhera, Along bypass and on Shahjahanpur road	To be decided in consultation with BDA
15	Health	Integrated Health Facility - Medicity	"Medicity" – designated area with multiple health business and activities	Location as demarcated in Master Plan 2021 and 2031	To be decided in consultation with BDA
16	Handicraft	Handicraft Cluster	Development of Handicraft Cluster/ Common Facility Centre (CFC) – Zari & Bamboo	Near Paraskhera/ Near Invertis Chauraha	To be decided in consultation with BDA
17	Real Estate	Redevelopment	Bareilly District Jail land parcel monetization through redevelopment.	Old jail complex.	To be decided in consultation with BDA

Sr. No.	Domain	Vision Proposed	What is Proposed	Location	Area
Land Development					
18	City level Infrastructure development	Development of areas near transit points as new gateways to the city	Development of logistic hub and mixed-use commercial district near the new Airport for future growth • Destination based mixed use development • Development of Offices, Hotels and convention centers • Designed as gateways to the city	Available land parcel abutting to Pilibhit Bypass	
19	City level Infrastructure development		Developing trade cum business expo centers near transit nodes • Providing a platform and infrastructure to traders and local craftsmen • Development of Exhibition areas	1. Manoranjan Sadan at Bareilly Jn. Railway station 2. Manoranjan Sansthan Purvottar railways, Opp. Izzat Nagar Railway station	Existing Manoranjan Sadan & Manoranjan Sansthan site
20	Redevelopment of City Gateway and experience on arrival to the city		Redevelopment of Pilibhit Bus stand • Redevelopment of bus stand area with multi modal integration. • Uplifting its visual character as a prominent city gateway.• Introduction of a prominent public plaza space at the bus stand.• Redesigning Streetscape of the junction along with organized spaces for parking, pedestrians, hawkers etc.	NH 24 & Pilibhit Bypass junction	Pilibhit bus stand precinct
21	City level Infrastructure development	Promotion & Innovation of craft products - Kala Sanskriti	Rejuvenation of Zari - Zardozi (Shyam Ganj market) - One district one product	Shyam ganj flyover Sailani Market Road	
Tourism Development					
22	Development of Spiritual Tourism	Developing Nath Temple Circuit	Development of Spiritual tourism by creating religious circuit of all seven Nath temples. • Tourists and Pilgrims Circulation: Movement Patterns Study based on Existing PanchKosi Parikrama and to Design Cultural Trail based on Inferences and Demand Assessment • Tourism Infrastructure and Public Conveniences • Integrating Math Tulsi Sthal in the Nath Temple circuit	Nath Temple Precincts: I. Alakh Nath (Qila Bareilly) II. Bankhandi Nath (Jogi Navada) III. Dhopeshwar Nath (Sadar Bazaar) IV. Madhi Nath (Madhinath) V. Tapeshwar Nath (Subhash Nagar) VI. Trivathi Nath (Macnair Road) VII. Pashupati Nath (Pilibhit Bypass) Math Tulsi Sthal	Nath Temple Circuit

Sr. No.	Domain	Vision Proposed	What is Proposed	Location	Area
23	Development of Spiritual Tourism		Urban Renewal of all Seven Nath Temples by defining entrance gateways, corridors and enhancing the public infrastructure • Development of symbolic identity/ entrance gateways of all Nath Temples. • Theme based Design of Streets Connecting the Temples Precincts from Major Artillery Roads and Junction along with their Branding: I. Street Furniture II. Light Poles III. Green/Buffer Areas IV. Pedestrian Oriented Designs V. Signages and Panels Design VI. Façade treatment guidelines. • Sensible Lighting and Illumination to Highlight Historical, Artistic and Architectural Significance of Temples • Restructuring the temple precinct while adding public infrastructure like designated parking space, washrooms, etc. • Site Management, Conservation of Temples and Revival of Ponds and Ablution Water Bodies based on Historical Evidence and Significance • Disaster Management, Risk Mitigation and Carrying Capacity Study of Temple Complex based on Survey of data on Tourism/Pilgrim Footfall	All Seven Nath Temples: I. Alakh Nath (Qila Bareilly) II. Bankhandi Nath (Jogi Navada) III. Dhopeshwar Nath (Sadar Bazaar) IV. Madhi Nath (Madhinath) V. Tapeshwar Nath (Subhash Nagar) VI. Trivathi Nath (Macnair Road) VII. Pashupati Nath (Pilibhit Bypass)	I. Alakh Nath - 10.10 Hectares II. Bankhandi Nath - 1 Hectares III. Dhopeswar Nath - 1.5 Hectares IV. Madhi Nath - 0.3 Hectares V. Tapeshwar Nath - 0.5 Hectares VI. Trivathi Nath - 1.3 Hectares VII. Pashupati Nath - 0.3 Hectares
24	Development of Spiritual Tourism	Place for spiritual tourism and nature retreat.	Ramganga riverfront development • Creating Ramganga river ghat into a multi-functional public space that caters to all pilgrimage activity, fairs and festivals. • Redevelopment of the existing ghat and fairground while adding public infrastructure like designated parking space, washrooms, etc.	Existing Chaubari Fairground	17.5 Hectares

Sr. No.	Domain	Vision Proposed	What is Proposed	Location	Area
25	Development of Medical Tourism		Development medical infrastructure for naturopathy and eco-tourism • Naturopathy • Nature retreat center • Promoting Ecotourism • Yoga, Sound meditation and Ayurveda treatments.	At the intersection of Pilibhit bypass & Bareilly bypass	Land parcel A - 39.65 Hectares Land parcel B - 25.15 Hectares
26	Cultural Heritage Tourism	Tourism Infrastructure upgradation of A.S.I sites	Ahichchhatra - Tourism infrastructure upgradation of A.S.I site in consultation with A.S.I and U.P regional managers Site Identity Design with Legal Protection of Surrounding Natural Landscape: Ahichchhatra Site - Ramnagar Village Site Development, Tourism Infrastructure and Facilities Upgradation as per Archaeological Survey of India (ASI) Norms: I. Cultural Theme based Landscaping II. Site Museum (Collection Based) III. Interpretation and Convention Centre IV. Light and Sound Show V. Public Conveniences VI. Monument Illumination, Signages, Guide Maps and Information Plaques VII. Inclusive of Green Energy Use - Solar Power Plant	Ahichchhatra Cultural Site	Ahichchhatra 90 Acres 36 Hectares
26	Streetscape of major roads and creation of landmarks	Streetscape of city core & development of Dargah precinct	Streetscape of market street from Qila to Shyam Ganj along with urban renewal of Dargah precinct by defining entrance gateways, corridors and enhancing the public infrastructure Urban Renewal of Dargah precincts by defining entrance gateways, corridors and enhancing the public infrastructure • Development of symbolic identity/ entrance gateways of the Dargah.• Establishing a corridor leading to Dargah and Khanqah along with façade treatment guidelines.• Restructuring the dargah precinct while adding public infrastructure like designated parking	Dargah E Aalahazrat, Khanqah E Niazia Qila flyover to Shyam Ganj flyover	

Sr. No.	Domain	Vision Proposed	What is Proposed	Location	Area
			space, washrooms, etc. • Restructuring mobility networks to facilitate walkability within the core city and prioritize the use of public transport.• Suggesting sensitive vehicular movement routes and integrating it with IPT, NMT and other public transit nodes to enhance connectivity and accessibility with the old city.		
SOLAR					
27	Semi / Fully Integrated Solar Street Lights	Upto 10 KW Plant can be set up between maidan gaps /road divider at main street else standalone solar streetlights can be installed.	Centralized Solar Power Plant Solar Street Lights	Main streets of city and Gardens	100 Sq. Feet / KW, for streetlight just a foot space to dig hole
	Solar Street Lights	Can Be Install at remote places.	Solar Street Lights	Premises of Hospitals, Government offices, Playing grounds etc.	same
28	Solar High Mast			At Main Square / Chowk	8 Sq. Foot
29	Solar Flood Lights	Solar Flood Lights		At Main Square / Chowk, Focusing on statue, landscapes, fountain, monuments	Can Be installed anywhere, being a standalone system
30	Solar Agriculture Pumps	On Tube Wells		Depends upon size of motor / Pump	100 Sq. Feet / KW
31	Solar Rooftop Plants	Solar Rooftop Plants	Solar Plants	Hospital, Government Offices Schools & Collages Vikas Bhawan Nagar Nigam Building Police Stations Post Offices	100 Sq. Feet / KW
		same	Solar Parks of Megawatts capacity	Non-Agriculture Land	3.5 Acre / Megawatt
32	Solar Tree	Designed Solar Power plant	Solar Trees of 5 KW	Public Gardens, Office Premises	25 Sq. Foot at ground
SOLID WASTE MANAGEMENT					
33	Solid Waste Management	Development of new solid waste treatment plant	Organic waste convertor and landfill facility.	To be decided	20 acres

Sr. No.	Domain	Vision Proposed	What is Proposed	Location	Area
		replacing the non-operational Paraspur plant			

10.2 Proposed List of Projects

After the discussion with Divisional Commissioner and various stakeholders on the total identified projects the following projects were discussed for the further working:

Table 10-1 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) (e) Sri Jankipuram	**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 fairground (Area 14 Acres + 500 Meter Ghats) (Nakatiya)		PWD / Irrigation Department / BDA
12	Aero city 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

Sr. No.	Project List under Bareilly City Vision Plan 2051	Domain	Nodal Department
Project in waitlist			
a	"Medicity" – designated area with multiple health business and activities	**Economy**	
b	Development of Handicraft Cluster/ Common Facility Centre (CFC) – Zari & Bamboo		
c	Bareilly District Jail land parcel monetization through redevelopment.		
d	Developing trade cum business expo centers near transit nodes		
e	Streetscape from Qila to Shyamganj along with development of Dargah precinct	**Urban Design**	

Chapter 11. URBAN PLANNING PROJECTS

11.1 Demographic Profile

11.1.1 Population Projections

For population projection of the horizon year, five projection methods are taken into account. The Arithmetical projection method shows the lowest population and predicts the population to be 22,50,731 to be in 2051 and 31,25,421 to be in the horizon year 2071. Similarly, the Incremental Increase method projects the population to be 28,49,757 to be in the horizon year. The geometrical increase method estimates the population to be 45,86,064. Apart from these methods such as the graphical method of population projection is also used to project the population by 4 different methods namely Linear Method, 2nd Order Polynomial Method, 3rd Order Polynomial Method, and Exponential Method. 3rd Order Polynomial Method projects the highest i.e., 47,58,683 population for Bareilly city. Based on the growth trajectory 2nd Order Polynomial Method which estimates the population to be 31,25,421 in 2071 is considered for the Municipal area.

Table 11-1: Population Projection for Municipal Corporation Area

Sl. No	Population Projection Method	2031	2041	2051	2061	2071
1	Arithmetic Progression Method	14,39,947	15,93,930	17,47,913	19,01,896	20,55,879
2	Geometrical Progression Method	16,58,330	21,38,520	27,57,754	35,56,296	45,86,064
3	Incremental Increase Method	14,92,872	17,52,706	20,65,464	24,31,148	28,49,757
4	Growth Method	16,68,765	21,65,517	28,10,141	36,46,654	47,32,177
5	Graphical Method					
	a) Linear Method	12,38,736	13,81,870	15,25,004	16,68,138	18,11,272
	b) 2nd Order Polynomial Method	15,32,953	18,72,228	22,50,731	26,68,462	31,25,421
	c) 3rd Order Polynomial Method	16,83,919	22,24,493	29,04,945	37,43,575	47,58,683
	d) Exponential Method	15,82,382	20,41,186	26,33,019	33,96,451	43,81,237

Master Plan boundary is a consortium of cantonment board area, villages within planning boundary, census towns within planning area boundary in addition to the municipal area. Bareilly city population including all these for the year is projected to be 19,49,012 as per the consultant analysis against the population of 18,94,211 of Master Plan consultant for 2031. For the year 2051 and for the horizon year 2071 population is projected to be 28,94,499 and 37,02,015 respectively.

Table 11-2: Summary of Population Projection

	2021	2031	2041	2051	2061	2071
Municipal Area	1140717	1431466	1698116	1991891	2668462	3125421
Cantonment Board	37388	46591	65206	81256	174853	279265
Total Villages within Planning Boundary	279655	348492	487722	607775	106911	170753

Total Census Towns within Planning Boundary	98273	122463	171389	213577	79252	126577
Total Planning Boundary Population	1556033	1949012	2422433	2894499	3029478	3702015
Master Plan 2031 estimation of Total area		1894211				

11.1.2 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.

11.1.3 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.

11.2 City Level Landuse Demand

Existing landuse of Bareilly city covers only 7421.66 hectares of area in 2021 against 20,563.82 hectares. There is only 36.09 percent 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 2051 and 16,152.82 in 2071 hectares needs to be added to regulate and develop the area in 2071. The total estimated area required will be 30468.41 hectares for the year 2051 and 38968.58 hectares for the year 2051 which will be within the current BDA Boundary of 36,558.70 hectares till 2051 but might be necessary to extend the Pilibhit, Delhi, and Hardoi Road boundaries based on the development that is already apparent and. For the year 2071, the total landuse area required will exceed the boundary on all roads and will require a total of 38968.58 hectares of land.

Table 11-3: Land use Requirement till 2071

S	Land use	Norms	Percer	Proposed Land use 2031	Area Required as per URDPFI Standards Land use 2031	Total Area Required for 2041	Total Area Required for 2051	Total Area Required for 2061	Total Area Required for 2071
1	Residential	30-35	38	8580.37	8669.99	9589.57	11578.00	12117.91	14808.06
2	Commercial	4-6	4	945.65	912.63	1056.88	1218.74	1275.57	1558.743
3	Industrial	8-10	10	2008.76	2281.58	2245.03	3046.84	3188.924	3896.858

4	Public and Semi Public	10-12	10	1406.82	2281.58	1572.29	3046.84	3188.924	3896.858
5	Official		2	360	456.32	402.34	609.37	637.7848	779.3716
6	Parks and Open Spaces	15-20	16	5705.74	3650.52	2274.04	4874.95	5102.279	6234.973
7	Traffic and Transportation	18-20	18	2034.72	4106.84	6376.84	5484.31	5740.064	7014.345
8	Others	Balance	2	1773.66	456.32	1982.27	609.37	637.7848	779.3716
	Total		100	22815.76	22815.76	25499.25	30468.41	31889.24	38968.58

These calculations are as per norms and standards in line with the Draft Master Plan, Industrial land use requirement as per the city development plan vision is detailed in the section titled "Projected Industrial Land Demand."

11.3 Project : Residential Housing Nodes

11.3.1 Residential Land use Demand

Draft Master Plan 2031 allocates a total of 8580.37 hectares of land under residential land use. Due to external growth drivers, a rising residential tendency in the city improved regional connectivity, and planned developments, the percentage of residential area is projected to be on the higher side i.e., 40 percent. Thus, a total of 14808.06 hectares of the land area needs to be under the umbrella of residential land use for 2071.

Zoning Regulations

Permissible Categories of Different Activities / Uses: The various activities/uses under the major land use zones proposed in the master plan will have the following permission categories:

Permissible Use: The activities/uses which will be ancillary to the major land-uses concerned and would normally be allowed.

Conditionally Permissible Uses: Those actions/uses which will be permissible based on work fulfillment in the respective major land-uses with mandatory means and restrictions are provided in section 6.4 of the Master Plan Document.

Permissible use with special permission of the Competent Authority: The activities/uses which are reckoned permissible during the approval process from the competent authority, based on the type of construction, infrastructure, and the environmental impact on the surrounding area, shall be permissible with special conditions. These are listed in section 6.3.3 of the Master Plan Document.

Prohibited use: All activities/uses that are not permissible in the master plan's major land-uses, those listed as prohibited activities; and all such activities that are not ancillary to the main land use or in the above three categories, or not included in the category's list of permissible actions, will be prohibited.

Floating Use: The proposal intends to improve the master plan's zoning system's flexibility. Certain activities/uses are proposed in response to a city's changing social, physical, and political context, but are not mentioned in zoning restrictions. For example, Bus/Rail/Air terminal Wholesale market, etc.

Rainwater harvesting: The existing actual use of natural reservoirs, ponds and lakes, etc. of one acre and above area under any land-use zone proposed in the master plans / zonal development plans of metropolitan areas, for the conservation and recharging of groundwater, will stay the same or supplementary thereto. The principal land use of the properties should have been shown differently in the same master plan. After listing all such reservoirs, ponds, lakes, and other bodies of water, it

will be necessary to establish appropriate measures for their protection in the master plan / zonal plan layout plan.

Impact Fee: Applications for permission of certain other activities/uses in plans approved by the Competent Authority in planned developed areas where provision has been made for ancillary activities according to the standards will be received, as per the master plan. The regulations of the Zoning Regulations will apply to such applications. If permission for high use is given in the low land use zone, it will result in an impact on the traffic-transportation infrastructure and environment in the area concerned. The impact fee options were outlined in-depth in the master plan.

Exempted Land use Conversions:

1. For commonly permitted activities/uses in a built-up area.
2. Activities to be allowed temporarily (maximum time limit one week) in various major land use zones for public and semi-public facilities.
3. Activities to be developed by government and semi-government agencies in residential land use zones / for uses.
4. There will be no impact fee charged under various policies declared by the state government, such as tourist policy, information technology policy, film policy, and others, for which activities/uses have been approved in specified land-use zones as per government directives. Hotels with a star rating and information technology units/parks with a capacity of up to 5 KVA.

Procedure for Permission:

1. In any of the major land use zones under the development area, before special permission is given for other activities by the competent authority, a committee will examine each such case and the committee's recommendation will be presented to the authority board.
2. The said committee will have the following members:

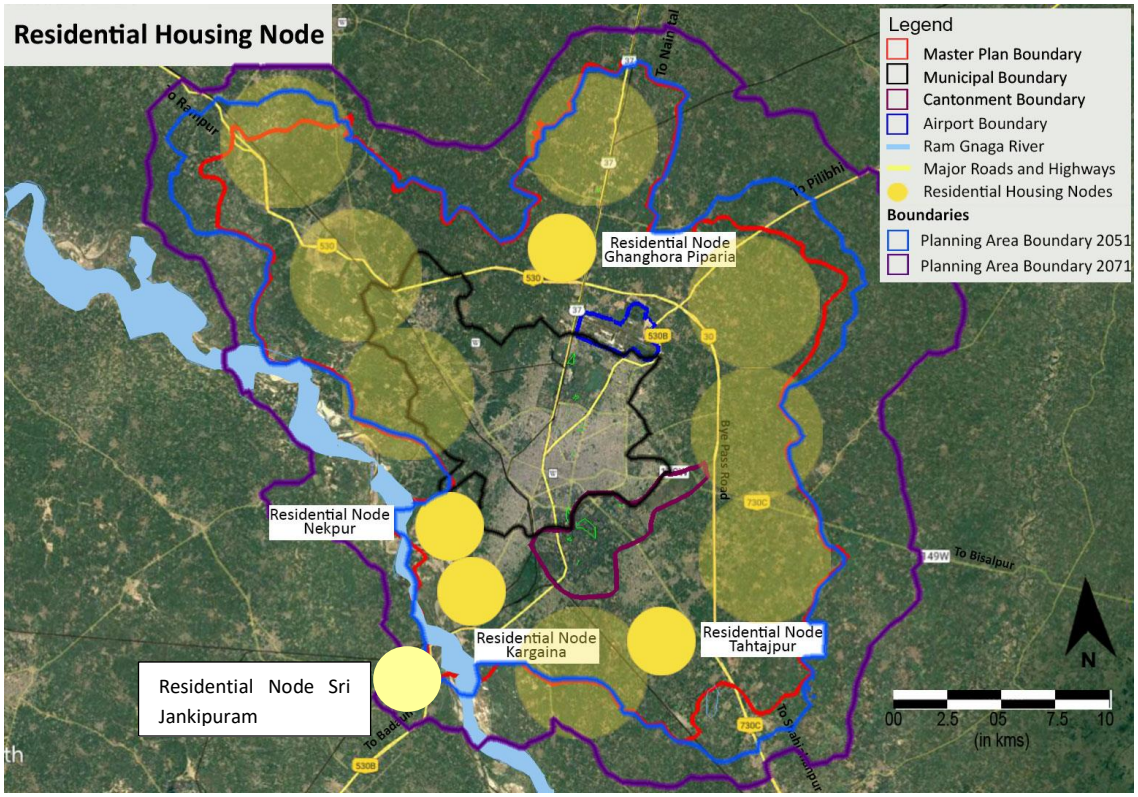
a. Chief Town and Country Planner, Uttar Pradesh or representative.
b. Vice-Chairman of the Development Authority or the officer nominated by VC.
c. A non-official member of the Authority Board nominated by the Chairman Development Authority.

3. The applicant shall not be entitled to any action or use under the zoning regulations. permission

Other Requirements:

1. Development/construction on a site proposed for any action or specific use under the master plan's major land use zones will be permitted only if that action or specific use is relevant to the master plan's major land use zones.
2. Existing forest areas or sites associated with public services and utilities, such as parks, playgrounds, and roads, will remain the same, regardless of where in the proposed master plan they are located.
3. If the zonal development plan or layout plan of a site/ plot has been approved by the competent authority, then in such a case the permissible land use of the said site/plot would be as specified in the zonal development plan or layout plan.
4. All development/construction works in all land use categories must comply with relevant building byelaws under the proposed zoning regulations.

11.3.2 Proposed Residential Housing Zones



Map 11-1: Residential Housing Nodes and Probable Residential Areas of Future

The population is projected to increase more than threefold and reach 38 lakhs within the horizon year. The growing population will need land for a habitat, but if these new regions are not built-in accordance with the laws and standards, it will exacerbate the already chaotic conditions in some sectors. New residential zones are suggested to handle the population growth and improve living conditions. 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 Kargaina and Sri Jankipuram. Other residential zones are proposed on Lucknow Road near Tehtajpur and near Village Ghaghoria Piparia on Nainital Road. Each residential node is expected to be developed on 100 hectares each.

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.

11.3.3 Projected Housing Demand

Bareilly city is projected to accommodate 5,78,900 households by 2051 and 7,43,403 households by the horizon year 2071. It is as per the national average of 5.0 person per household. EWS Category which is considered to be 15 percent will have 86,835 units and 1,11060 units by 2051 and 2061 respectively. LIG category and MIG category both will constitute 35 percent each of the total share of housing demand with 2,02,615 units in 2051 and 2,59,141 units by 2071. HIG category will constitute 15 percent and will require housing units similar to EWS category but 4 times the size of each unit. Below is a breakdown of demand by category according to the Draft Master Plan 2031:

Table 11-4: Housing Demand till 2071

Type of residential category as per economic status	Type of residential category as per economic status	No. of houses For 2031	No. of houses For 2041	No. of houses For 2051	No. of houses For 2061	No. of houses For 2071
EWS	15	58470	72673	86835	90884	111060
LIG	35	136431	169570	202615	212063	259141
MIG	35	136431	169570	202615	212063	259141
HIG	15	58470	72673	86835	90884	111060
Total	100	389802	484487	578900	605896	740403

Unit area for various groups is taken into consideration under socioeconomic requirements. Area for EWS category per unit is 50 sq.m., 80 sq.m. for LIG, 120 sq.m. for MIG and 200 sq.m. for HIG class. The total built-up area for 2031, 2041, and 2051 is computed based on these standards, as indicated in the table below:

Table 11-5: Built Up Area w.r.t. housing need till 2071

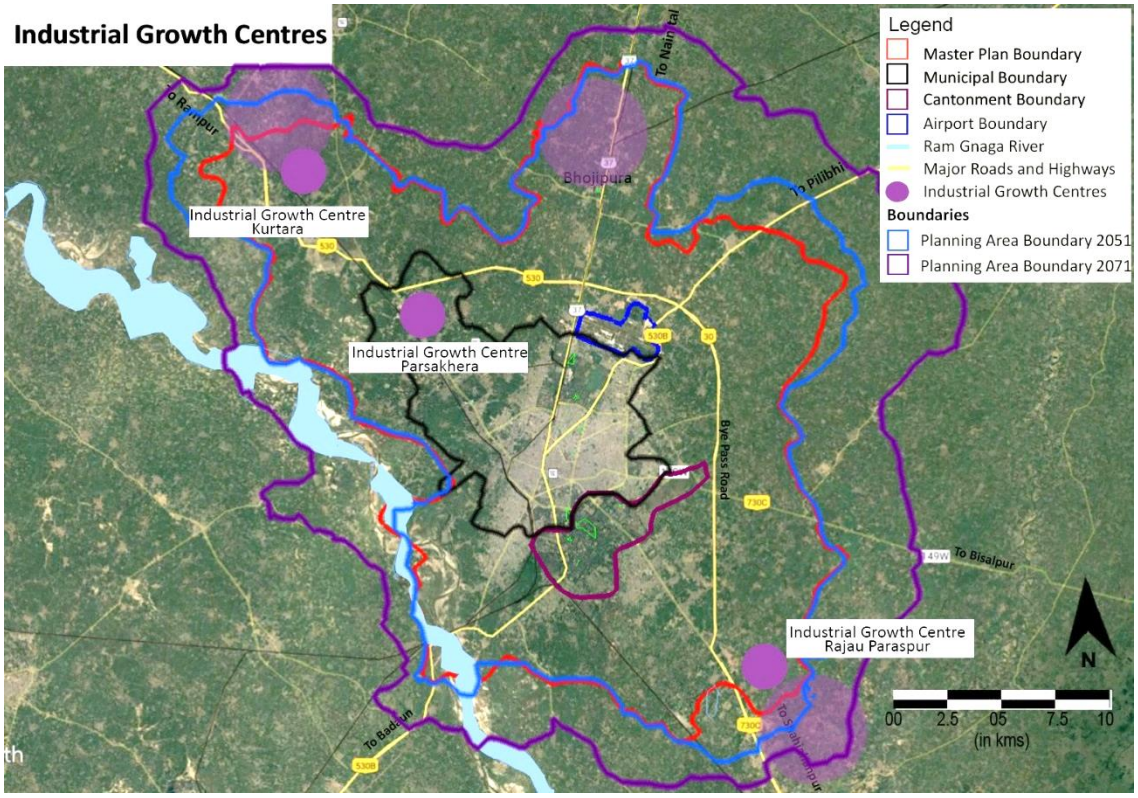
Type of residential category as per economic status	Unit Area Considered	Built-up area by 2031 (in sq.m.)	Built-up area by 2041 (in sq.m.)	Built-up area by 2051 (in sq.m.)	Built-up area by 2061 (in sq.m.)	Built-up area by 2071 (in sq.m.)
EWS	50	2923515	3633652.5	4341750	4544217	5553023
LIG	80	10914456	13565636	16209200	16965077	20731285
MIG	120	16371684	20348454	24313800	25447616	31096928
HIG	200	11694060	14534610	17367000	18176869	22212092
Total		41903715	52082352.5	62231750	65133779	79593328

No. of units for EWS and HIG is the same but due to the difference in unit size built-up area in the year, 2071 for EWS is 55,53,023 sq.m. and 2,22,12,092 sq.m. Similarly, HIG and MIG categories have similar no. of units in their share but a total built area of MIG will be 3,10,96,928 sq.m. and 2,07,31,285 sq.m. for LIG. Total built-up area required by 2051 will be 7,95,93,328 sq.m.

11.4 Project : Industrial Growth Centers

11.4.1 Proposed Industrial products as per the vision

Industries in Bareilly produce products of a varied range. While other industries are involved in generating items linked to chemicals, plastic, etc., major industries like Coco-Cola, Vadilal, and BL Agro produce agro-based products. Bareilly is an area that can procure raw material for agro-based industry from the surrounding region. As per the vision, Agro-based products which also include food processing and packaging are focused. In addition to this, Zari Zardozi is selected under the One District One Product Scheme so it is also focused under the vision and is proposed to provide enabling infrastructure for this.



Map 11-2: Proposed Industrial Growth Centers and Probable Industrial Areas of Future

11.4.2 Proposed Industrial 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 first industrial area is 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 second industrial area is also on Rampur/Delhi Road and lies near village Kurtara. It is proposed to cover 100 hectares of area. The third industrial area is proposed as an up-gradation and extension of the already existing private industrial area on Lucknow Road on an area of 100 hectares. Paraskhera industrial growth center is proposed in short term, Rajau Paraspur in the medium-term, and Kurtara in the long-term time frame.

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

11.4.3 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. According to the current situational study and demand assessment, there is no significant demand for large-scale industries.

11.4.4 Projected Industrial Land Demand

Table 11-6: Projected Industrial Land Use Demand

Year	Projected Population	Total Master Plan Area (Ha)	Proposed Percentage (Ha)	Required Commercial Area (Ha)	Additional Area Required additional to Master Plan 2031 (Ha)
2031	1949012	22815.76	8.8 (in Draft Master Plan 2031)	2008.76	0
2041	2422433	25499.25	12	3059.91	1051.15
2051	2894499	30468.41	15	4570.26	2561.50
2061	30,29,478	31889.24	15	4,783.39	2,774.63
2071	37,02,015	38968.58	15	5,845.29	3,836.53

8.8% of the overall Master Plan area, or 2008.76 hectares, has been allotted in the Draft Master Plan 2031. The city will need more land by 2041 for propelling industrial landuse at 12 percent, which will require an additional area of 1051.15 hectares. More industries will be needed to boost the economy and provide more employment opportunities, therefore from the year 2051, a 15% industrial landuse is recommended, requiring 2561.50 hectares of additional land. For the horizon year 2071, an area of 3836.53 hectares will be required in addition to the allocation in the Draft Master Plan for 2031, for a total of 5845.29 hectares.

11.4.5 Enabling Industrial Infrastructure

11.4.5.1 Raw Material Availability

Bareilly's industries produce a wide variety of commodities. For agro-based products, some industries obtain their raw materials from local agricultural products, while other large-scale industries, such as BL Agro, etc., import them from different regions of the nation. Raw materials for the bamboo and cotton industries are sourced locally or imported from other regions of the state or India. Similar to this, different industries in Bareilly obtain raw materials from various sources according to availability and demand. The proposed agro-based food processing and packaging industry is anticipated to obtain the necessary raw materials from the surrounding region and other parts of the nation following to their respective needs.

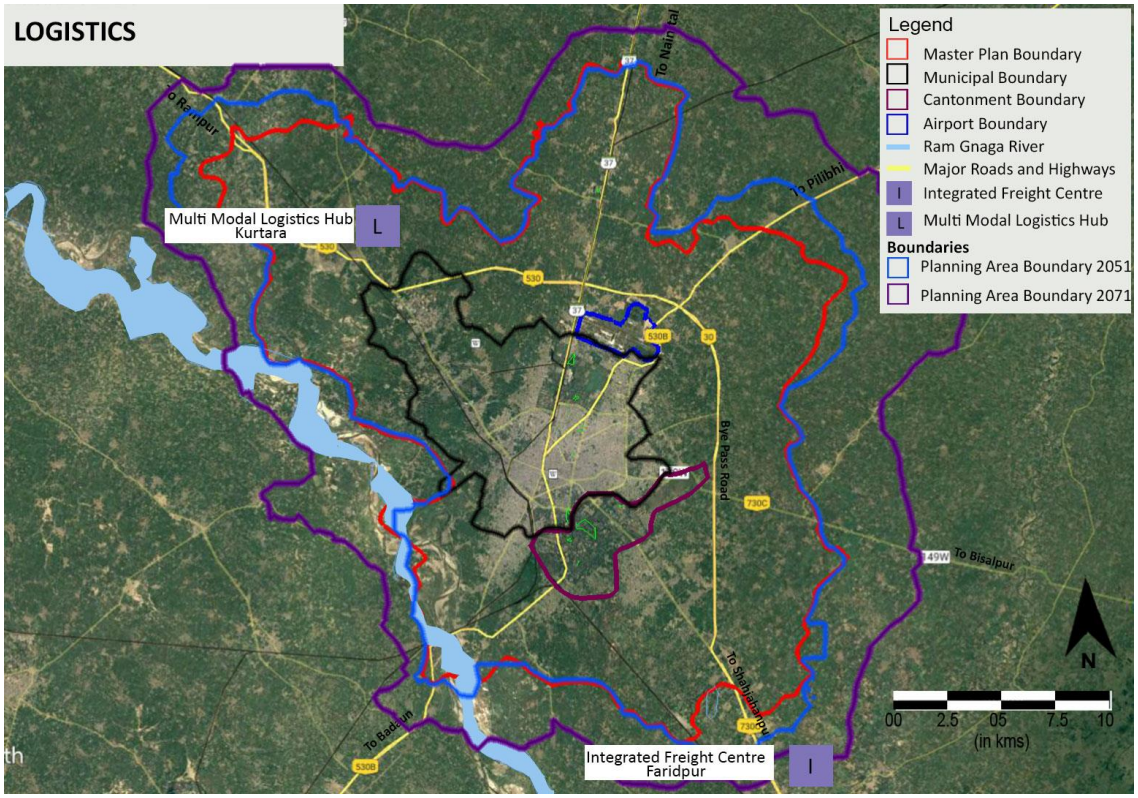
11.4.5.2 Waste Disposal

Proposed industrial areas will include a standard effluent treatment facility to dispose of the hazardous industrial waste in a suitable way. Currently, there is a problem of untapped drains flowing without bar mesh and discharging waste directly. So, it is also suggested to tap these drains in compliance with the environmental norms to avoid environmental degradation. Some private businesses in Bareilly are also working towards rubbish collection and recycling, and Bareilly Municipal Corporation is in charge of providing waste management services inside the municipal boundaries.

11.4.5.3 Logistics and Transportation

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. An Integrated Freight Center in Faridpur for the Lucknow

Road Industrial area and a Multi-Modal Logistics Hub close to Kurtara 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 Multi-Modal Logistics Hub and proposed Integrated Freight Centre will be approximately 35 hectares each.



Map 11-3: Proposed Logistics Hub

11.4.5.4 Common Facility Centers

A common facility center for Bamboo products and one for readymade garments has been set up in Bareilly recently to provide sill development and required infrastructure. As per the policy, CFC should provide the following facilities:

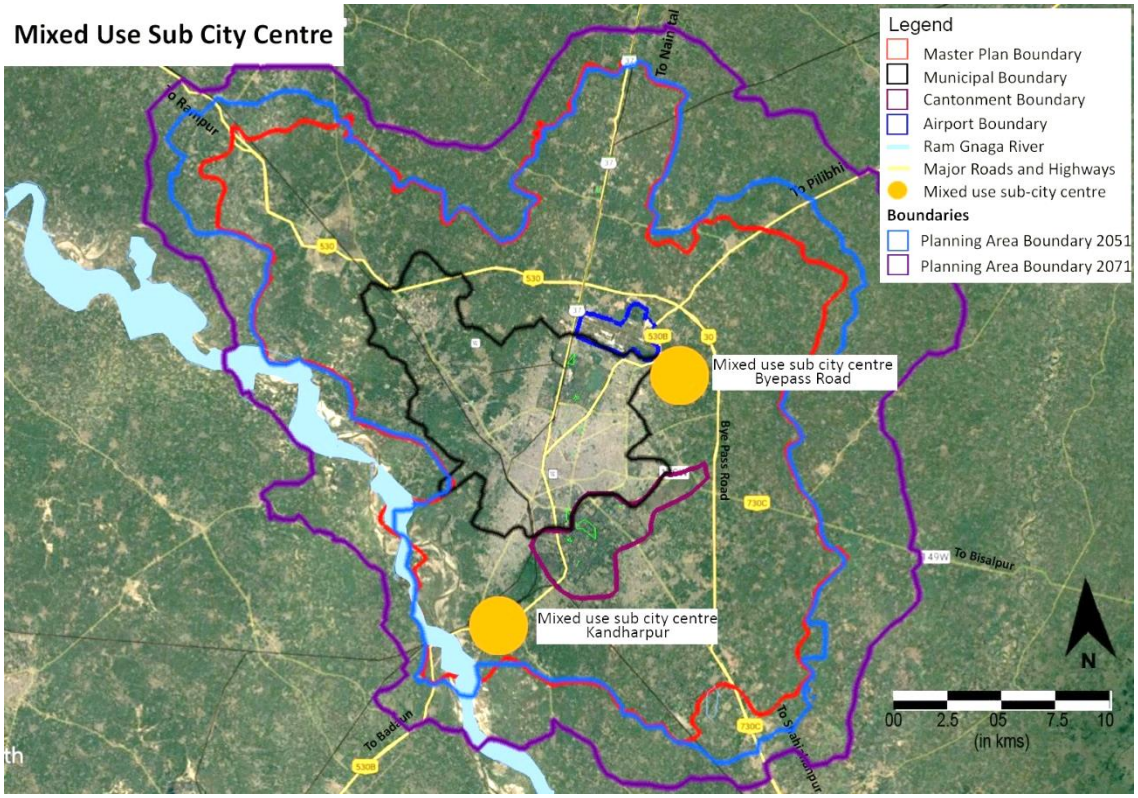
- Testing Lab
- Design Development and Training Center
- Technology Research and Development Center
- Product Demonstration cum Sale Center
- Raw-Material Banks/Common Resources Center
- Common Production/Processing Center
- Common Logistics Center
- Information collection, analysis, and broadcasting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

11.4.5.5 Other Infrastructure

There is a lack of physical and road infrastructure in all the existing industrial areas, especially the privately set-up Lucknow rod industrial area. Providing enabling infrastructure will motivate the investors to set up new industries and will also positively affect the existing industries.

11.5 Project : Mixed Use Sub City Center

11.5.1 Proposed Main Commercial Areas



Map 11-4: Proposed Mixed Landuse Sub-City

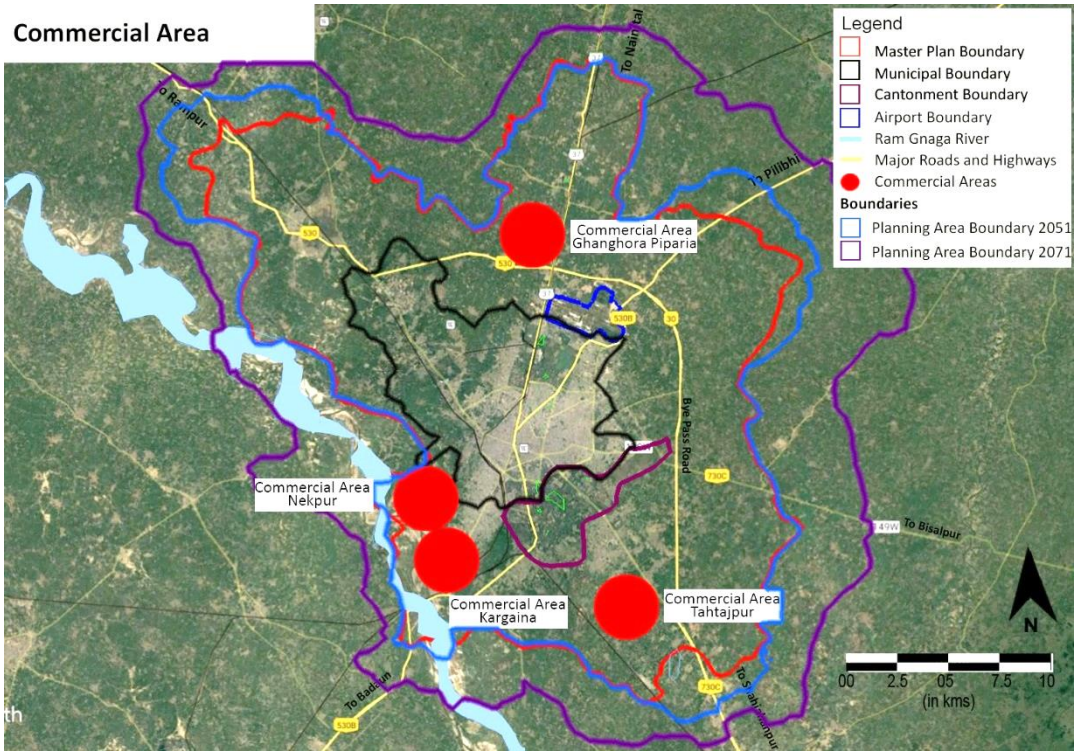
Existing commercial landuse of Bareilly city is 3.3 percent of the existing landuse in the year 2020. The core area which has major traffic and congestion problems and is densely populated currently serves as the major commercial area.

To curb these issues city needs commercial counter magnets to decongest the core area and reduce city's commercial dependency on the area. Bareilly city needs intervention in form of major commercial areas. To cater to this need of Bareilly city two mixed land sub-city one on Bye Pass near Airport and other near Kandharpur on Badaun road are proposed.

Additionally, physical and social infrastructure is the backbone of any residential area along with commercial areas which cater to the daily needs of the residents. Commercial pockets are suggested in the designated residential zones to meet the needs.

Major commercial areas proposed in residential nodes are:

1. Ghanghoria Piparia on Nanital Road
2. Nekpur Commercial area
3. Kargaina Commercial area on Aligarh Road
4. Sri Jankipuram
5. Tehtajpur Commercial area on Lucknow Road



Map 11-5: Proposed Commercial Areas within Residential Housing Nodes

In addition to these commercial areas, it is anticipated that commercial areas will expand near or around potential residential areas to accommodate the anticipated population growth.

11.5.2 Proposed Commercial Zone Typology

Commercial areas in mixed-use sub-city will be developed as retail markets but will a part of these sub-cities will be kept reserved for wholesale markets which will be developed in a phased manner starting from acting as a counter magnet to the wholesale markets in the core area. The proposed commercial spaces in the residential housing nodes/zones will mostly consist of planned commercial pockets which will offer retail spaces including complexes, showrooms, and offices.

11.5.3 Projected Commercial Land Demand

Table 11-7: Projected Commercial Landuse Demand

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

In addition to the area currently designated for commercial land use in the Draft Master Plan 2031, the additional land requirement for commercial space is 306.10 hectares for the year 2051 and 646.11 collectively for the year 2071. The required land for commercial land use for 2071 is 1558.74 hectares.

11.6 Public and Semi Public Landuse Demand

11.6.1 Projected Land Demand for Public and Semi-Public Area

Table 11-8: Projected Public and Semi-Public Landuse Demand

Year	Projected Population	Total Master Plan Area (Ha)	Proposed Percentage (Ha)	Required Public and Semi-Public Area (Ha)	Additional Area Required apart from Master Plan 2031 (Ha)
2031	1949012	22815.76	10	2281.57	0
2041	2422433	25499.25	10	2549.92	268.34
2051	2894499	30468.41	10	3046.84	765.26
2061	30,29,478	31889.24	10	3188.92	907.34
2071	37,02,015	38968.58	10	3896.85	1615.28

In addition to the area currently designated for public and semi-public landuse in the Draft Master Plan 2031, the projected land demand for public and semi-public landuse is 3046.84 hectares for the year 2051 and 3896.85 hectares for the year horizon year 2071. This will require additional 765.26 hectares of land in 2051 and 1615.28 hectares of land in 2071.

Chapter 12. URBAN DESIGN PROJECTS

12.1 Developing Nath Temple Circuit

12.1.1 Project – Development of Spiritual Tourism by Creating Religious Circuit of All Seven Nath Temples

12.1.1.1 Background

The city has a strong religious essence and is called the Nath Nagri owing to the seven Nath temples located at seven entry gates to the city via different cities. 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 Saavan 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.

12.1.1.2 Problem Statement

Since the construction of Nath temples at the city periphery as its gateways, the city has expanded drastically on all sides and the expansion of the city fabric has enveloped all seven Nath temples, making their identity disappear as city gateways. The expansion of city has also resulted in loss of imageability of all Nath temple precincts over a period of time, which has further led to disappearing of the overall circuit that connects all Nath temples. There are no proper legible gateways or routes that celebrate their essence and establish their strong image in the context of the city.

12.1.1.3 Key Intervention

- Identification of roads to develop the Nath temples circuit.
- Integrating IPT, NMT and other public transit nodes to enhance connectivity and accessibility along the circuit
- Development of Tourism infrastructure and public conveniences along the circuit.
- Redesigning Streetscape leading to temple precinct along with organized spaces for parking, pedestrians, hawkers etc.
- Integrating Math Tulsi Sthal in the Nath temples circuit.
- Streetscape for urban streets along the Nath circuit & restructuring its mobility network.
- Reclaiming the spaces for people under flyovers along the Nath circuit to create opportunities for public activity and enhance walkability.
- Strengthening the legibility and identity of the city chowks, chaurahas and market streets through signage's and visual landmarks.
- Creating public activity and vendor zones around the chowks along the circuit.

12.1.1.4 Site Delineation

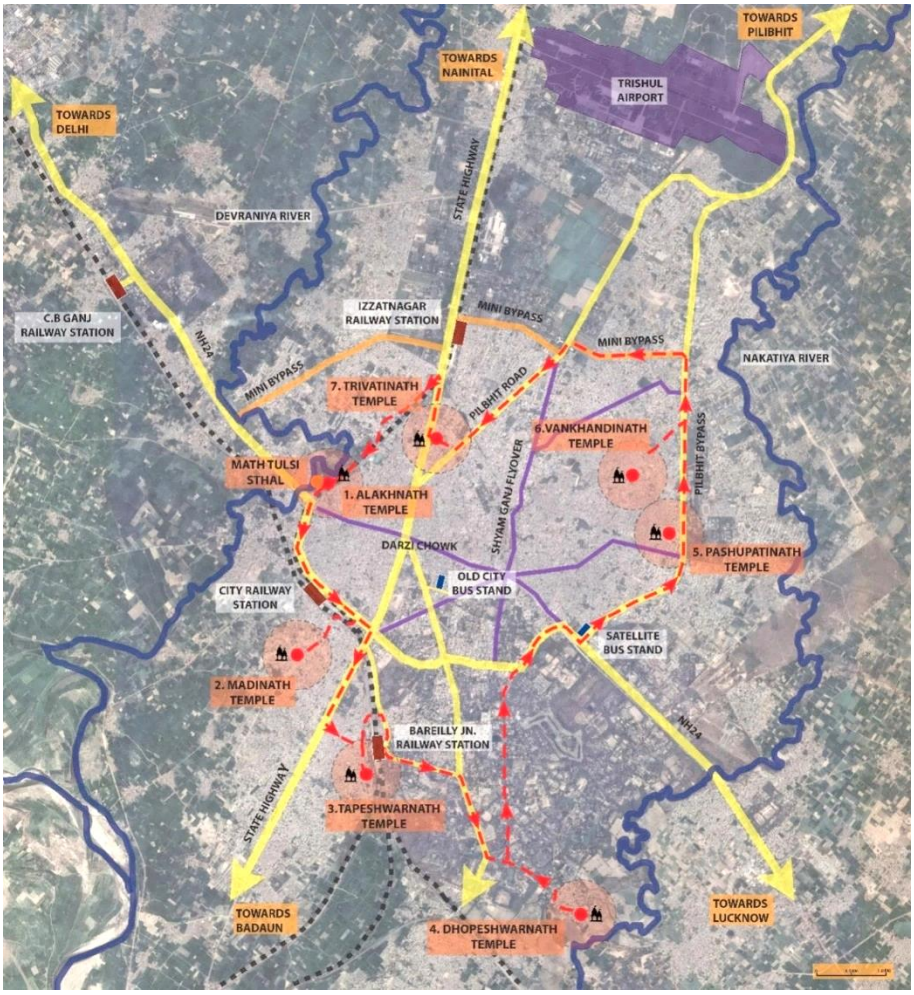
Since the seven Nath temples are situated on different routes which are entrance gateways to the city from other cities, they can be accessed from any of these routes. These seven routes formed the base of city's connectivity to major cities like Nainital (Trivatinath Temple), Delhi (Alakhnath Temple),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

Though the city is known for being the **Nath Nagri**, this essence is not reflected in the precincts of the Nath temples and not even along the routes leading to the city. The temples are strategically located at entry gateways of the city but there is no expression and legibility to their approach. The streets leading to the temples lack the visual character which they should strongly portray.

Area of Intervention:
Identified pilgrimage route as marked in the map showcases formation of a circuit connecting all the Nath temples.

Alakhnath Temple to Madinath Temple - 4.2 Km
Madinath Temple to Tapeshwarnath Temple - 2.8 Km
Tapeshwarnath Temple to Dhopeshwarnath Temple - 5.4 Km
Dhopeshwarnath Temple to Pashupatinath Temple - 6.6 Km
Pashupatinath Temple to Vankhandinath Temple - 2.7 Km
Vankhandinath Temple to Trivatinath Temple - 5.3 Km
Trivatinath Temple to Alakhnath Temple - 3.2 km

Total Length of Nath Nagri Circuit to be developed - 30.2 Km



Map 12-1: Nath Temple Complex

12.1.1.5 Project Impact and its Benefits

Considering the spiritual significance of the Nath temple in the city, the development of a dedicated Nath Temple circuit becomes essential to restore city's cultural value. Developing corridor leading to the religious places will enhance the urban character of their precincts. Establishing the Significance of Bareilly as Nath Nagri would enhance the Tourism Potential of the City. Provision of public amenities like parking space, washrooms, etc. along the circuit will offer convenience to the visitors.

12.1.1.6 Stakeholders

Nodal Agency

Nath Temple Association, Bareilly
Bareilly Development Authority

Helping Agencies

Bareilly Smart City Limited (BSCL)
Bareilly Nagar Nigam
U.P Tourism

12.1.2 Project – Urban Renewal of All Nath Temple Precincts by Defining Entrance Gateways, Corridors and Enhancing the Public Infrastructure

12.1.2.1 Background

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.

12.1.2.2 Problem Statement

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.

12.1.2.3 Key Intervention

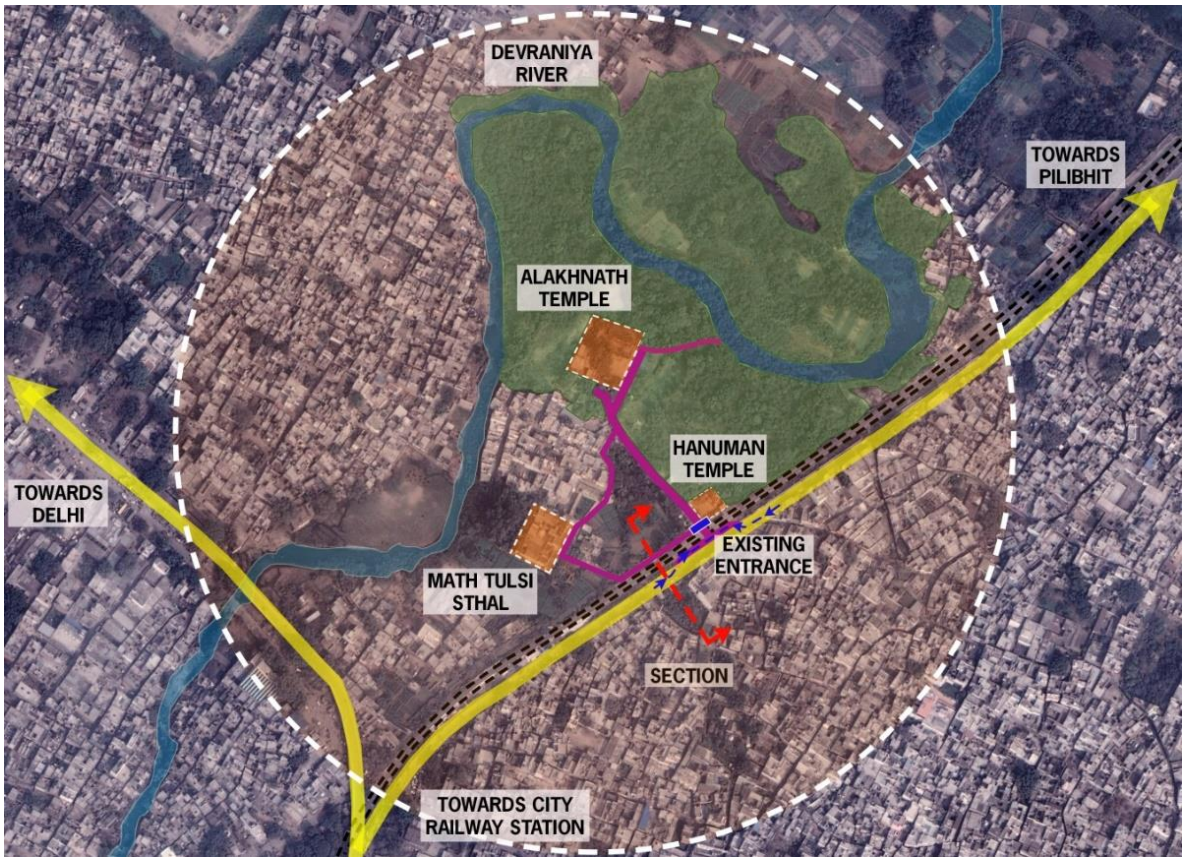
- Development of symbolic identity/ entrance gateways of all seven Nath Temples.
- Establishing a corridor leading to the temple precincts along with façade treatment guidelines.
- Place making of their precinct with respect to the surrounding neighborhood.

- Enhancing the spiritual character along the street/ corridor.
- Restructuring the temple precinct while adding public infrastructure like designated parking space, washrooms, etc.

12.1.2.4 Site Delineation

Alakhnath Temple Precinct and Math Tulsi Sthal

Situated on the Delhi route is the Alakh Nath Temple, that portrays its strong presence on the road. As the site is situated across the railway tracks, the approach to the temple complex from the by-lane is not feasible and becomes a challenge for the visitors. Enveloped with greens all around and Devraniya River passing by the temple precinct holds a great potential to be developed as a prominent public node. The site also lacks parking infrastructure to accommodate the high influx during fairs and festivals. Abutting to the Alakh Nath temple entrance is the approach road that leads to the Math Tulsi Sthal, a place that holds a very important historic and spiritual significance.



Map 12-2: Alakh Nath Temple Precinct

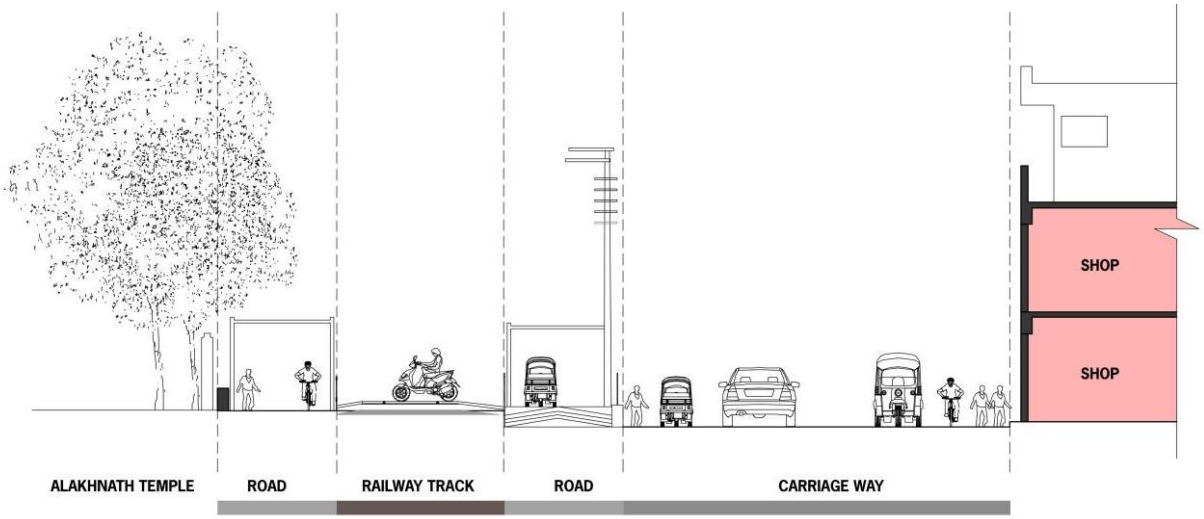


Figure 12-1: Alakh Nath Temple Section

Figure 12-2: Alakh Nath Temple Connecting Bylane

Figure 12-3: Alakh Nath Temple Entrance

Figure 12-4: Alakh Nath Temple Complex

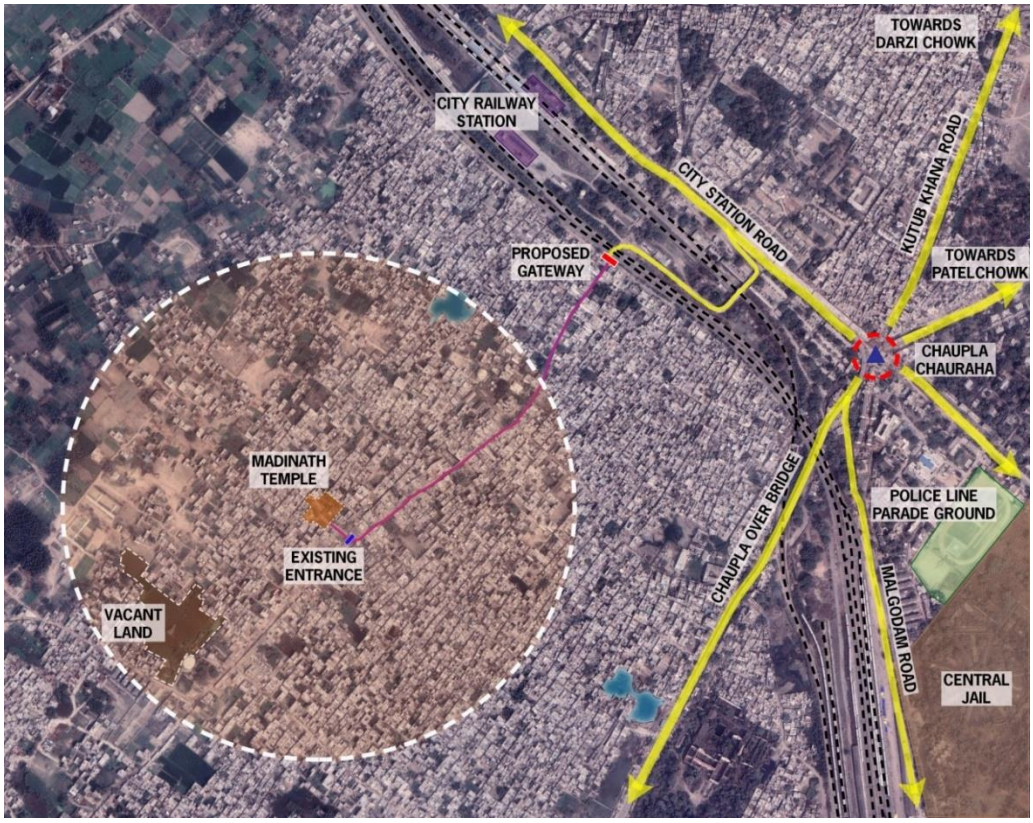
Figure 12-5: Pathway to Devraniya River

Figure 12-6: Bylane to Math Tulsi Sthal

Figure 12-7: Math Tulsi Sthal Entrance Gate (left) Math Tulsi Sthal Complex (right)

Madinath Temple Precinct

Situated on the south-west corner of the city, across the City Railway station is the Madinath temple. Despite of being one of the seven Nath temples, the temple fails to mark its presence in the precinct due to its location and having a dense settlement all around. The inappropriate access to the temple from the city station road also becomes another challenge to the visitors, with lack of signage, identity markers and designated approach road. The narrow streets leading to the temple showcase the lack of organization and urban character. Open sewerage/ drains, uneven width on the road can also be seen, that showcase a dire need of infrastructural development.



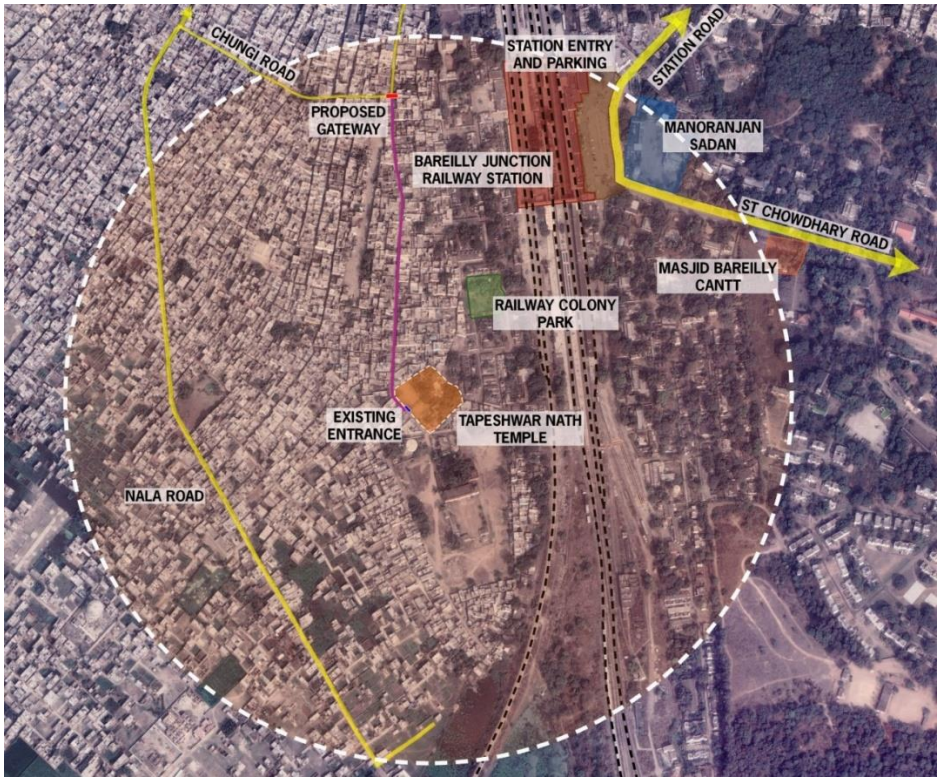
Map 12-3: Madinath Temple Precinct

Figure 12-8: Madinath Temple Approach Road

Figure 12-9: Madinath Temple Entrance Gateway

Tapeshwarnath Temple Precinct

The Tapeshwar Nath temple is situated in the southern part of the city opposite to the Bareilly Junction Railway station. Surrounded by a dense residential fabric, the temple lacks its connectivity to any of the city's main arterials. Due to undefined corridor/pathway leading to the temple complex, the narrow street network showcases a lack of imageability and way-finding in the overall precinct. Absence of signage, identity markers and designated approach road possesses a challenge for the visitors/ pilgrims to reach the temple complex.



Map 12-4: Tapeshwar Nath Temple Precinct

Figure 12-10: Tapeshwar Nath Temple Approach Road

Figure 12-11: Tapeshwar Nath Temple

Dhopeshwarnath Temple Precinct

Dhopeshwar temple, also known as the birth place of Draupadi (Mahabharata) is situated in the southern part of the city near Sadar bazaar of cantonment area. The temple is one amongst the seven nath temples present in the city and was initially a gateway to the city from Lucknow route. The temple inherits a historic and spiritual value of very high significance. Due to the development of neighborhood over the years, the temple has eventually lost its presence in the precinct. The precinct portrays no sense of place, identity markers and lack of imageability.

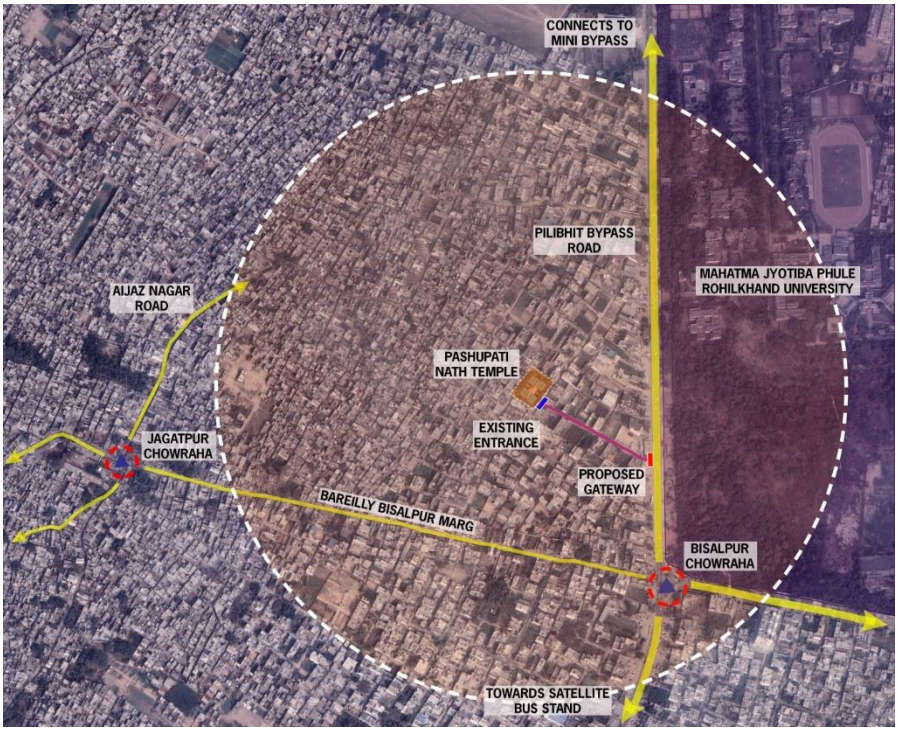
Map 12-5: Dhopeshwar Nath Temple Precinct

Figure 12-12: Dhopeshwar Nath Temple Approach Road

Figure 12-13: Dhopeshwar Nath Temple Entrance (left) and Kund (right)

Pashupatinath Temple

Situated just two hundred meters away from the Pilibhit Bypass Road is the Pashupati nath temple. Despite of being connected to such a major city bypass, absence of signage, identity markers and possesses a challenge for the visitors/ pilgrims to reach the temple complex. The two-hundred-meter approach road tends to be an advantage to the site and holds tremendous potential for establishing a Gateway and reviving the overall street character. The site not only lacks public conveniences but also has no open space to cater high influx of people or organize any fair. With the temple in the middle of the site and kund (water body) on all four sides, the architecture of Pashupati Nath temple provides it with a distinct identity from all other Nath temples.



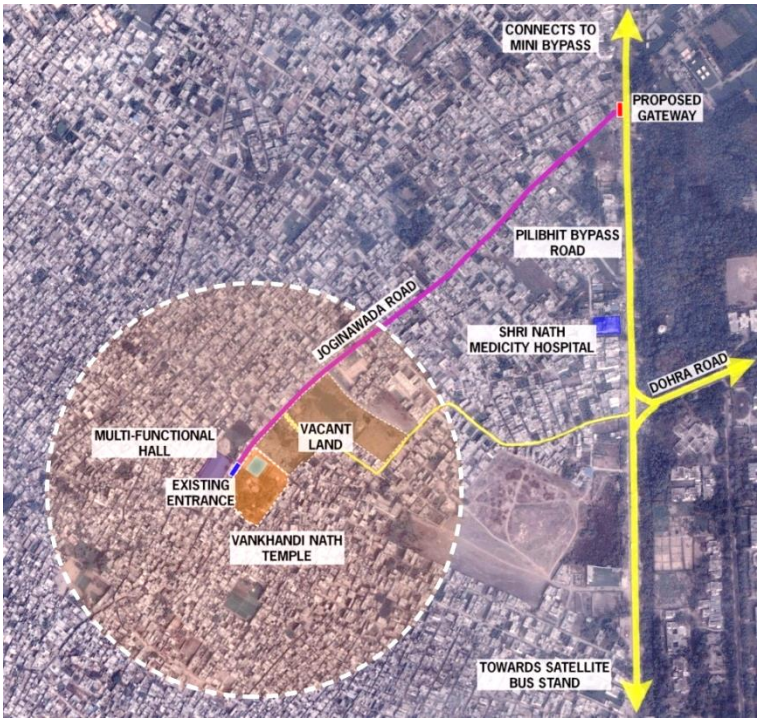
Map 12-6: Pashupati Nath Temple Precinct

Figure 12-14: Pashupati Nath Temple Entrance (left) and Temple (right)

Figure 12-15: Pashupati Nath Temple Precinct

Vankhandinath Temple Precinct

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.



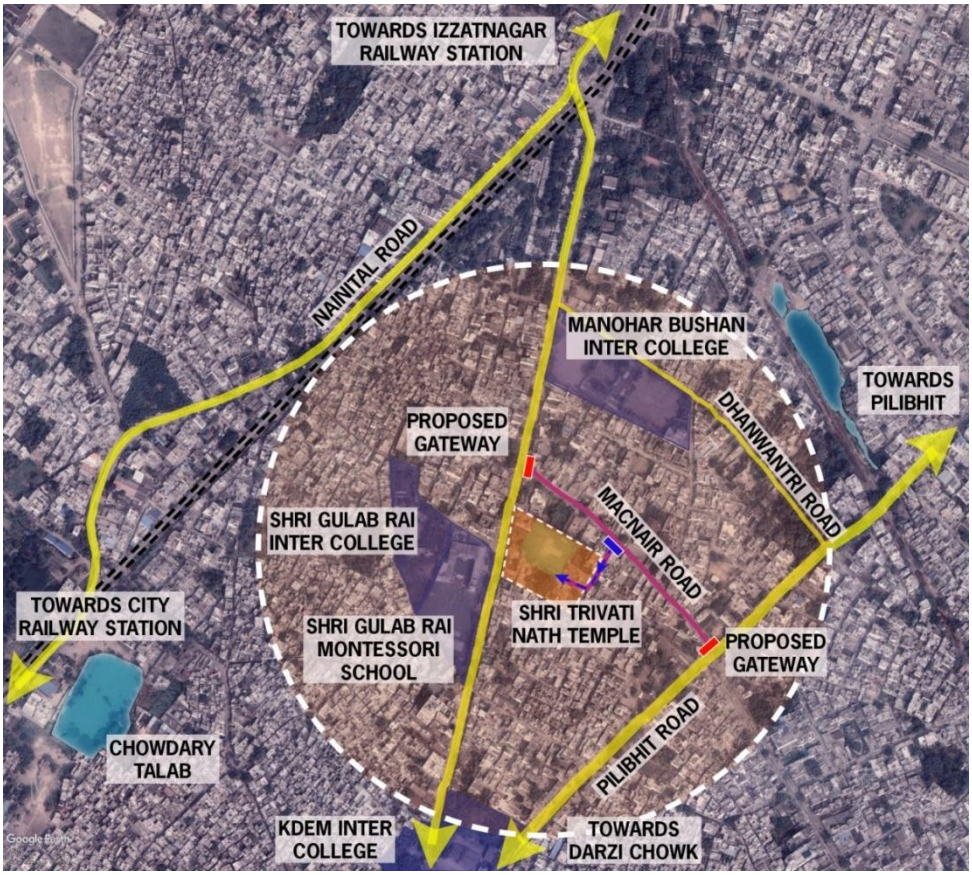
Map 12-7: Vankhandi Nath Temple Precinct

Figure 12-16: Vankhandi Nath Temple Approach Road

Figure 12-17: Vankhandi Nath Temple Fairground

Trivati Nath Temple Precinct

Situated in the Northern part of the city towards the Nainital route is the Trivati nath Temple, which holds a strong presence on the road. Though, the MacNair road becomes a designated corridor to the temple complex forging its connection to the Nainital road and Pilibhit road, it still lacks the urban character and organization. Though the existing temple complex is very well developed in terms of infrastructure which easily caters to the high influx of visitors, the approach to the temple seeks intervention to define the spiritual character of the corridor and provisioning of signage/ identity markers.



Map 12-8: Trivati Nath Temple Precinct

Figure 12-18: Trivati Nath Temple Entrance

12.1.2.5 Area of Intervention:

For all Nath Temples, the area of intervention will be the approach road to the temple & the temple precinct itself.

Approach road size for all temples:
Alakhnath Temple - 100m
Madinath Temple - 750m
Tapeshwarnath Temple - 400m
Dhopeshwarnath Temple - 250m
Pashupatinath Temple - 250m
Vankhandinath Temple - 1000m
Trivatinath Temple - 450m

12.1.2.6 Project Impact and its Benefits

Considering the spiritual significance of the city, the revival of these religious precincts becomes essential to restore city's cultural value. 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.

12.1.2.7 Stakeholders

Nodal Agency

Bareilly Market Associations
Nath Temple Association, Bareilly

Helping Agencies

Bareilly Development Authority
Bareilly Smart City Limited (BSCL)
Bareilly Nagar Nigam
U.P Tourism

12.2 Streetscape of City Core and Development of Dargah Precinct

12.2.1 Project – Streetscape of Market Street from Qila to Shyam Ganj Along with Urban Renewal of Dargah Precinct by Defining Entrance Gateways, Corridors and Enhancing the Public Infrastructure

12.2.1.1 Background

The city of Bareilly is a predominant trade city where different market typologies co-exist and form the base of the city economy and business culture. The market streets have a clear hierarchy based on the predominance of the functional activity and products sold as we move along the streets connecting Delhi to Lucknow. Upon arrival from Delhi, the Bada Bazaar market street stretches from Qila to Darzi chowk which caters to multiple segments of retail and wholesale markets, and from Darzi chowk to Shyam Ganj flyover is the Shyam Ganj market where Zari zardozi works and karkhanas used to flourish a few years back.

Situated in the dense fabric of Bada bazaar is the world famous - Dargah-e-Ala-Hazrat which invites lakhs of pilgrims from all over the country. It holds a historic and spiritual value of very high significance in the city. The dargah is also known for its annual Urs which takes place in the grounds of Islamia College of Bareilly, which invites over five lakh people to the city. Thus, the precinct of Dargah-e-Ala-Hazrat becomes a very important public node. Situated in its proximity is the Khanqah e Niazia, which is also a significant spiritual landmark of the city.

12.2.1.2 Problem Statement

The narrow street of Bada bazaar and Shyam ganj market is the harbor for all kinds of activity and with extended retail activities, IPT and light freight vehicles obstruct smooth pedestrian flow leading to congestion and noise pollution. Often the IPT is seen hitting the pedestrians, hence making the streets very uncomfortable to walk upon. Though a clear distinction can be observed in terms of function and products, the market streets lack imageability and a distinct character that can aid visitors in orienting themselves within the bazaars.

Situated in the close proximity of Bada bazaar and clock tower, Dargah e ala hazrat and Khanqah e Niazia have witnessed the effects of increasing density in the core. 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.

12.2.1.3 Key Intervention

- Restructuring mobility networks to facilitate walkability and Para transit within the Bada bazaar and Shyam ganj market street
- Prioritize the use of public transport.
- Provision of signage design scheme for Bada Bazaar and Shyam Ganj market by standardizing the size & its location on the façade to create uniformity in streetscape.
- Development of symbolic identity/ entrance gateways for both, Dargah and Khanqah.
- Establishing a corridor leading to the religious precincts along with façade treatment guidelines.

- Place making of their precinct with respect to the surrounding neighborhood.
- Enhancing the spiritual character along the street.
- Restructuring the Dargah precinct while adding public infrastructure like designated parking space, washrooms, etc.

12.2.1.4 Site Delineation

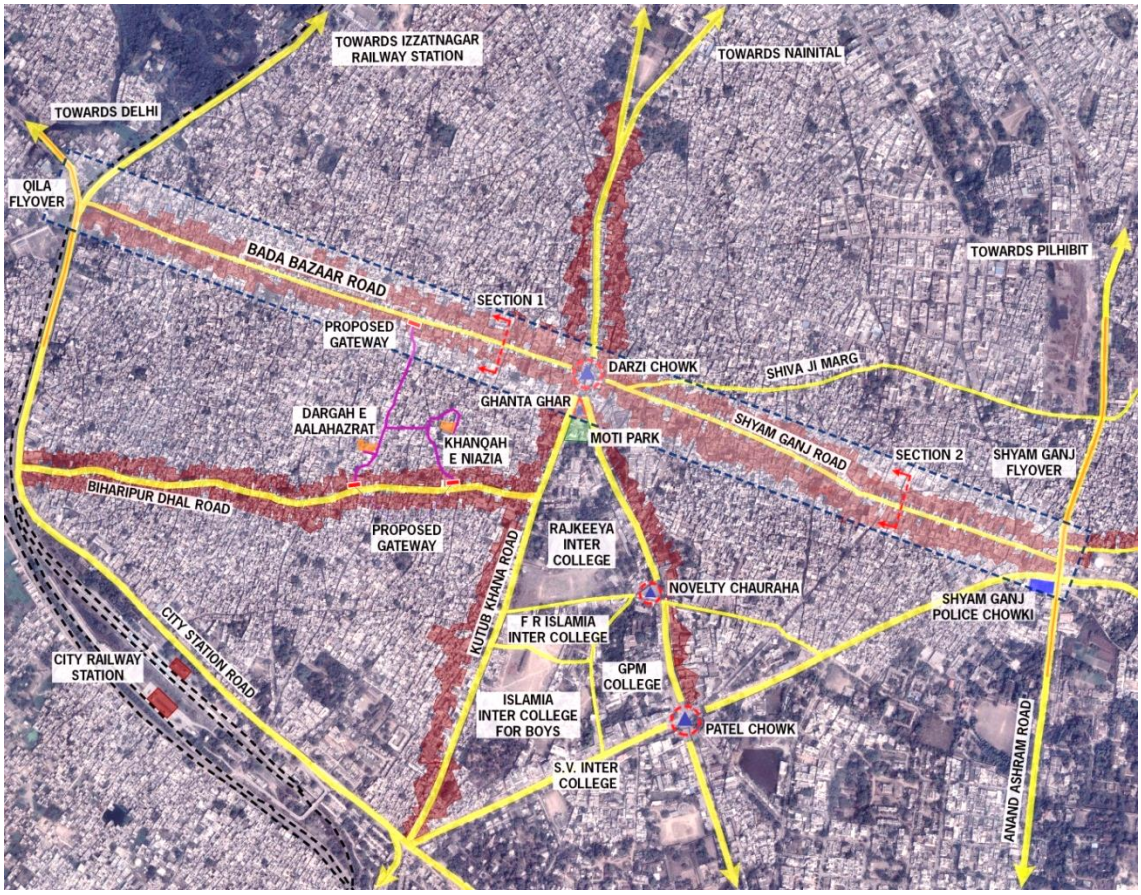
Upon arrival from Delhi, the market streets start from Qila with the grain market and move in a straight line to Bada Bazaar featuring Sarafa Bazaar (gold and silver jewelry), Surma market, Cloth and cosmetic market respectively. Following the Bada Bazaar which terminates at the Darzi Chowk and further leads to Shiva ji marg road (featuring Sarafa bazaar) and Shyam ganj market (featuring utensils, Zari Zardosi and furniture markets respectively).

Situated in the dense fabric of city core is the Dargah e Ala hazrat, which is one of the important pilgrim destinations in the city. With no defined access point/ entrance gateway, the dargah is approached from various routes from Bada bazaar road and Kutub khana road. This results in an unfeasible approach for the pilgrims who are new to the city. Lack of identity markers and a designated corridor fails to establish imageability and legibility of the precinct. Due to the existing situation in the current scenario, the working of bazaar streets also get hampered, eventually affecting the business.

Area of Intervention:

Qila to Shyam Ganj Market Road:
Total Road Stretch of the Market – 3 Km
Width of road – Varies from 5 - 7 meters (ROW based on existing situation)

Biharipur Dhal Road to Dargah & Khanqah:
Total Road Stretch for redevelopment – 700 meters
Width of road – 3 meters (ROW based on existing situation)



Map 12-9: Qila to Shyam ganj Road, Dargah e Aalahazrat and Khanqah e Niazia Precinct

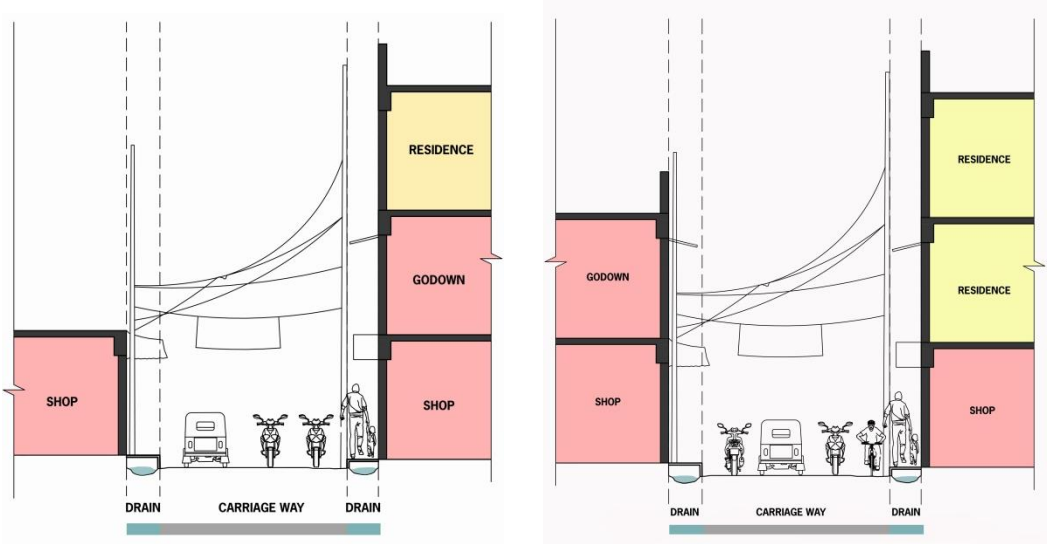


Figure 12-19: Bada Bazaar Street (Section - 1) (left) Shyamganj Market Street (section 2) (right)

Figure 12-20: Bada Bazaar Street (left), Shyam Ganj Market Street (right)

Figure 12-21: Street leading to Dargah-e -Aalahazrat (left), Dargah-e -Aalahazrat (right)

Figure 12-22: Street leading to Khanqah E Niazia (left), Khanqah E Niazia (right)

12.2.1.5 Project Impact and its Benefits

The project aims to define the character of the city market streets. The core city roads shall be defined as internal streets that will be prioritized on cycle and pedestrian infrastructure. These streets shall be designed to reduce the carriageway for low vehicular speed. The peripheral city streets will be developed as the outer loop where provisions for cycling, IPT, parking near intersections, cycle stands at regular intervals shall be given.

Taking the spiritual significance of the Dargah and Khanqah into the revival of these religious precincts becomes essential to restore city's cultural value. Designating corridor leading to these religious places and defining its street character will elevate the essence of the precinct. Establishing identity markers/ entrance gateways and development of public amenities like parking space, washrooms, etc. will offer convenience to visitors in terms of approach and user experience.

12.2.1.6 Stakeholders

Nodal Agency

Bareilly Market Associations
Dargah Association

Helping Agencies

Bareilly Development Authority
Bareilly Smart City Limited (BSCL)
Bareilly Nagar Nigam
U.P Tourism

12.3 Promotion & Innovation of Craft Products – Kala Sanskriti

12.3.1 Project – Rejuvenation of Zari – Zardozi (Shyam Ganj Market) – One District One Product

12.3.1.1 Background

Renowned all over the world, Bareilly is a city very well known for its craft of Zari and Zardozi. The native craft has established Bareilly's identity in the national as well as international market. The skill has eventually been carried on by generations of artisans over past many decades. Many artisans have adopted this as their main occupation or profession. It has provided employment opportunities to thousands of artisans spread over the city as most of the artisans have inherited art to be converted into an occupation.

12.3.1.2 Problem Statement

Situated in one of the dense fabrics of the city is the **Sailani market road** dedicated for retail of Zari Zardozi. Before the construction of Shyam gunj flyover, its prime location on Stadium Road made the market easily accessible from all parts of the city. The flyover passing over the market entrance has not only disrupted its linkage from the city's main arteries but has drastically changed the approach to the market underneath.

12.3.1.3 Key Intervention

- Designing the streetscape for pedestrians and NMT system
- Façade Development to establish the identity of the market
- Traffic decongestion of Market Street and parking proposals

12.3.1.4 Site Delineation

Despite of being covered by the Shyam ganj flyover, the strategic location of Sailani market road still holds a potential for an urban renewal for its transformation. The road from Patel chowk to Satellite bus stand passes under the flyover gives the site an advantage for a fair mobility. The space available underneath the flyover can be better utilized for place-making of the market's entrance.

Area of Intervention:
Shyam Ganj Flyover:
Total Road Stretch Underneath Flyover for redevelopment – 100 meters
Width of road – 9 meters (ROW based on existing situation)

Sailani Road:
Total Road Stretch for redevelopment – 600 meters
Width of road – 7 meters (ROW based on existing situation)

Map 12-10: Sailani Market Road

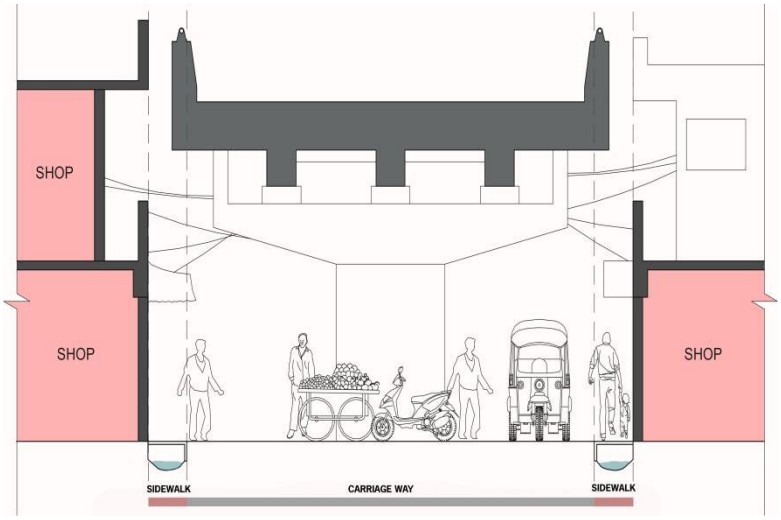


Figure 12-23: Shyam Ganj Flyover Road Section

Figure 12-24: Shyam Ganj Flyover Road

Figure 12-25: Sailani Market Road

12.3.1.5 Project Impact and its Benefits

Redevelopment of Sailani Market Road is one of the most significant developments needed for the revival of Bareilly's native craft. The urban renewal of the road underneath the flyover will not only enhance the approach to the Sailani market street but will also address a prominent access point for the visitors/tourists. The intervention will redefine the urban character of the whole market street and will also emphasize on the underlying market of Zari - Zardozi. This will initiate more influx to the market street and help in restoring the city's native craft.

12.3.1.6 Stakeholders

Nodal Agency

Bareilly Development Authority

Helping Agencies

Bareilly Smart City Limited (BSCL)
Bareilly Nagar Nigam
Bareilly Market Associations
Sailani Market Association
Bareilly Zari–Zardozi Association
U.P Tourism

12.4 A Place for Spiritual Tourism and Nature Retreat

12.4.1 Project – Ramganga Riverfront Development

12.4.1.1 Background

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 riverbanks attracting tourists and pilgrims from all over the city. The riverbanks 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 pilgrims, which initiates tourism for the city on a large scale.

12.4.1.2 Problem Statement

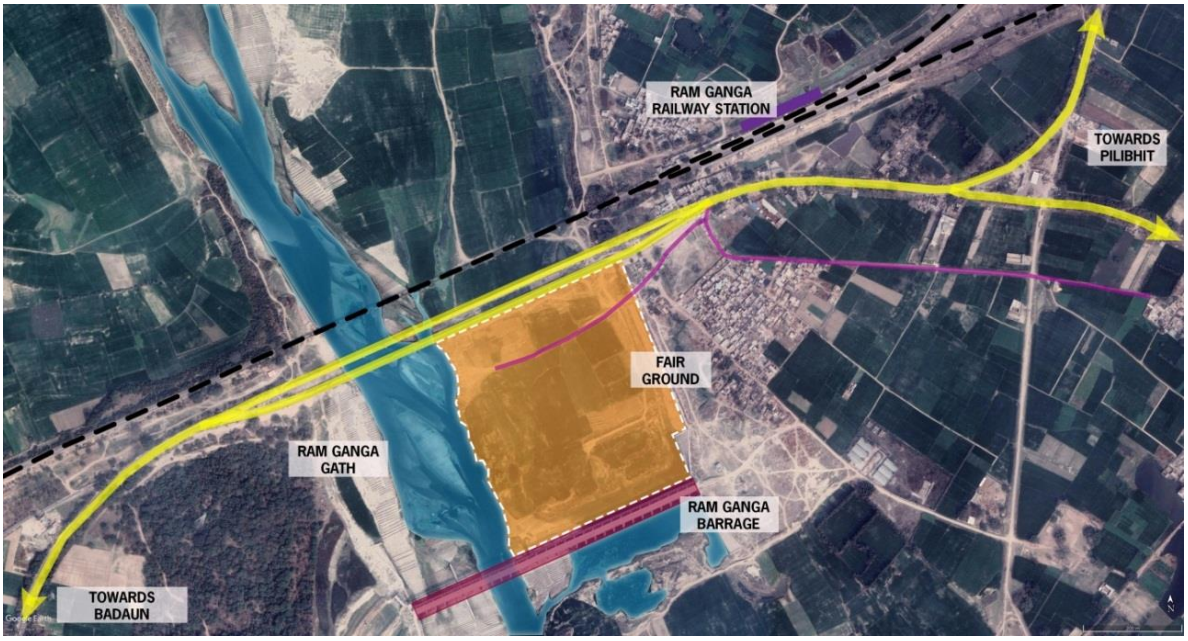
Despite of having a spiritual value of such prestige, the river ghat and the fairground still remains redundant. Due to lack of identity markers, entrance gateway and wayfinding, the approach to the ghat area is not feasible for the visitors. The Ramganga fairground is not only an ecological asset but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

12.4.1.3 Key Activities, Task & 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.
- 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

12.4.1.4 Site Delineation

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.



Map 12-11: Ramganga Ghat and Fair Ground

Figure 12-26: Dilapidated Ghat along river edge and connecting bridge (left), Vacant Land Parcel near bridge (right)

Figure 12-27: Provision of boating to cross the river

12.4.1.5 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.

12.4.1.6 Stakeholders

Nodal Agency

Bareilly Development Authority

Helping Agencies

Bareilly Smart City Limited (BSCL)
Bareilly Nagar Nigam
U.P Tourism

12.4.2 Project – Nakatiya river front development into city level greens

12.4.2.1 Background

Devraniya and Nakatiya are the two main rivers of Bareilly. Both the rivers pass through the dense fabric of the city, thus becoming an integral part of the neighborhood. The organic growth of settlement along both the rivers has led to major encroachments and loss of green buffers. Over the years, the ecological condition of both the rivers has consequently depleted due to lack of infrastructure development and maintenance. Opening up of Sewage drains directly into the river has degraded the water quality, which has severely affected the overall riverine along with its flora and fauna.

12.4.2.2 Problem Statement

Due to lack of infrastructure development, Nakatiya River portrays a very dilapidated image with many ghats along the edge lie redundant over a period of time. With no preservation of the river edge, wetlands or development of public spaces, the condition of riverine ecology has consequently depleted over the period of time. Thus, the land parcels along the river have become dump yard for the neighbors and cattle herding/bathing area for some.

12.4.2.3 Key Intervention

- Development of the riverfront will help in revival of the overall river edge and restoring its ecology as well.
- Integration of the river edge along with the available land parcel will result in rejuvenation of the overall precinct, creating an active green asset for the city residents.
- The provision of public amenities will add to the overall development and public convenience.
- Development of available land parcels to facilitate a better open public green with a mix of 50% active and 50% passive recreational space.
- Development of plaza space along with provision of street furniture – benches, dustbins, lighting

12.4.2.4 Site Delineation

The land parcel identified for development lies on the banks of Nakatiya River on the way to Lucknow from Bareilly. Situated in the middle of cantonment area and a residential cluster, the strategic location of the site possesses a high potential for its revival. The existing Shiva temple and Nakatiya Masjid also adds spiritual dimension to the precinct. The two land parcels of size 1.4 hectares and 1.15 hectares share one edge with the river and a direct connection to the road, making it feasible for proposing active public zone.

Map 12-12: Nakatiya River, Cantonment Area

Figure 12-28: Approach Road to the land parcel (left), Existing Condition of Naktiya (right)

Figure 12-29: Abandoned land parcel on Nakatiya River

Figure 12-30: Nakatiya River, Cantonment Area

12.4.2.5 Project Impact and its Benefits

Development of abandoned land parcels along the river will help in revival of the river edge. Integration of these land parcels along with the abutting public spaces, open greens and spiritual places will result in rejuvenation of the overall precinct benefitting the visitors and city residents. The project will eventually result in upliftment of the city's social infrastructure. The development of this project will not only restore the overall ecology of this abandoned natural asset but will also help in revival of the overall precinct.

12.4.2.6 Stakeholders for the Project

Nodal Agency
Bareilly Development Authority

Helping Agency
Bareilly Smart City Limited (BSCL)
Bareilly Nagar Nigam

12.5 City level infrastructure Development

12.5.1 Project – Aero city integrated office complex near Airport development

12.5.1.1 Background:

Bareilly is listed as one of the nine counter magnets of the National Capital region which can be developed as the economic growth centre. 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

12.5.1.2 Problem Statement:

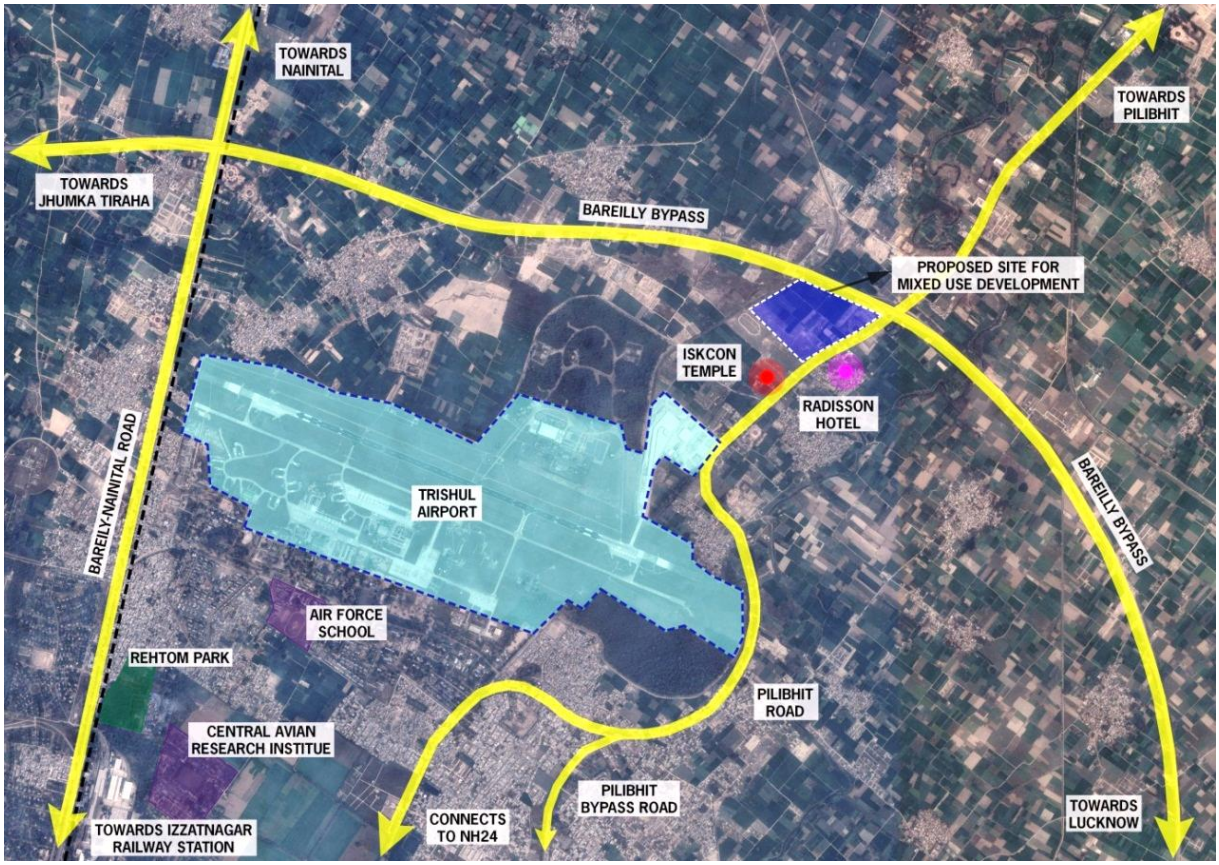
Lack of planned commercial spaces hinders the flourishing of economic trade and commerce activities in the city.

12.5.1.3 Key Interventions:

1. Development of Aero city 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.

12.5.1.4 Site Delineation

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 mixed-use development can be envisioned.



Map 12-13: Proposed Site for Mixed Use Development

12.5.1.5 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.

12.5.1.6 Stakeholders for the Project

Nodal Agency

Bareilly Development Authority

Helping Agency

Bareilly Smart City Limited (BSCL)
Bareilly Nagar Nigam
Bareilly Airport Authority

Chapter 13. HERITAGE AND TOURISM PROJECTS

13.1 Project 1: Ahichchhatra – Tourism Infrastructure Upgradation of ASI Site in consultation with ASI and UP Tourism Regional Managers

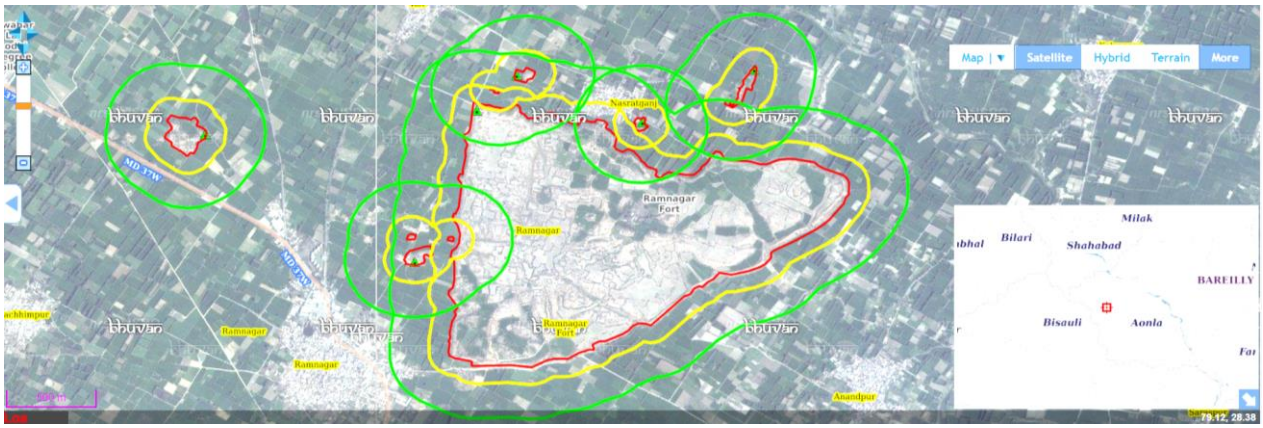
Background:

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.

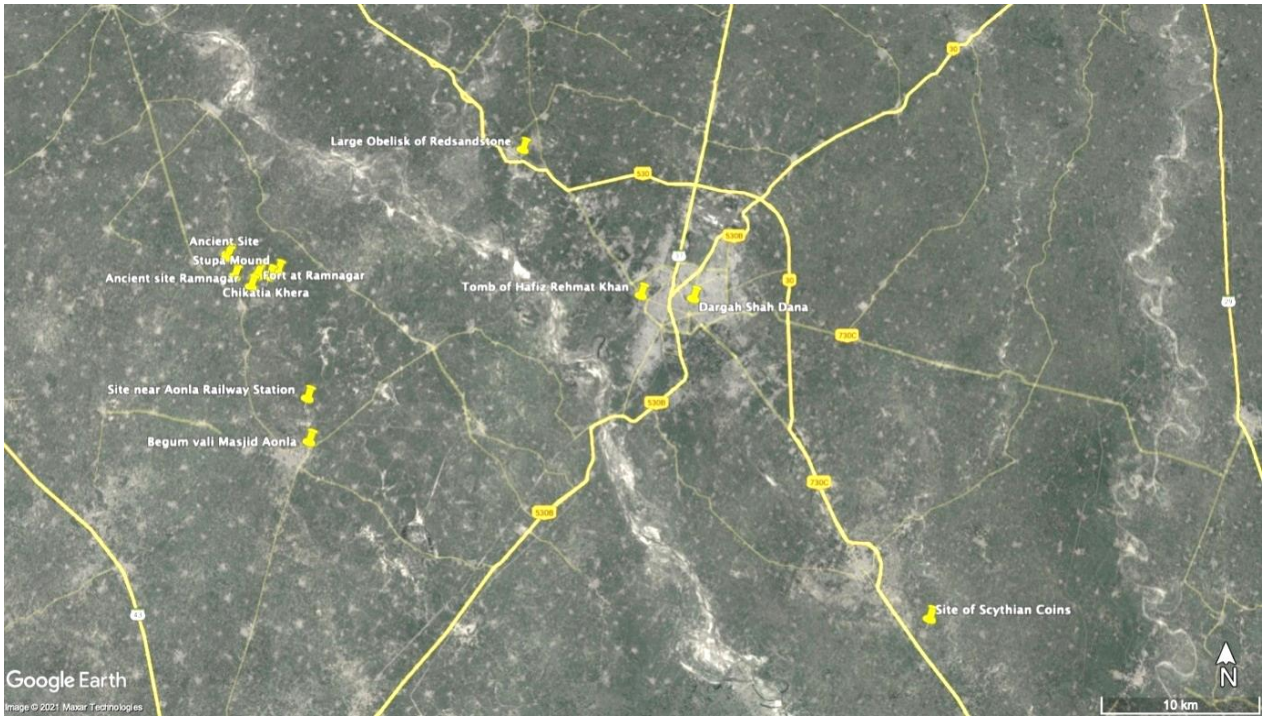
Near Ahichchhatra, 2 km to its west there is a big pond which is said to trace its ancestry to the time of Mahabharata. The pond, located in the village of Jagannathpur is said to have been made by the pandavas at the time of their forest dwelling.

Table 13-1 List of ASI Sites in Bareilly District (3 sites in Bareilly, 7 sites in Ramnagar, 2 in Aonla and 1 site in Pachomi)

S.NO.	NAME	LOCATION	DISTRICT
1.	**Tomb of Hafiz-ul-Mulk Rahmet Khan, the Rohila Chief**	**Bareilly, Bakar Ganj**	**Bareilly**
2.	**Tomb of Hermit Shah Dana**	**Bareilly, BakarGanj**	**Bareilly**
3.	Large obelisk of red sandstone	Fateh Ganj	Bareilly
4.	Several ancients ruined mounds in which Indo-Scythian coins are found.	Pachomi or Wahidpur Pachaumi	Bareilly
5.	Ancient Site	Ramnagar, Alampur Kot	Bareilly
6.	Fort	Ramnagar	Bareilly
7.	Mound called Chikatia Khera	Ramnagar	Bareilly
8.	Mound to the south of the tans known as of the Gandhan Sagar and Adisagar	Ramnagar	Bareilly
9.	Small hillock called Katari Khera or Kottari Khera	Ramnagar	Bareilly
10.	Stupa mound	Ramnagar	Bareilly
11.	Two Buddhist mounds close to the Konwaru Tal	Ramnagar	Bareilly
12.	Begum's Masjid with three lofty domes	Aonla	Bareilly
13.	Site near Aonla railway station	Rehtoia	Bareilly



Map 13-1: ASI sites with buffer demarcation Source: Bhuvan Portal



Map 13-2: Location of ASI Protected Structures in District of Bareilly

Figure 13-1 Archival image of the site excavation activities (1940 – 1945) Alexander Cunningham

Figure 13-2 Archival image of Excavated Site (1940 – 1945) Alexander Cunningham

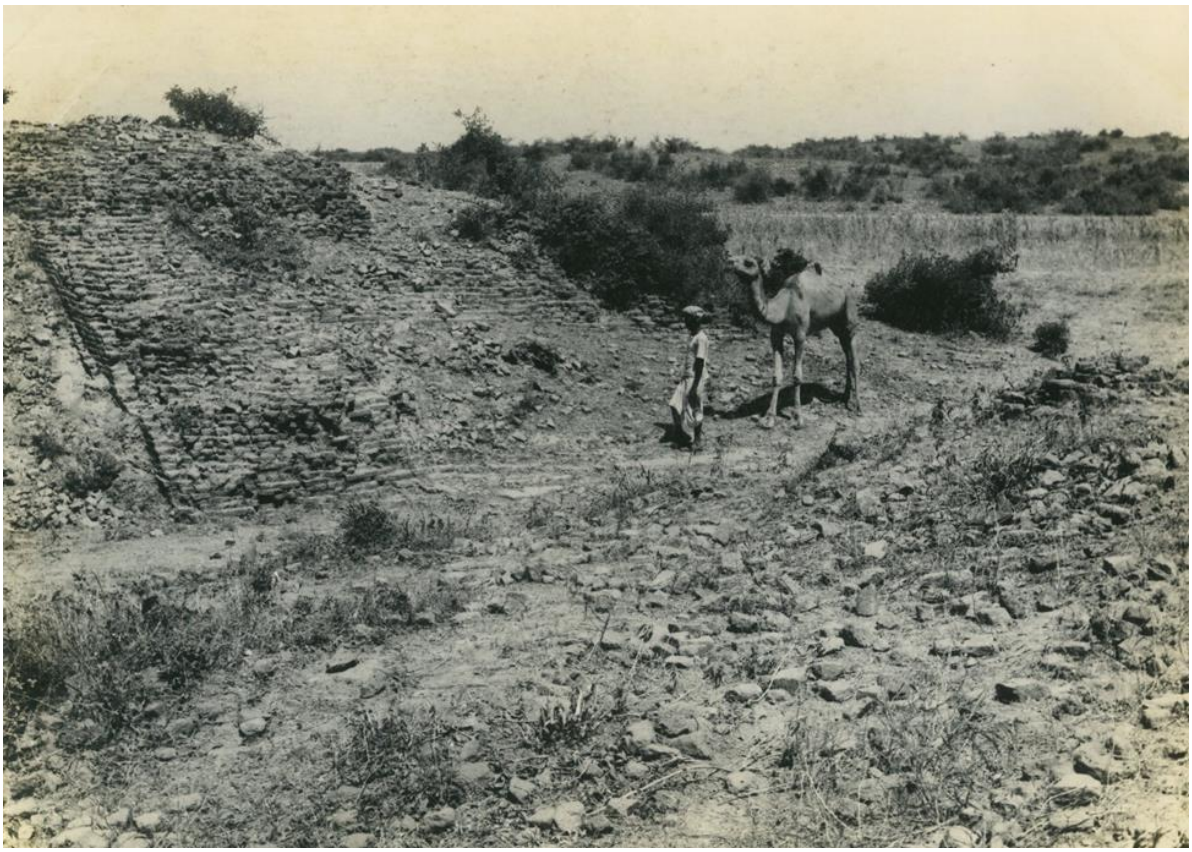


Figure 13-3 Archival image of Excavated Site (1940 – 1945) Alexander Cunningham

Figure 13-4 **Archival image of Excavated Site (1940 – 1945) Alexander Cunningham**

Figure 13-5 **Archival image of Excavated Site (1940 – 1945) Alexander Cunningham**

Problem statement:

The site is located at a distance of 55.4 kms from Bareilly with poor tourism infrastructure and site interpretation facilities. It is also located in close proximity of a Jain Teerth which is highly visited by the pilgrims as well as the visitors. There are 7 ASI protected sites in Ramnagar and other unprotected sites including Jain Temples Shri Ahichchhatra Parshvanath Atishaya Teerth Kshetra Digambar Jain Mandir, Ramnagar, Lakes and temples in Aonla etc. which are not explored to its full potential dues to lack of awareness, poor infrastructure facilities, lack of connectivity and improper visitor infrastructure facilities.

Value addition of this project to the tentative vision:
The provision of proper visitor amenities, support infrastructure facilities and improved last mile connectivity will enhance the tourist footfall to these sites. The site interpretation would help to generate interest of different categories of tourists.

Key activities, tasks, interventions involved:

1. Identification of area for development of Museum.
2. Connectivity enhancement to the identified sites located in close proximity.
3. Site Development & Landscape Improvement.
4. Providing wayfinding and interpretative signages in and around the sites.

Site Delineation: The buffer area of the Ahichchhatra Fort identified in consultation with ASI.

Strategies for Precinct Level Development:

1. To improve last mile connectivity from towns / cities such as Bareilly, Badaun and other nearby towns.
2. Development of Site Interpretative Museum for creating awareness about site, and to develop outreach programmes.
3. Site development and landscape improvement to provide visitor amenities such as food and beverage, toilet facilities, tourist information centre.

Project Impact & Benefit:

- World Heritage Site Nomination
- Increase in tourist footfall both domestic and foreigner resulting in creation of more jobs and economic benefit of the district.

SWOT Analysis

Strength:

1. Close proximity with Bareilly makes it an apt site to be developed as a destination for one/ two-day excursion.
2. Eight ASI protected sites are located in close proximity along with the Jain Temples which can be explored and be used for creating tourist interest.
3. Regional connectivity with Badaun.
4. The fort has potential to be designated as World Heritage Site, therefor site development with proper infrastructure facilities, site Museum with Interpretation centre, last mile connectivity would enhance the future tourism prospects of the district.

Weakness:

1. Last mile connectivity.
2. Lack of awareness of other tourism attractions both built and natural heritage.
3. Lack of Infrastructure Facilities.

Opportunity:

1. Ahichchatra/ Ramnagar Fort is the most visited site in Bareilly.
2. Improved infrastructure facilities will help to increase the footfall.
3. Regional connectivity of Bareilly –Ramnagar and Badaun can be explored to develop a tourist circuit.
4. Site sensitive interventions would help to enhance the importance of the site.

Threat:

1. Any insensitive interventions in and around the site would be detrimental to the significance of the site.
2. Any development around the archaeological areas are to be protected and conserved.

Stakeholders:

1. Department of Tourism, Government of Uttar Pradesh.
2. Archaeological Survey of India.
3. Bareilly District Administration.
4. Gram Panchayat / Tehsil.

Nodal Agency:

1. Archaeological Survey of India	For site development
2. Department of Tourism	For developing Tourism Infrastructure facilities

Data needs for the projects/ Obtained Data:

S.No.	Data	Status
1.	Visitors' footfall in Ahichachhatra, Aonla, Bareilly	**500 – 700 Daily (Average)**
2.	Tourist Profile	**No Records**
3.	Average stay of Tourist	**No Records**

13.2 Project 2: Developing a Theme based Museum on First War of Independence 1857

Project Background:

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 13-6 The Indian Mutiny: 6th Dragoon Guards (Carabiniers) at Bareilly, May 1858 by Orlando Norie. Source: Royal Collection Trust

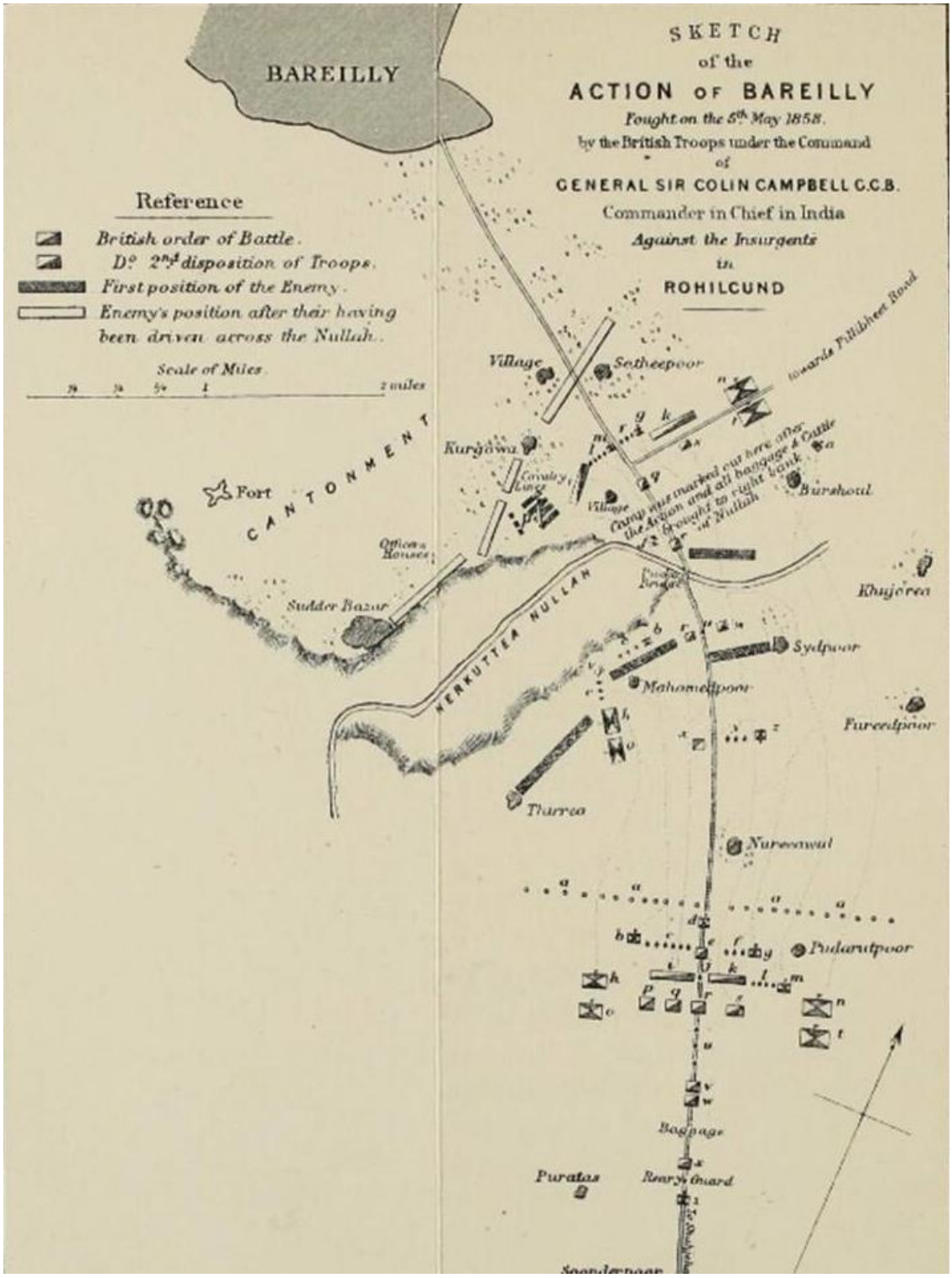


Figure 13-7 Sketch of Battle of Bareilly, 1858. (Source: A history of the Indian mutiny by G.W Forrest)

Case studies:

1. Town Hall of Amritsar which is developed and Adaptive Reuse as Partition Museum.

2. Dara Shikoh Library in Delhi which is converted under Adaptive Reuse mission as Partition Museum.

Figure 13-8 Town Hall, Partition Museum of Amritsar – Punjab

Figure 13-9 **Town Hall, Partition Museum of Amritsar, Galleries – Punjab**

Figure 13-10 Dara Shikoh Library and 1947 Partition Museum – Mori Gate, Delhi

Problem statement:

There is lack of awareness about the city as a major centre of the first war of independence. A theme based interpretative Museum development would address this and also enhance the future tourism prospects. Bareilly has potential to develop a museum based on the theme of First War of Independence by Adaptive Reuse of a historic building.

Value addition of this project to the tentative vision:

Potential for Tourism Development, Creating awareness and recreational facility at city level.

Objectives:

1. Develop Bareilly as Tourist destination and Enhance the Tourism potential of the city.
2. Reviving the memory of the First War of Independence.

Key activities, tasks, interventions involved:

1. Development of Theme based Museum.
2. Interpretative displays of the history of the region and associated personalities, role of Bareilly.
3. Visitor Management Plan.
4. Development of visitor amenities.
5. Site improvement.
6. Building Conservation for Adaptive Reuse.
7. Signages and way finding.

Site Delineation:

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.

Figure 13-11 Bareilly College – Gangapur, Bareilly Source: Project Team

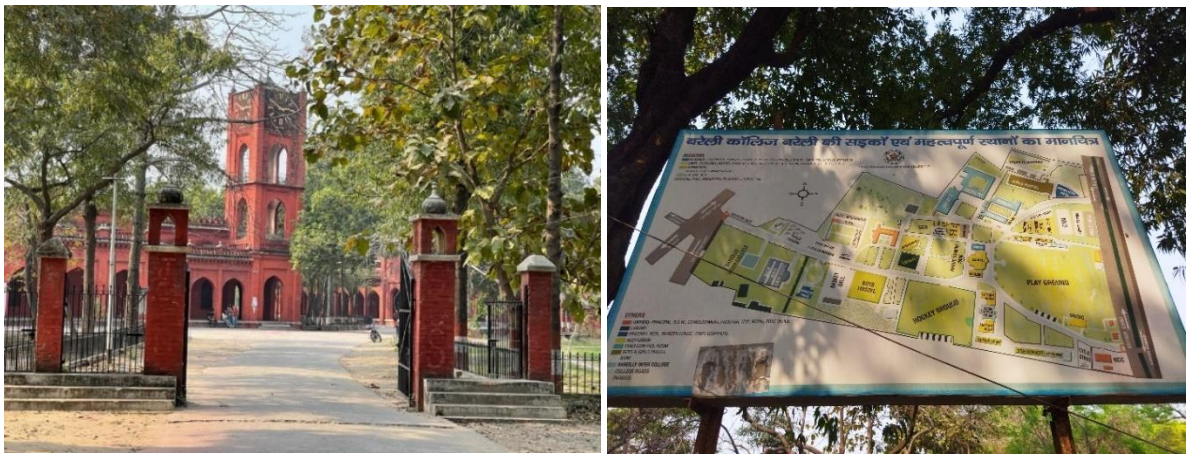


Figure 13-12 Bareilly College – Gangapur, Bareilly Source: Project Team

Strategies for Precinct Level Development:

1. NOC and approval from the college for the Adaptive Reuse and Development of Museum
2. Museum Design and Planning
3. Visitor Information
4. Visitor Amenities

Project Impact & Benefit:

The Project would help to create a tourist site by development of the Museum. It would also help to create awareness about the rich cultural past of the city at the local as well as at the State level. It will also be one of the contributing factors in celebrating "Azaadi ka Amrit Mahotsav" celebrating 75 years of India's Independence. It will also help to increase tourist footfall in the city by making it as a one/ two day stay destination to visit the local sites of freedom movement as well as the regional sites.

SWOT Analysis

Strength:

1. Representative of an important period in the growth and evolution of Bareilly City.
2. One of the oldest heritage site and 1st Colonial schools in India.

Weakness:

1. The connectivity of site is ideal but lack in proper tourism infrastructure and issues of heavy traffic on vehicular road.
2. Planning museum in institution building sometimes fails to magnetize larger crowd as compared to sites dedicated to only museum and gallery planning.

Opportunity:

1. Development of first theme-based Museum on First War of Independence.
2. Site sensitive interventions would help to enhance the significance of the site.

Threat: The structural study must be done before Adaptive Reuse of structure.

Nodal Agency:

Bareilly Municipal Corporation	Site Development
UP Tourism	Funding and Tourism Infrastructure
Education	Institutional Services and Guidelines for Visitor Management

Stakeholders: Bareilly Municipal Corporation, UP Tourism, Education Department

13.3 Project 3: Colonial Heritage Trail in Bareilly

Background:

Since the city was a cantonment under British rule, there are a range of colonial heritage in the city located largely in the civil lines area. The cantonment area of the city displays some historically and architecturally significant buildings which are unprotected. These structures are a reminder of the colonial past in the state of Uttar Pradesh. There are many states such as Maharashtra, Punjab etc. where these building are revered as architectural marvels and are being reused as a museum based on themes.

The city approximately has 26 Churches which are both architecturally and historically significant such as St. Stephan Church, Free Will Baptist Church, Christ Methodist Church etc.

St. Stephan's Church: It was built in Victorian architectural era in 1861, it is the most magnificent Church among the 26 churches in Bareilly. A red brick church with exquisite interiors ornamented with ebony wood panels and marble pulpit. It also houses 20-foot-high pipe organ imported from England.

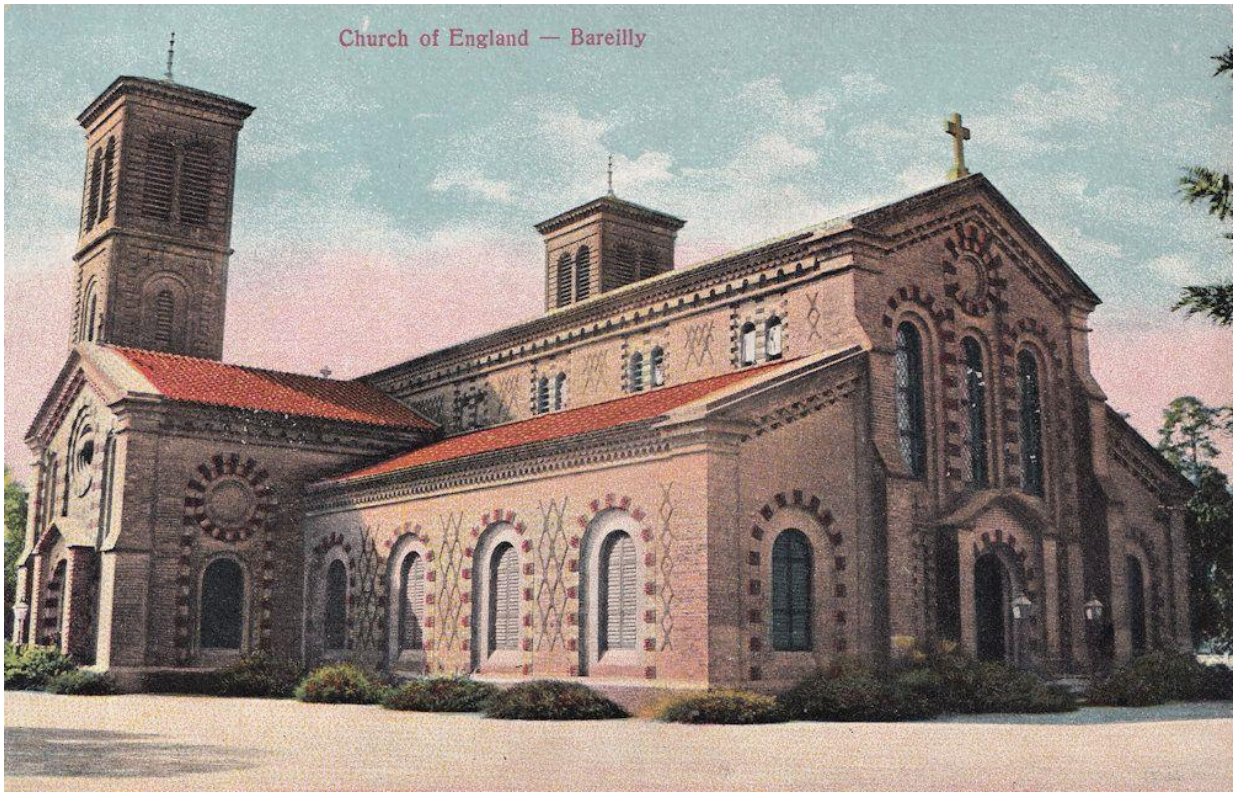


Figure 13-13 St. Stephan's Church – Civil Lines, Bareilly

Free Will Baptist Church: One of the oldest churches of Bareilly on Helen Road. It was constructed by East India Company in 1838 under the supervision of British Bishop Daniel Wilson. During the first war of Independence, the church was set on fire as the armed soldiers hid inside claiming lives of 40 British subjects, majority of soldiers. The church was repaired in 1858. The graves of the pastor, his wife and minor son who lost their lives in this incident are in the backyard.

Figure 13-14 The Freewill Baptist Church – Civil Lines, Bareilly

Figure 13-15 Bishop Cantonment Church - Bareilly

Figure 13-16 Christ Methodist Church – Civil Lines, Bareilly

Bareilly College: It was constructed on the land donated by the Nawab of Rampur, Hamid Ali Khan and inaugurated by Sir James La Tpuche in 1906, the then governor of Northwestern Provinces. It was started as a school in 1837 and attained the status of college in 1850. It was later affiliated to Calcutta University in 1862 and to Allahabad University in 1888. At present, it is part of Rohilkhand University.

Figure 13-17 **Bareilly College – Gangapur, Bareilly**

Figure 13-18 Dharamshala - Bareilly

Figure 13-19 North Indian Theological Seminary - Bareilly

The city also has Dharmshalas which were constructed in the city during colonial period using elements of colonial architecture. The Indian Theological Seminary was one of the important sites associated with the First war of Independence in the city.

Cemetery: It is burial place where Britishers were buried during 1857 who were killed in the war of Independence. The burial place of Christians or cemetery can be developed for tourism.

Figure 13-20 **British Cemetery - Bareilly**

*Figure 13-21*British Cemetery - Bareilly

Problem statement:

Colonial heritage is one of the typologies of Heritage of the city which is unprotected as well as unrecognized. These sites are associated with the first war of independence in the city in one way or another. Very few people are aware that Bareilly was the last town which fell after a year of struggle

under the leadership of an 82-year-old man Khan Bahadur Khan. It is required to revere these sites as part of the heritage of Bareilly by creating awareness through outreach activities, by improving interpretative signages and other infrastructural amenities.

Value addition of this project to the tentative vision:

Creating awareness about the Cultural Heritage of the City as well as the district and increasing the Tourism Potential.

Objectives:

1. Create awareness for the Regional Colonial Heritage of the city.
2. Conservation, Protection, Maintenance and Management of the Cultural Heritage of the city.
3. Develop Bareilly as Tourist destination and Enhance the Tourism potential of the city.

Key activities, tasks, interventions involved:

1. Developing the Colonial Trail by identification and mapping of Colonial Heritage of Bareilly.
2. Streetscape Development in identified stretches.
3. Connectivity enhancement to the identified sites located in close proximity.
4. Provision of Visitor Amenities.
5. Providing wayfinding and interpretative signages in and around the sites.
6. Application based audio tours

Site Delineation:

Identification & Mapping of the historically & architecturally significant Colonial Sites - St. Stephan Church, Free Will Baptist Church, Bishop Cantonment Church, Christ Methodist Church, Bareilly College, Dharmshalas, Northern Indian Theological Seminary, Cemetery etc. for creation of Trail. The buildings added can be expanded/ added in a phased manner based on the archival research.

Strategies for Precinct Level Development

- Mapping of Colonial Sites
- Conservation & Protection of these heritage sites by the State / Municipal Corporation.
- Heritage Conservation & Development guidelines for the identified sites
- Creation of Visitor amenities & Interpretatory signages

Project Impact & Benefits

The project aims to create awareness about the colonial sites in the area and ensuring harmonious development around these sites. It also aims to attract more visitors and tourists at these sites through placemaking activities and sensitive design & planning.

SWOT Analysis

Strength:

1. Representative of an important period in the growth and evolution of Bareilly City.
2. These buildings have historic, architectural, artistic, social and educational values.
3. An important repository of regional colonial heritage of the city.

Weakness:

1. Lack of awareness of Colonial Heritage of the city as tourist attractions.
2. Lack of guidelines for the conservation, protection and maintenance of these sites including guidelines for addition and alteration.
3. Lack of Signages both descriptive and informative.

Opportunity:

1. Conservation of the Buildings in poor condition.
2. Site development and landscape improvement.
3. Adaptive Reuse of abandoned colonial buildings for creating Interpretative Museum on the theme of First War of Independence.
4. Site sensitive interventions would help to enhance the significance of the site.

Threat:

1. Unrecognized as heritage by the City Administration as well as the Masterplan.
2. Disappearance of important sites dues to Urban Development activities for example road widening activities lead to demolition of Heritage.
3. Any insensitive interventions in and around the site would be detrimental to the significance of the site.

Nodal Agency:

Bareilly Municipal Corporation	**Site Development**
UP Tourism	Signages and Visitor Amenities
Bareilly Development Authority	Integration & Mapping of Cultural Heritage of Bareilly in the masterplan with demarcation of the buffer of 100 and 200m of the ASI protected sites

Stakeholders listing:

1. Department of Tourism, Government of Uttar Pradesh.
2. Archaeological Survey of India.
3. Bareilly District Administration.
4. Bareilly Development Authority.
5. State Department of Archaeology.

Chapter 14. ECONOMY PROJECTS

14.1 Handicraft sector in Bareilly

14.1.1 Background

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. There are two types of artisans / workers in this craft, mainly those who are doing this work as their main occupation and engaged in that throughout the year and 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 labor productivity. The income of these artisans used to be Rs 400-500/day earlier, which has now been reduced to Rs 250-200/day due to various reasons.

Figure 14-1: Photograph of the Zari Artisan in Bareilly

At present, limited number of functional clusters for handicraft in Bareilly (one for each Zari and Cane Bamboo) and two cluster are in the development stage. There are approximately 1.7 lakh Zari Zardozi artisans (1.4 lakh directly involved and 30,000 are involved in other allied activities) in Bareilly. The Zari artisans / workers are mostly working at household level in various parts of the city. The working conditions of these artisans are not up to the mark and requires upliftment for enhanced productivity.

14.1.2 Problem statement

Following challenges 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.

A growing need has been felt to facilitate and empower artisans to chart out a sustainable path for growth, income generation and better work environment so that they are able to have a right working atmosphere and better ambiance to enable them to carry out their work efficiently.

14.1.3 Vision – Handicraft

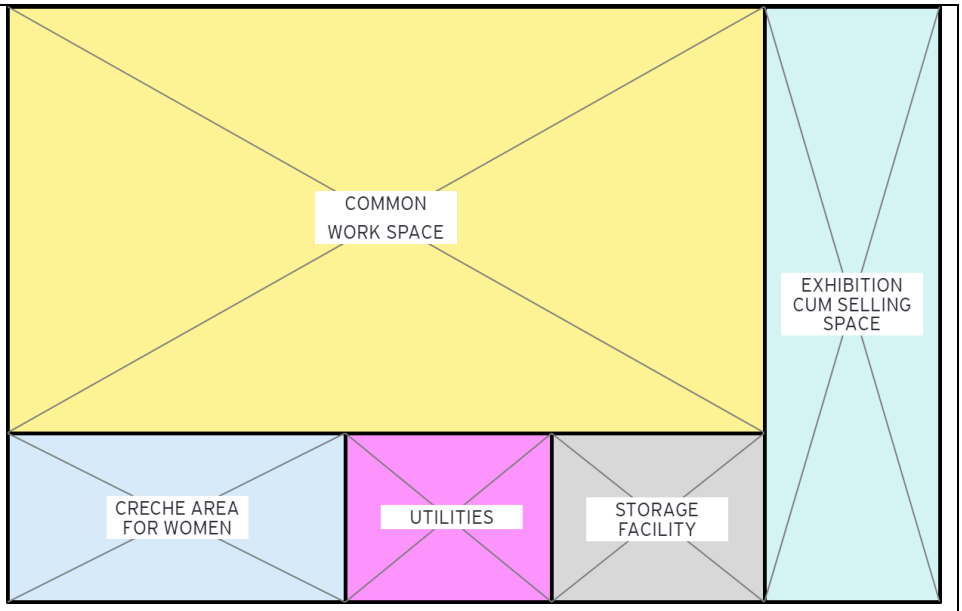
Vision Statement – Handicraft

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

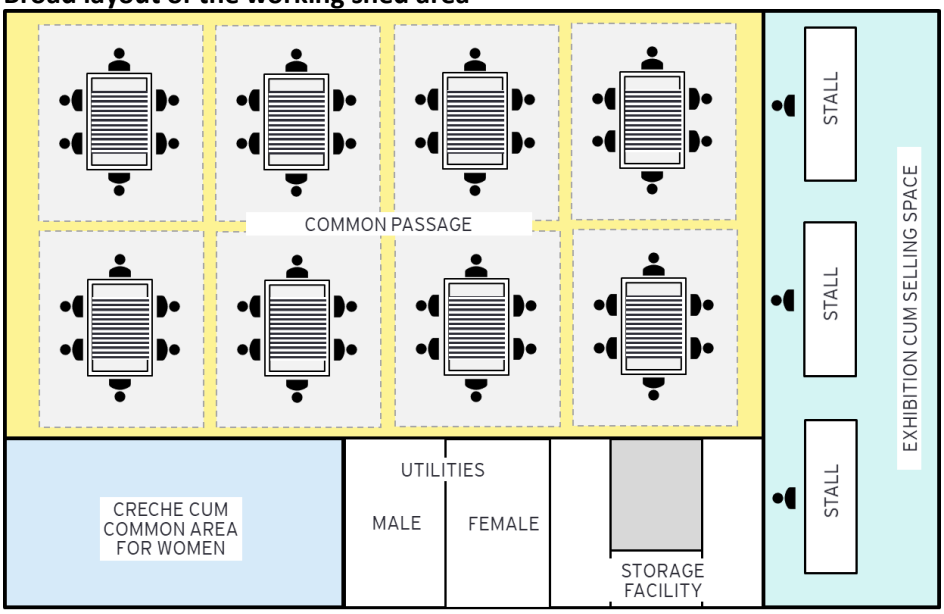
14.1.4 Key intervention - Development of working shed for Zari Handicraft artisans

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.

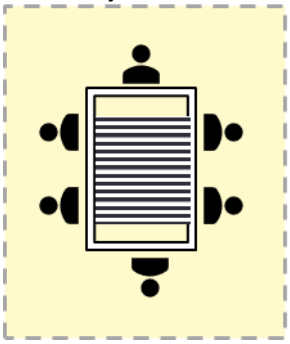
Proposal	**Development of working shed for Zari Handicraft artisans**
Probable Locations	Approximately 6-8 locations namely: (i) Near Paraskhera, (ii) Near Invertis Chauraha, (iii) Biharipur, (iv) Kasgaran, (v) Puranashahar, (vi) Katrachand Khan, (vii) Chhipitola, (viii) Partapur
Components proposed	• 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
Concept	**Schematic zoning of the working shed**



Broad layout of the working shed area



Broad layout of a frame and sitting arrangements of artisans



Broad assumptions-based area calculation:

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 Sq. ft 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.

- The working shed area requirement will vary from **3000-4000 Sq. ft. for minimum sitting capacity of 40-50 artisans at a stretch.**
- Based on the interviews and qualitative survey during assessment studies, it was observed that approximately an artisan takes approximately 10 days for completion of a product.
- A single working shed can facilitate approximately 2500 workers in a year.
- 8-10 such working shed can provide a healthy and efficient working environment to **approximately 10% of the total workers** in Bareilly.

Model

- **Land:** To be identified and provided by Bareilly Development Authority based upon availability in a particular location
- **Phasing:** Pilot shed for 6-8 location and then based on success of these, implementation on multiple locations (phase wise) for multiple locations with availability of artisans.
- **O&M -** 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.
- **Financial assistance -** The financial assistance will be in the form of 80% assistance from Office of DC (H) subject to the ceiling and 20% will be contributed by the implementing agency under the "COMPERHENSIVE HANDICRAFTS CLUSTER DEVELOPMENT SCHEME (CHCDS)".

Stakeholders listing (both Government and Private)	• District Handicraft Department • Bareilly development authority • District Industries Centre (DIC) • Existing CFCs • Artisans (registered and non-registered) • Skill development institutions • NGOs working for artisans

The small handicrafts units and poor artisans are inadequate to undertake the initiatives on their own due to non-availability of proper infrastructure and common facilities such as trade and marketing facilities, Computer-Aided Design center, Communication network, etc. In order to overcome the above challenges, it is necessary to form a Public-Private Partnership (PPP) model to create clusters with infrastructure facilities required to meet the industry needs.

The Ministry of Textiles has launched the **Comprehensive Handicrafts Cluster Development Scheme (CHCDS)** under the guidance of Mega cluster scheme. This scheme was initiated with the object of setting up of new cluster to assist artisans and entrepreneurs in setting up world-class units with modern infrastructure, latest technology, and adequate training.

The objectives of the Comprehensive Handicrafts Cluster Development Scheme (CHCDS) are:

(i) To provide requisite support in terms of infrastructure, technology, product diversification, design development, marketing and promotion, social security and other components that are necessary for the sustainability of craftsmen/artisans engaged in the Handicrafts sector,

(ii) To create additional livelihood opportunities to the people through specific intervention in the industry and to increase the income of the craftsmen/artisans engaged in this sector.

Incentives and guidelines under the scheme are as follow:

Technology Upgradation:

- Upgradation/modernization of machinery, processing and other methods of manufacturing.
- To support entrepreneurs in setting up world-class units with the latest technology by obtaining one-time assistance in the ratio of 30:70 from the government.

Margin Money for Working Capital:

Under Margin Money for Working Capital, the artisans will be provided with margin money of Rs.4000 per artisan to complete one cycle of production-cum-marketing within three months.

Export & Marketing:

Provision of Trade Center, Exhibition Hall, Customs office and Clearing facility, etc. will be provided.

Product Diversification:

Diversifying and upgrading the product range to meet the needs of contemporary market requirements through quality improvement, design development, etc.

Raw Material Bank:

The proposal for the establishment of a raw material bank for the continuous availability of quality and the graded raw material is performed.

Common Facility Centre (CFC):

Common Facility Centre (CFC) comprises of the state of art machines in which the individual is unable to afford for this facility. Under this incentive, the individual can access the high-tech facility at a reasonable price as the beneficiary has to afford only for operating expenses.

Resource Centre:

The proposal for the establishment of resource center as one point information center which acts as an arsenal in the hands of artisans is performed.

Market Development:

To improve the share of the cluster products in domestic as well as export markets through exhibitions, brand promotion, buyer-seller meets, retail space, warehouses, e-commerce etc.

Forward & Backward Linkages:

Provision of need-based infrastructure in the form of common facility centers, handicrafts parks, testing labs, design studios, TQM, Research and Development, etc. will be provided.

Skill Development:

To improve productivity and quality, the **training will be provided on technical skills** apart from coverage under soft skills and other entrepreneurship development programs.

Social Security:

The artisans in the cluster will be covered under social security schemes, which includes small savings, group insurance, financial institutions, etc.

Physical Infrastructure:

Proposal for land development, water treatment and supply, roads connectivity, power supply, telecommunication network, housing-cum-work sheds and other common buildings, sewerage, solid waste management and effluent treatment plant will be performed.

Funding Pattern:

The assistance to the extent of 3% of the total project cost would be provided for establishing baseline data against which performance can be compared at the end of the project.

The funds would be released in three instalments as given below:

- **1st Instalment:** The 1st Instalment of 40% as an advance on Special Purpose Vehicle (SPV) acquiring land.
- **2nd Instalment:** The 2nd Instalment of another 40% on the utilisation of the first instalment will be provided on submitting utilisation certificate.
- **3rd Instalment:** The 3rd Instalment of balance amount will be reimbursed on completion of the project.

S. N.	Activity	Government Contribution	Financial Limit of Government (in Rs)	Share of SPV
1.	Soft skills such as Product Development workshop, skill development training, etc.	First Year – 100% Second Year – 90% Third year – 75% Final year – 75%	Rs.10 crores per project	Nil 10% 25% 25%
2.	Common production-related Infrastructure, which is artisan centric such as **Work shed, CFC**, etc	100%	Rs.20 crores per project	Land and recurring expenditure
3.	Other commercial infrastructure such as Gas pipeline, etc	75%	Rs.20 crores per project	25% and recurring expenditure
4.	Facility Centres for entrepreneurs / Exporters	30%	Rs.20 crores per entrepreneur	70%

Project Management Cost

The Project Management Cost will be reimbursed to the Cluster Management &Technical Agency (CMTA) for managing the activities of the cluster. CTMA will be selected for the clusters through a competitive bidding process.

Eligible Agencies

The Special Purpose Vehicle (SPV) will act as the implementing agency with the participation of stakeholders, leading manufacturers, suppliers, buyers and Self-Help Groups (SHGs). The SPV would be selected through the open competitive bidding process. However, the selection of SPV would depend upon the profile of the project, activities related implementation. Therefore, the selection of eligible SPV will be performed after the approval of the Project Approval Monitoring Committee (PAMC).

Our proposal is adhering to the existing scheme as per following matrix:

S.N.	Scheme component	Adherence in the proposal
1	**Export & Marketing:** Provision of Trade Centre, Exhibition Hall, Customs office and Clearing facility, etc. will be provided.	
2	**Common Facility Centre (CFC):** Common Facility Centre (CFC) comprises of the state of art machines in which the individual is unable to afford for this facility. Under this incentive, the individual can access the high-tech facility at a reasonable price as the beneficiary has to afford only for operating expenses.	
3	**Market Development:** To improve the share of the cluster products in domestic as well as export markets through exhibitions, brand promotion, buyer-seller meets, retail space, warehouses, e-commerce etc.	
4	**Physical Infrastructure:** Proposal for land development, water treatment and supply, roads connectivity, power supply, telecommunication network, housing-cum-work sheds and other common buildings, sewerage, solid waste management and effluent treatment plant will be performed.	

S.N.	Scheme component	Adherence in the proposal
5	Common production-related Infrastructure, which is artisan centric such as **Work shed, CFC**, etc. (**Government Contribution upto Rs.20 crores per project)**	

Additionally, the proposal may be converged with the incentives provided in the **ODOP scheme 2018**.

Under the ODOP project, artisans, production units and associations which are related to the selected products are promoted by lending loan, establishing Common Facility Centres, providing marketing assistance so these products can be popularized, and employment can be generated at district level.

ODOP Schemes:			
I	II	III	IV
Common Facility Centre Scheme	Marketing Development Assistance Scheme	Finance Assistance Scheme (Margin Money Scheme)	Skill Development Scheme

(a) Marketing Development Assistance (MDA) scheme

The MDA scheme is aimed at achieving fair pricing for the artisans, weavers, entrepreneurs and exporters of the ODOP products through better marketing. This scheme provides financial assistance to participants of national and international fairs/exhibitions for display and sale of their products selected under ODOP project.

(b) Margin Money / Financial Assistance Scheme

Under the Financial Assistance Scheme, all nationalized banks, regional rural banks and other scheduled banks will finance the scheme and the Department of Micro, Small and Medium Enterprises and Department of Export Promotion shall release the ODOP margin money subsidy against all applications submitted under the scheme. For:

- Enterprises with project cost upto INR 25 lakhs, 25% of the entire project cost subject to a maximum of INR 6.25 lakhs, whichever is less, shall be payable under the margin money scheme.
- Enterprises with project cost between INR 25 lakhs to 50 lakhs, INR 6.25 lakhs or 20% of the project cost whichever is more, shall be payable under the margin money scheme.
- Enterprises with project cost between INR 50 lakhs to 150 lakhs, INR 10 lakhs or 10% of the project cost, whichever is more, shall be payable under the margin money scheme.
- Enterprises with project costs exceeding INR 150 lakhs, 10% of the entire amount subject to maximum of INR 20 lakhs, whichever is less, shall be payable under the margin money scheme. The margin money shall be merged with the subsidy after the enterprise has successfully completed 2 years of operation.

(c) Skill Development scheme under ODOP

The ODOP Skill Development and Tool Kit Distribution Scheme is aimed at fulfilling current and future requirements of skilled work force in the entire value chain of ODOP products, across the state of Uttar Pradesh. Additionally, the scheme intends to equip the artisans / workers through distribution of relevant advanced tool kits.

Incentives – (i) Artisan who are already skilled shall be imparted required training through RPL (Recognition of Prior Learning) and shall be certified through relevant Sector Skill Councils (SSCs), (ii) Unskilled artisans shall be provided a 10-day training. Post completion of training, these artisans shall also be certified under RPL, (iii) All the trainees shall receive an honorarium of Rs. 200 per day during the training period, (iv) An advanced toolkit, free of cost, shall be provided by the department to the trained artisans

(d) Common Facility Centre (CFC) scheme

Objective of the CFC scheme is to establish a CFC which would encompass following activities: Testing Lab, **Design Development and Training Centre**, Technical research and Development Centre, **Product exhibition cum Selling Centre**, Raw Material Bank / Common Resource Centre, **Common Production / Processing Centre**, **Common Logistics Centre**, Information, Communication and Broadcasting Centre, Packaging, Labelling and Barcoding facilities, Other such facilities related to missing link of value chain.

Proposed working shed for artisan may get advantages from the CFC scheme under ODOP for the activities such as - Design Development and Training Centre, Product exhibition cum Selling Centre, Common Production / Processing Centre, Common Logistics Centre

Incentives – (i) For CFCs of project cost up to Rs. 15 crores, the State government shall provide a financial assistance up to 90% of the project cost, while a minimum of 10% would be borne by the SPV, (ii) Financial assistance would also be given for CFCs of project cost more than Rs 15 crores, provided the State's share would be calculated on Rs 15 crores only, (iii) The State government can also sanction capital for the projects of similar nature, previously approved by the Central & the State governments, which are incomplete due to the lack of funds. For supporting such incomplete projects, proper justification would be provided.

A few relevant case studies for the handicraft upliftment projects are detailed put in **next section**.

14.1.5 Case study - Handicraft sector

14.1.5.1 Case study – Banarasi Silk Saree work

Case study of Banaras Saree Industries

*Varanasi or Banaras is also been the **famous for its production of silks & brocades with gold & silver thread work.***

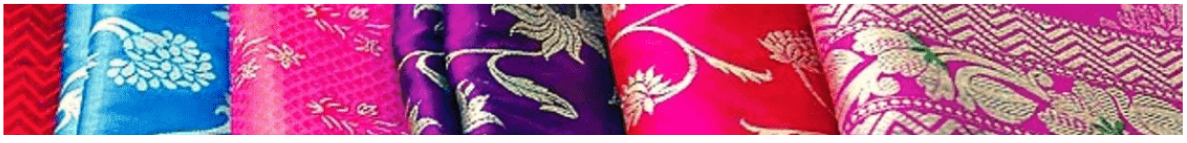
Banarasi silk has, for generations attracted the fashion world & has been a great source of inspiration to the costume experts all over the globe.

Challenges

- *With the growing popularity of power looms in the mid – 1980, the Banarsi Silk Industry started **facing a stiff competition from Power loom Industries**. Due to the reduced timing of weaving through power looms, the weavers were choosing the power looms over the traditional handlooms, although the quality produced was not that of being produced by a Handlooms.*
- *The low sales of the Banarsi Silk Sarees due to **lack of orders because of availability of cheaper, brighter machine made sarees which are made from synthetic & polyester yarns.***
- *Most of the local artisans involved in the industry **did not have the knowledge of Marketing strategy, fashion trends & organizational skills** due to which they are being exploited by the middle men. As a result of which, they were not able to expand their market which threatens their existence in the market.*
- ***Electricity crises & storage space crises** was the fourth challenge being faced by the industry due to which they were unable to produce their daily minimum products.*

Measures taken to revive the industry

- *In 2009, **Geographical Indication (GI) rights** were issued to 'Banaras Brocades & Sarees' covering silk brocades, textile goods, silk sarees, dress materials & silk embroideries.*
- *A **200 crore Trade Facilitation Centre** was set up by the Government in 2017 in order to provide a platform to the local artisans for showcasing their products produced by handlooms as well as a **skill development centre was also set up** in order to encourage the next generation to carry forth the legacy.*
- *Presently, many Top designers are closely working with the weaving clusters to showcase the handlooms products in their fashion shows. Apart from this, they are also trying to modernize the Banarsi Silk sarees by introducing new patterns & weaves.*



14.1.5.2 Case study - Tripura Cane & Bamboo craft

Case study of Tripura cane & bamboo craft Handicraft Industries

- Tripura is primarily an agrarian economy wherein Agriculture and allied activities are predominant but apart from being an agrarian economy, The State's economy is also being supplemented by art & craft industries involving manufacture and production of handicrafts and handlooms products.
- The main forms of art & craft industries in the State are Intricately designed handloom and silk, cane & bamboo works along with other various products being produced which are Interior decorative products, furniture, various gift items, etc. which are also being exported to many countries.
- However, the art & craft industry of the state still remained one of the unorganized sector of the state's industrial sector till 2007 & was not able to expand at greater level with the course of time due to various challenges being faced by local artisans.

Challenges

- Due to the **transportation bottlenecks & remote location of the state,** the artisans do not have direct access or connectivity to the markets. As a result of which they were not able to sell their products at national & international levels.
- The second challenge faced by the industry was that even if they got order from the whole seller, they were not able to deliver that orders on time , due to transport bottlenecks.
- Another challenge faced by these industries was the **absence of Market Infrastructures in the state.**

Map source –www.infoandopinion.com

Measures taken to revive the industry

- In order to boost the development of the Handicraft & Handloom industry, **government has launched Tripura Bamboo Mission in PPP mode in 2007**. The main objective of this mission is to increase the turnover of the industry through introduction of new design products & organised marketing of the products.
- Apart from Tripura Bamboo Mission, State Government has also **launched other following programmes** to give a boost to the industry which are as follows:
  - **Skill Up – gradation training programme**
  - **Assistance of working capital**
  - **Setting up of a Bamboo park in Agartala**
  - **Organization of Industries & Commerce Fair annually**
- Apar from the above government initiative, **youths have started handicraft workshops & a Community Facility Centres (CFC) at their own level** which have helped the industry to grow.

14.1.5.3 Case study – Bhadohi Carpet craft

Case study of Bhadohi Carpet Industries

- Bhadohi Carpet is famous for its various knots & counts design which are being exported to many countries. The specialization of this belt lies in Wollen, Tufted, Tibetan Carpet & Durries. The production of carpet industry in Bhadohi district is being spreaded over 1000 square kilometres & the livelihood of many villagers is being dependent on the Bhadohi carpet industry employing approx. 22 lakh rural artisans.
- Carpet weaving by hand has got rich history as long as back in 13th Century. As per evidence available, this craft had started in 1300 BC at individual level in India. However, carpet weaving in Bhadohi was started by a small number of carpet wavers on a very small scale after 1875 A.D war of freedom which was proliferated to industrial level in late 19th century through the establishments of some industries/ factories in the small village of Khamaria by some industrialists such as Mr. A. Tellery & his son Mr. Otto Tellery and a group of three European industrialists (Messrs, Oklay and Tallor).

Challenges

- **Due to the 2007 – 2009 recession, there was decrease in the exports of Carpets** which had forced many carpet weavers & business community to shut down their factories. This was the first challenge being faced by the carpet industry after having establishment of around 400 years.
- **Due to the low wages, many skilled artisans have been shifted to NREGA scheme** which is providing a standard wages. This resulted in the shortage of skilled weavers in the industry.
- The third challenge faced by the industry was that **weavers involved in the industry did not have the knowledge of Marketing strategy & organizational skills** due to which they were being not able to expand their market which threatens their existence in the market & were highly dependent on Middleman.
- The **infrastructure facilities required to support the Hand woven carpet industry like electricity, water supply was poor** which was reducing the working hours of the weavers, thus, impacting their productivity.

Map source – www.Mapsofindia.com

Measures taken to revive the industry

- In September 2010, the Bhadohi Carpet Industry has granted the Geographical Identification (GI) number, so that, the exploitation of weavers by middle – man can be minimized.
- Carpet Export Promotion Council India (CPEC),a non – profit organization was set up by Ministry of Textiles in 1982 in order to promote all types of Handmade carpets overseas through fairs being organized by them.
- In addition to this, to address the above stated challenge, the UP Government has set up the different government agencies. For example – Uttar Pradesh Small Industries & Export Cooperation (UPSIEC) in order to provide land & industrial shed; Small Industries Development Bank of India (SIDBI) in order to provide financial assistance, etc.

14.1.5.4 Case study – Raw material bank

In order to improve access to raw materials, the component under AHVY- 'Setting up of Raw Material Banks' was envisaged under a PPP mechanism to ensure availability of good quality, certified and graded raw material to artisans/ entrepreneurs at a reasonable rate. So far, 16 Raw Material Banks have been set up under this component, however, there have been several challenges faced due to which the coverage has not been as wide as envisaged. To address these, a new approach is needed, with the inclusion of the Raw Material Banks component under the Infrastructure Scheme with the provision of greater financial assistance. At the same time smaller Raw Material Banks can be set up within the cluster, improving the access for artisans and attaining greater coverage. The details of the component for setting up of 'Raw material banks' under the AHVY scheme and its performance are as follows:

Components repositioned from the AHVY scheme are:

- Establishment of craft-based resource center
- Setting Up of E-Kiosks
- Setting up common facility center
- Setting up raw material bank
- Setting up of facility centers by exporters/ entrepreneurs

The Aim of this component is to make easy availability of quality, certified and graded raw material to artisan/ entrepreneur at a reasonable rate.

Status of implementation of component for setting up Raw Material Banks
A total of 16 Raw Material banks have been sanctioned so far, in the following States and Craft Categories:

Table 14-1: Number of raw materials under AHVY

State	No. of Raw Material Banks Sanctioned	Craft
Karnataka	1	Wood & Lacquer craft
J&K	1	Khatumband
Andhra Pradesh	1	Red Sander Wood
Nagaland	1	Cane & Bamboo, Wood & Artistic Textiles
Mizoram	1	Cane & Bamboo, Wood
Uttar Pradesh	1	Jute craft
Tamil Nadu	1	Metal Craft
Kerala	1	Wood Craft
Assam	3	Bell Metal, Cane
Madhya Pradesh	1	Leather Craft
Manipur	2	Artistic Textiles
Orissa	2	Brass & Bell Metal, Applique

Source - Working group report on Handicrafts for the 12th Five Year Plan
https://niti.gov.in/planningcommission.gov.in/docs/aboutus/committee/wrkgrp12/wg_handi1101.pdf

14.2 Health and education sector

14.2.1 Background

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 nearby areas as well as Kumaun, Rohilkhand, and West Nepal region.

As per data provided by CMO Bareilly, at present, there are various government & private healthcare facilities as below:

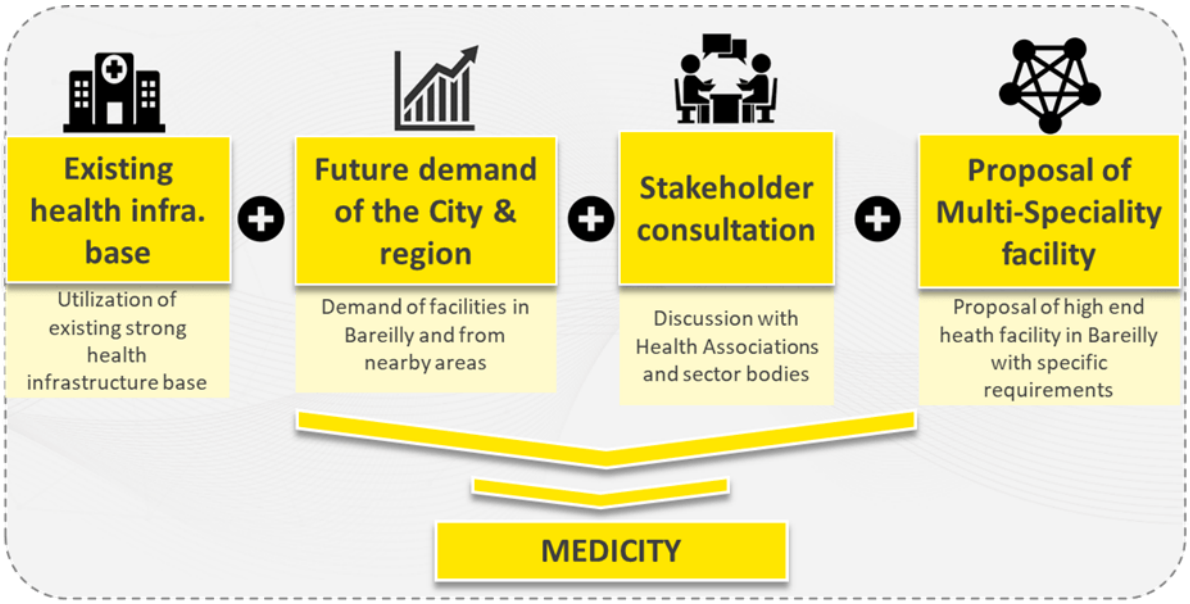
- Under Urban area, there are District Women Hospital, District Hospital, 300 Bed Hospital, PHC's & Others including District Mental Hospital, TB Hospital, Mother and Childcare (MCH) Wing, Railway Hospital, Military and Army Hospital, Employee's State Insurance Corporation Hospital.
- Under Rural areas, there are government facilities PHC's, Health Sub – Centers & CHC's.
- Private Health Centre also available in this region due to high demand of health services. Most of private health center situated in the urban regions Bareilly as a head quarter has high density of medical facilities. Clinical Health Centers and Nursing Homes are well dense in Bareilly city.

There is a total of 104 PHC's. Currently, 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.

14.2.2 Problem statement

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.

Factors governing the requirement of a Medi - City



Additionally, discussions with Health Associations and health sector bodies, it has come up that there is a need of an organized healthcare facility in the Bareilly. As at present, the existing healthcare

facilities are present in various parts of the city irrespective of parking, ROW and proper access due to which the local people as well as people from nearby areas face difficulties in accessing these facilities. The existing health facilities needs to be upgraded in terms of technologies, resources, and facility, as well due to deterioration of these facilities over the time. To address these, a proposal is already being put up by the government for the high-end health facility in the district in the master plan which may be incorporated with the provision of Medi – City in Bareilly.

14.2.3 Vision – Health & education center

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

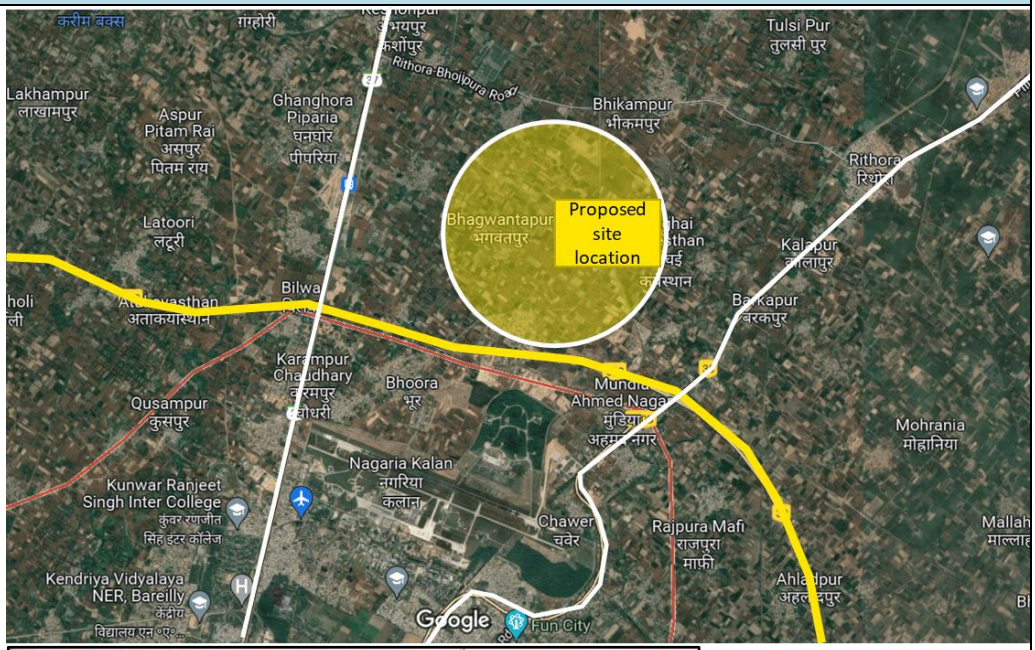
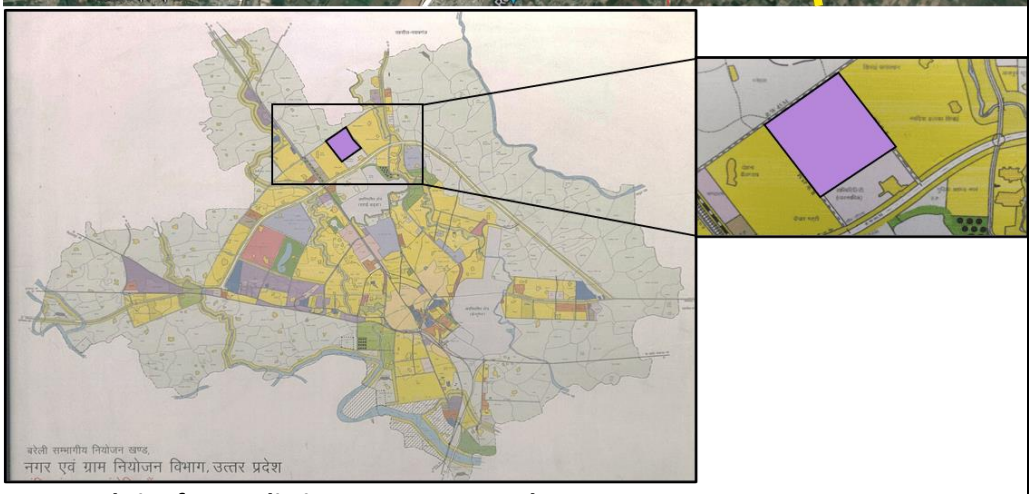
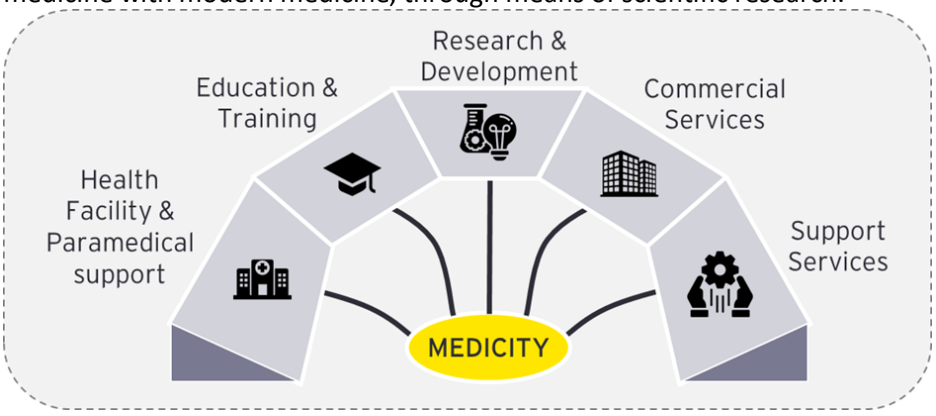
14.2.4 Key intervention - Development of "Medicity" designated area with multiple health business and activities

The concept of modern medical cities or special health care facilities has been in place for some time, but has gained renewed interest, particularly in rapidly developing economies. The concept of a Medi City or health city defines a cluster of hospitals, a holistic healthcare center; a large hospital sprawled across acres of land. Medi-city can be a new township or a zone of a city, where medical facilities are provided releasing pressure from the main city or to promote medical tourism attracting new sources of economic growth.

Medi-cities have been designed to be comprehensive in scope and incorporate advanced technologies and medical practices. The scale and scope of medical cities usually demands an advanced level of care, both in technology and approaches to create an attractive destination for care to ensure the high level of patient volumes required to support such a large setup.

Planning strategy - Medi cities have the ability to support services that are highly specialized, services that often struggle to see sufficient volume to support a business case. Medi-cities need to have a strong higher and medical educational system and complete and stable infrastructure to become an ideal location for specialization. Due to the interplay of economies of scale, the Medi-city creates an interesting and opportunistic intersection with medical tourism as mentioned earlier. For those organizations providing medical tourism services, this integration extends beyond the immediate community into the global healthcare delivery system.

Proposal	**Development of "Medicity" – designated area with multiple health business and activities**
Location	Proposed Medi City land in Master plan 2021 may be utilised for this proposal

Proposal	Development of "Medicity" – designated area with multiple health business and activities
	  **Proposed site for Medi City as per master Plan**
Components proposed	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

<table>
<tr><td>Proposal</td><td>Development of “Medicity” – designated area with multiple health business and activities</td></tr>
<tr><td></td><td>• Paramedical education hub
• Medical Research Centre
• Traditional Medical Practices
• Manufacturing and technology
• Convention centre and hotel accommodation</td></tr>
<tr><td>Concept</td><td>Broad identified components under Medi city for Bareilly:
<table>
<tr><th>Category</th><th>Components</th><th>Guideline</th><th>Assumption</th><th>Sq.Ft.</th></tr>
<tr><td>Residential</td><td>Hostels for staff & students</td><td>Residential Hostel Area = 0.40 Ha for 1500 persons</td><td></td><td>43,056</td></tr>
<tr><td rowspan="2">Commercial</td><td>Convenience stores</td><td>Local shopping including service centre for 15,000 pop, area 4,600 sqm</td><td></td><td>49,514</td></tr>
<tr><td>Hotels / accommodation facilities</td><td>-</td><td>13455 sq.ft.area for 50 rooms</td><td>13,455</td></tr>
<tr><td rowspan="3">Recreational</td><td>Recreational buildings</td><td>10000 sq.mt for 1 lakh</td><td>5000</td><td>53,820</td></tr>
<tr><td>Meditation centre</td><td>5000 sq.mt for 1 lakh</td><td></td><td>53,820</td></tr>
<tr><td>Garden / parks</td><td>Neighbourhood Park for 15000 pop, area 1.00 ha</td><td></td><td>1,07,639</td></tr>
<tr><td rowspan="6">Health</td><td>Paramedical cum Nursing college</td><td>For 10 lakh population - Institute Plot area = 2000 sqm (subject to Nursing Council of India/ Ministry of Health Norms)</td><td></td><td>21,528</td></tr>
<tr><td>Multi-Speciality Hospital (including Area for hospital and Area for residential accommodation)</td><td>200 beds (Initially the provision may be for 100 beds 1 Lakh) (Total Area = 9.00 Ha a) Area for hospital = 6.00 Ha b) Area for residential accommodation = 3.00 Ha)</td><td></td><td>9,68,752</td></tr>
<tr><td>Centre for medical research and development work</td><td>-</td><td>1500 sq. ft</td><td>1,500</td></tr>
<tr><td>Pharmacy</td><td>min 15 sq.mt.</td><td>more than 150 sq. mt.</td><td>1,615</td></tr>
<tr><td>Rehabilitation centre</td><td>-</td><td>1 hectare</td><td>1,07,639</td></tr>
<tr><td>Wellness Centres</td><td>-</td><td>1 hectare</td><td>1,07,639</td></tr>
<tr><td colspan="4">Total</td><td>15,29,975</td></tr>
<tr><td colspan="4">in Hectares</td><td>14</td></tr>
</table></td></tr>
</table>

Proposal	Development of "Medicity" – designated area with multiple health business and activities
	in Acres: 35 **Broad assumptions for concept:** **Minimum area requirement:** 30 – 50 acres based upon case studies. However, the area is a limiting factor pertaining to the components proposed. It will also impact the overall project cost.
Stakeholders listing (both Government and Private)	• Bareilly development authority • Indian Medical Association • Chief Medical Officer Office Bareilly • UP nurses and midwife Council Bareilly
Benefits	• Development of a comprehensive facility integrating health facilities, institutions, research labs etc.

Our proposal is adhering to the existing URDPFI guideline as per following matrix:

S.N.	URDPFI Prerequisites for Medi City	Adherence in the proposal	
1	**Volume and demand:** Medi-cities will always require a significant amount of patient volume from the local population in addition to the human resources and community infrastructure that a city setting provides.	The city serves as a gateway to the patients of the nearby areas as well as Kumaun, Rohilkhand, and West Nepal region. At present, Bareilly city has 7 general hospital, 9 multi – speciality hospital, 14 intermediate hospitals and 13 veterinary Hospital for pet and animals whereas as per URDPFI norms up to 2031, there will be requirements of additional 5 multi – specialty hospitals, 14 specialty hospitals.	✓
2	**Special infrastructure:** Medical care and associated infrastructure is to be provided in a planned manner. Medi-cities require highly specialized provisions for medical waste handling especially hazardous bio-waste, accessibility, special care systems, area reservations and infrastructure.		✓
3	**Accessibility:** Well-connected site is required for Medi-city development to provide ease in accessibility. Parking provisions in a Medi city is need based demand, focusing on institutional set-ups. Accessibility into and around the Medi city should be highly focused on the accessibility of differently abled / physically challenged / disabled.	The site is strategic and well located, which good connectivity to nearby urban centres as following: **State / UT** — **Urban centres** **Uttar Pradesh** — Pilibhit – 1 hr; Shahjahanpur – 1.5 hrs; Budayun – 1.5 hrs; Moradabad – 2 hrs; Aligarh – 4 hrs; Lucknow – 5 hrs **Uttrakhand** — Haldwani – 2 hrs; Nainital – 3 hrs **Delhi** — Delhi – 5 hrs	✓

S.N.	URDPFI Prerequisites for Medi City	Adherence in the proposal	
4	**Attractiveness:** Medical cities need to offer several attractive attributes to attract foreign or 'non-local' patients to overcome the competition, having special care, area reservation, and infrastructure facilities. Hotels, beautiful landscaping, and country club, in order to attract and promote medical tourism, should complement the Medi city.	The propsed Medi City comprises of recreational, commerical infrastruture as well to complement the development.	
5	**Multiple functions:** Medi-cities developing in isolation do not reach the maturity stage. Medical cities should also incorporate substantial non-medical services to support the staff, patients, and visitors. Clear approach and effective forecasting may not be easy in such a case.	Medi city shall comprise of medical and non-medical services to support the existing working population of the city in the capacity of the staff, patients from city and nearby areas and visitors.	
6	**Poor management of health care waste** potentially exposes health care workers, waste handlers, patients and the community at large to infection, toxic effects and injuries, and risks polluting the environment. It is essential that all medical waste materials generated from medical city are segregated at the point of generation, appropriately treated, and disposed of safely. Bio- Medical Waste (Management and Handling) Rules, 2011 MoEF or latest such guidelines, must be followed in Medi-cities (to be monitored by CPCB/SPCB as per their regulations).	Bio-Medical Waste (Management and Handling) Rules, 2011 MoEF or latest such guidelines, shall be followed in Medi-city.	

Aspects of Planning:

One of the most critical issues in Medi-city can be handling of hazardous medical waste, essential facilities for the maintenance of Medi-city have been prescribed by WHO, these are:

- Effective waste reduction and waste segregation, ensuring that only appropriate wastes are incinerated.
- Siting incinerators away from populated areas or areas where food is grown, thus minimizing exposures and thereby risks.
- A properly engineered design, ensuring that combustion conditions are appropriate, e.g., sufficient residence time and temperatures to minimize products of incomplete combustion.
- Construction following detailed dimensional plans, thus avoiding flaws that can lead to incomplete destruction of waste, higher emissions, and premature failure of the incinerator.

Apart from the waste handling of the Medi-city, the key aspects of planning are:

- **Access:** One of the primary success factors for proper healthcare design is convenient and easy access to and from the facility. This includes simple way finding, safe and weather-protected vehicular drop-offs, and convenient access to parking. Such access is often at odds

with urban planning trends, which attempt to minimize the impact of vehicular transportation in favor of more pedestrian-oriented buildings.

- **Transportation facilities** like bus routes, metro rail, bicycling, and heliports are substantial non- medical services to support the staff, patients and visitors.

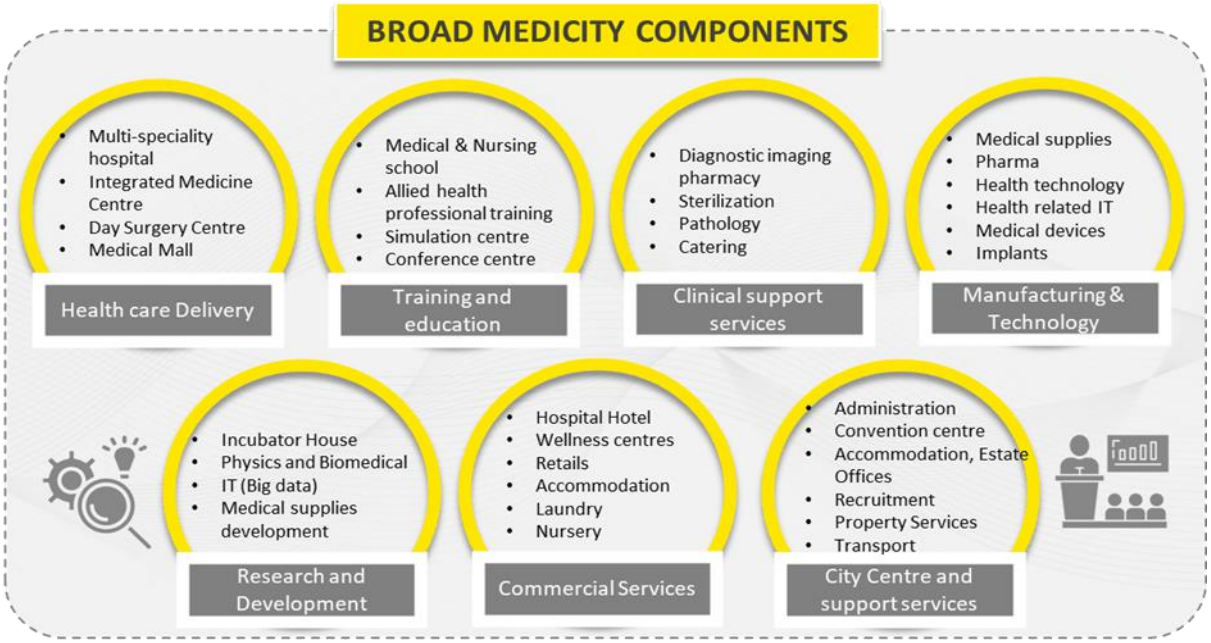
- **Parking Demands:** Access to public transportation and housing within walking distance creates opportunities for staff and certain patients and visitors to avoid vehicular commuting altogether. This reduces the polluting impact of automobiles and can minimize the size of required parking facilities. It should be noted, however, that even with these reductions, hospitals would still generally create a much higher parking demand per square foot than a typical urban office building.

- **Natural Environment:** Environment Studies have concluded that a natural environment is essential to create a genuine state-of-the-art healing environment and reducing stress. Key sustainable design elements such as roof-gardens, courtyard spaces can minimize the buildings heat-island effect, reduces demand on storm water systems, improves surrounding air quality, and reduces noise pollution.

- **Institutional:** Integration of Medi-city with research and development centres for bio-medical research, medical colleges, training centres are necessary. Also, financial support units should be created such as banks, ATM facilities, information centres, money transfers and exchange and insurance company outlets.

- **Commercial Space:** A mixed use community is desirable in this area because of its proximity to the emerging Medical City. Therefore, Planned Development shall be encouraged, including a mixture of residential use types, hotel, retail/commercial, office and airport support, commerce, conservation, and recreational uses.

Medical city should encompass the concept of self-sustainable cities/townships, in a way as an eco-city is designed with consideration of environmental impact. They should have clean disposal of waste, waste-to-energy, renewable energy, sustainable transportation and drainage system, zero-energy building, green roof, etc.



A few relevant case studies for the Medi-city concept projects are detailed put in **next section**.

14.2.5 Case study - "Medicity"

14.2.5.1 Health hubs / Medico cities in West Bengal, Andhra Pradesh on PPP mode:

Case study	Bardhaman Health City, Bardhaman, West Bengal	Health hubs in 13 districts of Andhra Pradesh
Components	• 500 bedded hospitals • Centres of excellence (super-speciality treatment) • Pharmacy • Telehealth institute • Rehabilitation centre • Medical college, nursing college, advanced dental college • Centre for medical research and development work • Mother & child health centre • Hostels for staff & students • Convenience stores, recreational facilities & other civic amenities	• Medical colleges • Nursing colleges • Teaching hospitals • Super-specialty/multi-specialty hospitals [Objective to scale up tertiary healthcare facilities]
Project Cost	INR 1000 Cr (expected)	Min. 100 Cr
Site area	60 acres	30-50 acres (5 acres free of cost)
Type of PPP	DBFOT	Not yet decided
SPV	**Bengal Faith Health Care Pvt Limited (**Bardhaman Development Authority & Bengal CES Infratech Private Ltd in association with FAITH Healthcare Private Ltd	--
Status	**No updates since 2013** (Phase 1 commenced; 100 bedded Bengal Faith Hospital – functional)	Announcement in May 2021

14.2.5.2 Fortis Medicity, Gurgaon and Lucknow

Figure: Fortis Medi-City

At an investment of over Rs 1,200 crore, the project in Gurgaon will have two campuses. The hospital campus will have a high-end, multi-super-speciality hospital and research centre. The college campus will boast of a medical college for undergraduate and postgraduate education, a dental college, nursing college and facility for primary and applied research in medicine along with a 600-800-bed hospital.

Spread over 52 acres, the project in Lucknow will see an investment between Rs 500 and Rs 800 crore. It will have an 800-bed hospital, a medical college offering undergraduate, postgraduate and post-doctoral courses, a dental college, nursing college, college of physical medicine and rehabilitation, college of rehabilitative medicine and a college of allied medical science.

14.2.5.3 Apollo Health City, Hyderabad

At an investment of Rs 1,000 crore, this 33-acre project in Hyderabad will not impart undergraduate education. However, it has a postgraduate college for doctors, a nursing school and college, college of physiotherapy, institute of hospital administration, institute of medical informatics, institute for emergency medicine and an institute for paramedics. The hospital has 500 beds and almost 200 more will be added over the next six months.

Figure: Apollo Health City, Hyderabad

14.2.5.4 Aster Medicity Kochi

Aster Medicity is a quaternary care healthcare centre in the city of Kochi and one of the largest in South India. It is the flagship hospital of Aster DM Healthcare, a healthcare conglomerate founded by Azad Moopen. This was the third venture of the group in Kerala, after the Malabar Institute of Medical Sciences (MIMS) and DM Wayanad Institute of Medical Sciences (DMWIMS).

Figure: Aster Medi-City, Kochi

Aster Medicity is a ₹ 5.5 billion waterfront facility located along Kutti Sahib Road in Cheranallur, a suburb of Kochi and its 40-acre campus is situated on the banks of the backwaters of Kochi. The hospital complex, designed by HKS Architects, has a built-up space measuring a total of 62,710 square metres. The hospital is 7 km from the city center and is accessible through the National Highway 66. Edappally railway station is 7.3 km away and the nearest airport is Kochi International Airport, 24.7 km from the hospital by road. The distance to the National Highway 544 is 7.9 km at Edappally bye-pass junction where Lulu Mall, the largest shopping mall in the country, is located.

The hospital has an in-patient capacity of 670 beds and has 24-hour emergency and accident trauma care facilities. The hospital has been functioning since September 2014 after a soft launch, but the official dedication ceremony was on 6 May 2015, when the institution was inaugurated by the former president of India, A. P. J. Abdul Kalam. The hospital plans to add 500 more beds in its second phase of expansion.

Facilities

The hospital has a general clinical division which includes Internal medicine, General surgery, Clinical imaging, Anaesthesia and critical care, Emergency, Pulmonology, otorhinolaryngology, Dermatology, Craniomaxillofacial surgery, Dental sciences, Infectious diseases and infection control, Psychiatry and

Nuclear medicine. It also has eight centres of excellence such as Cardiac Sciences, Orthopaedics, Neurosciences, Nephrology and Urology, Oncology, Gastroenterology and Hepatology, Women's Health and Child and Adolescent Health, each manned by independent medical teams composed of specialists, nursing and ancillary staff and technicians.

Figure 14-2: Lay out plan of Aster Medi-City

Aster Medcity has facility for Minimal Access Robotic Surgery (MARS) using da Vinci Surgical System and is reported to be the first hospital in Kerala to provide the service. The system employs tele surgical master-slave robotic system and the surgery is carried out using robotic arms instead of human hands. The Diagnostics division is equipped with 3 Tesla Digital MRI Scanner, 256 slice CT Scanner, Digital Mammography system, The Dexa, Digital X-Ray, Time of Flight PET CT, Cath Lab Allura Clarity system, Flat panel Bi-plane Hybrid Cath Lab, Colour Doppler Systems electronic 4D Imaging and Ultrasound Machines with multi modal image fusion. The clinical laboratory which conducts Biochemistry, Hematology, Bacteriology, Mycology, BS Level 3 Tuberculosis, Serology, Immunology, Histopathology, Neuropathology, Renal pathology, Pulmonary pathology, Hematopathology, Bone Pathology and Onco pathology tests, is integrated with the hospital information system. The hospital has an ambulance service, a pharmacy and a rehabilitation centre. A blood bank is also operational round the clock in the hospital.

Other services

Aster Medicity is linked to Aster Foundation, an independent charitable non-governmental organization, engaged in providing free medical assistance to financially compromised patients. The hospital serves as a referral healthcare centre for patients from the Persian Gulf region. The group has opened help desks in Qatar and Oman for this purpose.

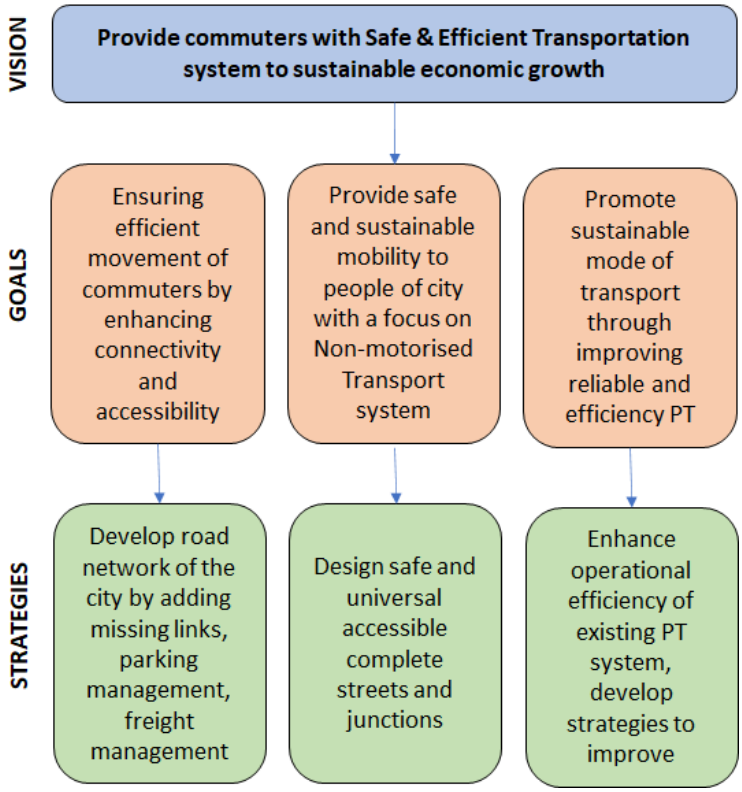
Chapter 15. TRANSPORTATION PROJECTS

15.1 Vision Planning in Transport Sector

Bareilly (UP) envisions the comprehensive features to the user for provision of Intelligent Transport System, Sustainability and Safety features. The commuters/road users will have urban amenities as per norms/guidelines for transport facilities, road markings, street lighting, public transport, parking, street infrastructure, charging stations, bollards, vehicle registration system, junction improvement plan, comprehensive mobility plan, smart components on roads, Integrated Command and Control Centre, non-motorized vehicles stand, pods and signages. Towards a sustainable urban environment, the local development authority is committed to creating better transport infrastructure and connectivity to the city needs.

15.2 Approach

A system that informs every commuter with accurate information, when they need it, where they need it, and how they need it and contributes to a safe, seamless, secure and equitable transportation network.



Most of the cities in UP are being facing public transport problems for many years, affecting the mobility of people and economic growth of the area. These problems are due to inadequate transport infrastructure and its sub-optimal use, lack of integration between land use and transport planning, lack of mass transport system and little improvement in city bus services, which encourage a shift to personalized modes.

15.3 Critical Gaps and Issues in Transport Sector

The urban transport & infrastructure related departments face several challenges, such as lack of infrastructure in the department, paucity of funds, etc. Similarly, issues related to lack of adequate data, clarity in rules and procedures, implementation difficulties are being reported by the departments in terms of meeting the programme objectives.

To improve urban mobility certain measures would be taken, such as convert all buses into clean fuel and hybrid technology driven so as to reduce the pollution level. GPS and GPRS systems would be made mandatory in all buses. New routes will also be required to be formulated for better transportation in urban areas along with traffic regulation/management in the existing routes. Separate city bus track/multi-level parking/inter-state bus terminals (ISBT) and intrastate bus terminals will be developed by PWD/Development Authority and Nagar Nigam.

All encroachments on roads will be removed by coordinating with all departments concerned. Few other interventions required to provide sustainable urban transport services in the cities are:

- Providing radio taxis in every tourist city.
- Providing separate city bus track in all big cities and double decker buses on these routes.
- Urban transport services will be made disability and gender friendly.
- GPS/GPRS system, Wi-Fi facility, air conditioning and bio-toilets will soon be installed in public buses.
- Development of multi-level parking is going on in all big cities. ISBT and intrastate bus terminals are in the process of modernisation.
- Disaster management system proposed to be developed at all public transport facilities such as bus stations, petrol pumps and parking places.
- Conversion of all buses into clean fuel, ethanol and hybrid technology driven to reduce pollution levels.
- Solar panel enabled buses in big cities.
- Under the Smart City Mission, special transport system will be developed for promoting intracity tourism in heritage cities.
- State Road Transport Corporation (UPSRTC) will be developing special transport package to connect heritage cities.

15.4 Vision and Project Components

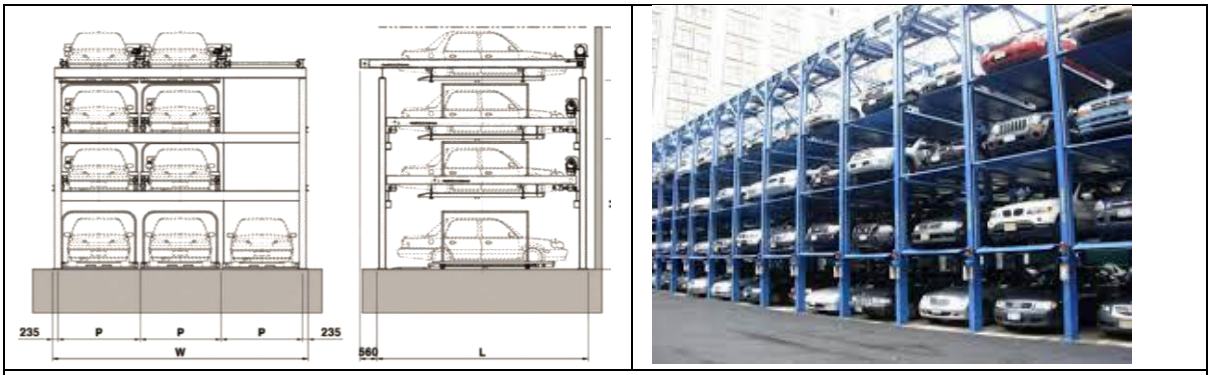
15.4.1 Parking Policy and Construction of Off-street parking lots in major market and commercial areas to accommodate the parking demand.

The main objective of the Parking policy to provide relief of congestion, to reduce parking demand through increased parking cost, to promote public transport for comprehensive mobility.

The vision of this project focuses on setting up an off-street parking infrastructure in high traffic congestion zones for the citizens of Bareilly city. The intention is to create modern, space and cost-efficient multi-level parking structures which will ease the load on the roads. They shall have the following features:

- Automated operation
- Puzzle-type electromechanical parking
- Space efficient design
- Reasonable pricing

Multi-level puzzle Type Parking best practices



- System: Electro Mechanical (upper & lower pallets move)
- Material: Mild Steel
- Levels: 5 Levels
- Measurements: 7.5 m width, 6.0 m in length, 3.7 m in height

Figure 15-1: Multi-level Puzzle type parking at Kolkata

Multi-level Puzzle type parking system can be said to be a combination of pallet and stack systems with minimum space utilisation adjacent to the road.

- Revolutionary Parking System with maximum floor space utilization
- Vertical Allocation of the parking rooms
- System virtually eliminates Driveways, Ramps, Passenger Lifts etc.
- Three side open cantilever lift for direct drive in and drive out operations
- Possible to integrate various safety and security features
- Can be installed in independent steel tower as well as built in type in RCC structures
- Model Type: 9 Bay x 4 levels
- Area of unit: 2.5 x 5.6 m
- Height: 1.6 m
- Load Bearing: 1600 kg

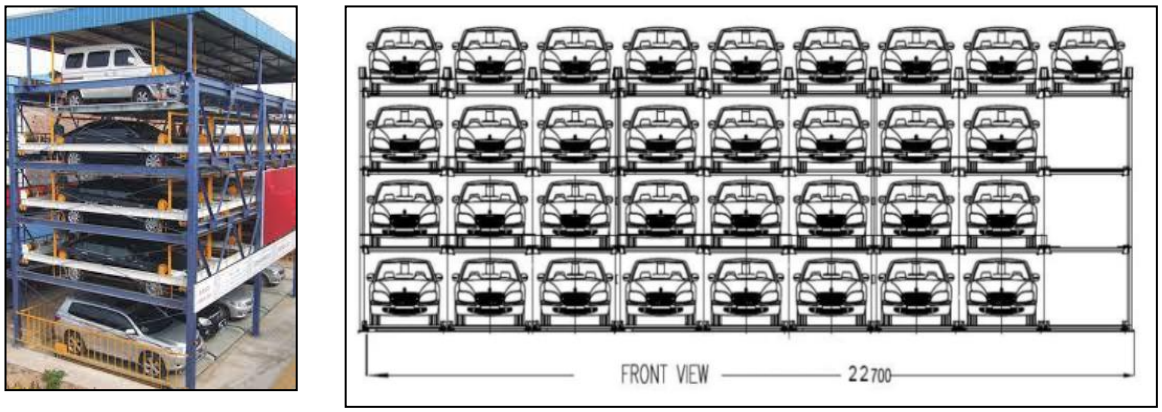


Figure 15-2: Typical Layout of Multi-level Puzzle Car parking

15.4.2Strengthening of Radial Road connecting to Ganga Expressway

The proposed Ganga Expressway is a greenfield project with 6 lane connecting western part of the UP with eastern part with total length of 594 km. The expressway will cover 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.

NH 530B is a secondary route, connects Bareilly-Budaun-Kasganj-Hathras and Mathura in the state of UP with total length of 265 km. The distance between Bareilly to Badaun is only 50.0 km and as per news article the connectivity to Bareilly city is 36 km (Approx.) from proposed ganga expressway.

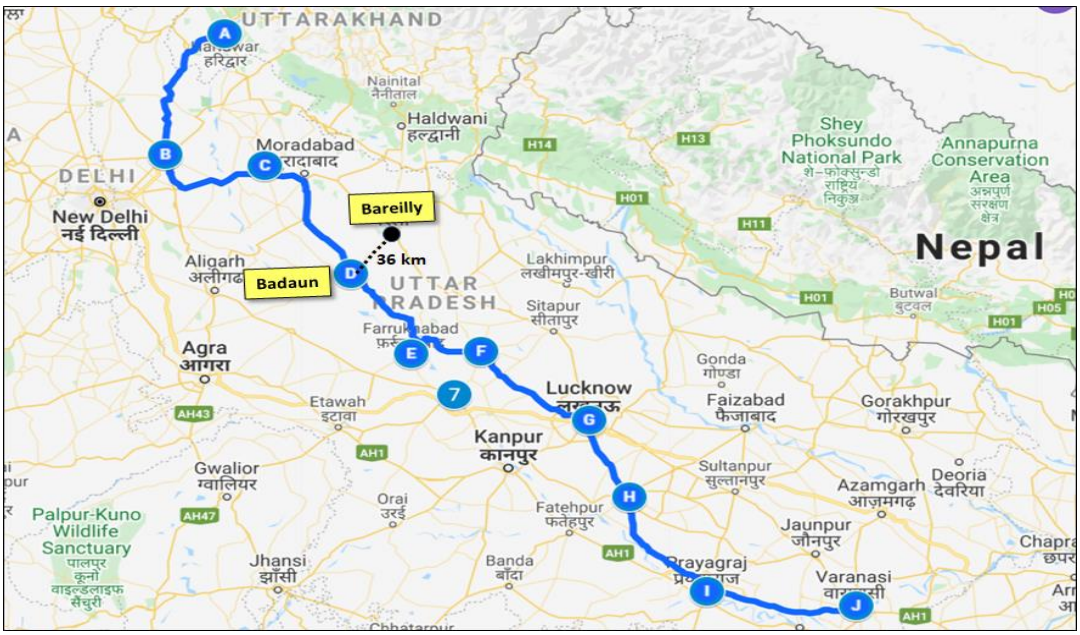


FIGURE 15-3 GANGA EXPRESSWAY ALIGNMENT

FIGURE 15-4 STRENGTHENING OF THE NH 530B ROAD

The vision of this project is to connect the Bareilly city with proposed Ganga Expressway with seamless and uninterrupted traffic movement by strengthening the NH 350B. At present, this section is 4 lane divided carriageway and at some locations construction of flyover is taking place. An alternative connection from Parsakhera Industrial area of Bareilly can be linked to the NH 350B.

15.4.3 Interactive Bus Stop at various locations

To bridge the gap and provide a society in line with the vision of inclusive growth, the purpose of the project is to drive economic growth and improve the quality of life of people by enabling local area development. The objective is to promote cities to provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment. Redevelopment of Integrated bus stops/shed with the facility of charging point, CC Camera, Location Map, Lighting, seating facilities and Information display Boards.

The system must meet the essential criteria such as Availability, Accessibility, Assessment and Acceptance. Amongst the citizens, special provisions must be made for the physically challenged, senior persons, women and children who may have difficulties in accessing the services of minibus easily. The range of interventions to meet the stakeholders' expectations could cover:

- Redesigning bus stops on-line display of bus arrivals
- Creation of suitable infrastructure at bus stops and bus stations for on-line real-time
- passenger information system.
- Special seat allocation for old-aged, physically challenged, women and children
- Prioritizing their entry into and Exit from the buses before others.
- Status of the bus schedules.
- Electronic ticket sale machine and fare collection system.
- Real time communication with the drivers for incident / emergency management.
- Schedule and bus stop announcements through visual displays and voice based.
- Dustbins, bollards and other facilities

FIGURE 15-5 CONCEPT DESIGN OF THE MINIBUS STAND

15.4.4 Development of Cycle Track Corridor

Objective of this project is to provide safe and congestion free movement of vehicles and provide preference to NMT vehicle for future sustainability. Non-motorized mode is sustainable, environment friendly mode of transport and docking stations are proposed at close proximity to bus stand/railway station/major junction.

In 2015, a cycle track from satellite flyover was constructed with length of 850 m with 2.75 m wide from Satellite junction to isanyion-ki-puliya. Features of Non-motorized transport system is

- To provide convenience to the passengers by way of last mile connection with availability of eco-friendly transportation services at convenient locations in the city.
- To ensure affordable, flexible, safe & secure and comfortable mobility services for short trips as may be utilized by the citizens and general public.

- To provide an active transport choice that offers physical health benefits to the residents of Bareilly.
- Thermoplastic paint with reflective glass beeds with 2.5 mm thickness, 150 mm white solid lane marking and cycle symbol with different colour on the path.
- Lane width: 1.5 to 2.5 m
- Signages of cycle tracks along the route.

FIGURE 15-6 CYCLE TRACK IN LUCKNOW

15.4.5 Establishment of Freight Logistic Hub for efficient distribution of inter & intra urban freight movement in Bareilly

Freight Logistic hub plays a vital role in promoting storage and distribution of Agricultural and industrial produce. In case of Agricultural produce, it enables the markets to ease the pressure of safe storage during harvest season and thus maintain uninterrupted supply of agricultural commodities during off season. It solves the problems of excess and scarcity, which are the usual problems in marketing of agricultural produce. Industrial produce could be seasonal processing factories, which can be operational for only 3-4 months in a year.

Freight Logistics is that part of the supply chain process that plans, implements and controls the efficient, effective flow and storage of goods, services and related information from the point of origin to the point of consumption in order to meet customers' requirements."

- Logistics plays a very prominent role in providing the backbone for the economy
- Logistics is one of the key elements in the production process.
- It involves the integration of information, transportation, inventory, warehousing.

City logistics is the process for totally optimizing the logistics and transport activities by private companies in urban areas while considering the traffic environment, the traffic congestion and energy consumption within the framework of a market economy.

Bareilly is very well connected with Delhi & Lucknow with road and railway line and is an important hub for all the trains passing through this city.

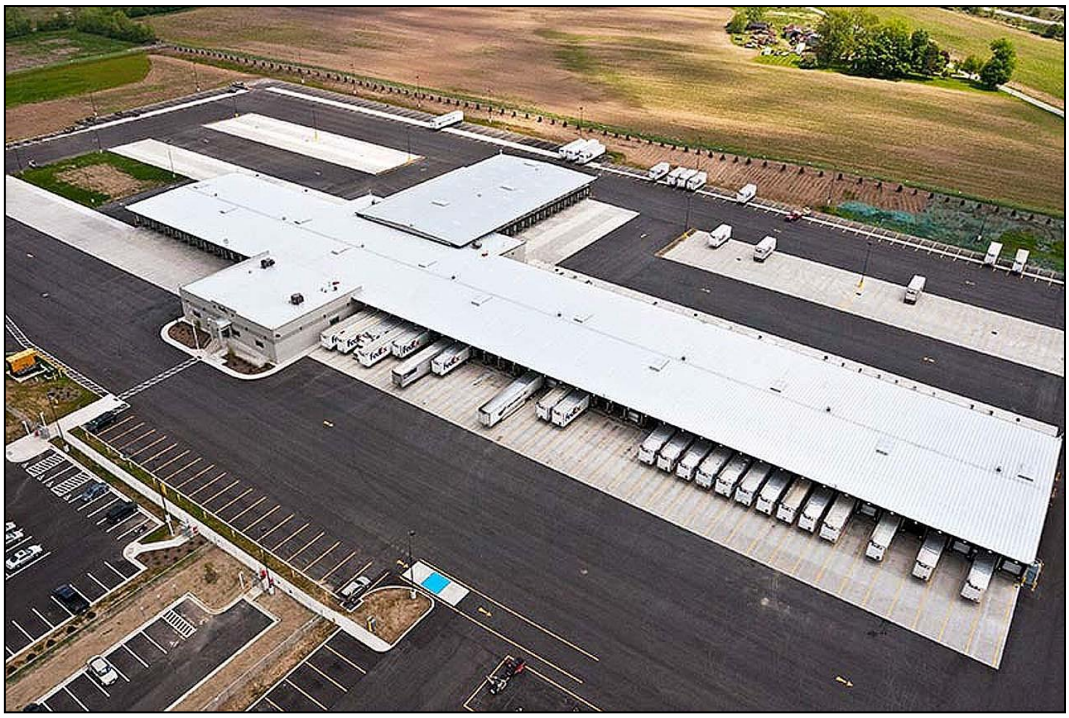


FIGURE 15-7 TYPICAL LOGISTIC HUB

15.4.6 Electric Vehicle Charging Station along the National Highway for Cars

Installing EV charging stations along the NH will immensely help electric vehicles for long distance travels. Currently there are only limited EV charging stations along the highways to cater to the needs for EV owners.

Setting up EV charging station along NH is also help boosting EV sector around the country. The government's focus on providing world class infrastructure and related services for the highway network is expected to get good returns. Besides EV charging station can also plan restaurants, food courts along the national highways to boost infrastructure.

Area requirement for setting up charging station along highway

Sl No	Category & Type of Facility	Area Requirement	Other Controls
1	National and State Highways: Public Charging Station (PCS) minimum requirement as per MoP Guidelines	Minimum Area 13.5 m x 5.5 m	Charging Station and all equipment layouts with respect to nearest Dispensing Unit (DU), Fuel tank to be as per PESO rules.

FIGURE 15-8 TYPICAL CHARGING TYPE

15.4.7Lite Metro facility for Bareilly city

A medium capacity system or also known as light rapid transit or light metro, is a rail transport system. Ridership determines the scale of a rapid transit system; size of the rail system needs for the proposed location. Most light rail system are fully grade separated and the distance between the stations is not much longer and constant speed of the rail.

The main reason to build the light metro instead of regular metro is to reduce costs, and shorter stations. Light metro may operations faster than heavy rail transit system. In metro light system, ticket counters, platform are on the same floor. Approximately, 300 to 400 passengers/trip can travel in the metro light.

FIGURE 15-9 METRO LIGHT SYSTEM

Chapter 16. INFRASTRUCTURE PROJECTS

VISION FOR PHYSICAL INFRASTRUCTURE

This consultancy project is supported by the Government of Uttar Pradesh which envisions for betterment of the city of Bareilly by enhancing its comprehensive development of physical, institutional, social and economic infrastructure in accordance with modern and innovative urban planning principles.

The project envisages to prepare the Vision, Implementation Strategy and integrated infrastructure plan to support objectives of holistic, sustainable and planned development of Bareilly city. It requires to take a much broader view of planning to allow for more integrated land use and infrastructure development schemes. The project is expected to drive economic growth, improve the quality of life of people by strengthening city's inherent potentials and augmenting its existing infrastructure. It should also contribute to enhancing the resilience of the city by incorporating policies to enable the city in coping with urban risks and climate change mitigation and adaptation. The Vision, Implementation Strategy and integrated infrastructure plan for Bareilly in Uttar Pradesh will further pave the way for project development, management and project implementation support.

Vision Plan- "Clean Green City"

16.1 VISION PLAN FOR WATER SUPPLY:

Bareilly city is provided with water supply from ground water sources such as bore wells fitted with hand pumps or power pumps. Existing installed capacity of water supply to the city is about 143 MLD, where the volume capacity is 138 MLD and overall demand for city is 154 MLD in year 2021. There is no Water Treatment Plant. Water is only supplied with just 51 percentage coverage in the entire planning area. Total billable volume of water supply connection is 109 MLD.

16.1.1 DESIGN PERIOD:

This vision Plan has been prepared for a design period of 30 years with the initial stage taken as the year 2021, mid stage as the year 2036 and ultimate stage as the year 2051. Intermittent five years duration projection have been also assessed as under. Further 2071 Demand will be freezed for visionary outline development planning purpose

16.1.2 POPULATION FORECAST FOR SPATIAL EXPANSION:

There are totally 19 census towns except M.C. and Cantonment board in Project area i.e. Planning Boundary in Master Plan 2031. There are 149 villages within the Project area among which 54 villages are already engulfed with the 2031 Master plan boundary. To account the population growth as per master plan, the general growth method has been adopted and the population estimation for Project area is as under:

Table 16-1: POPULATION FORECAST FOR SPATIAL EXTENT AND ENTIRE PROJECT AREA

Year	Municipal Area Population (Nos.)	Cantonment Board	Total Villages within Planning Boundary	Total Census Towns within Planning Boundary	Total Planning Boundary Population	Master Plan 2031 estimation of Total area
2021	11,40,717	37,388	279,655	98,273	1556033	
2026	12,46,391	41,990	314,074	110,368	1712822	
2031	14,31,466	46,591	348,492	122,463	1949012	1894211
2036	15,61,400	52,326	391,383	137,535	2142644	
2041	16,98,116	65,206	487,722	171,389	2422433	
2046	18,41,613	73,231	547,749	192,483	2655075	
2051	19,91,891	81,256	607,775	213,577	2894499	
2071	3125421	279265	20,59,691	723,792	61,88,168	

Source: Analysis

Based on the development plan proposals and by taking into consideration the present trends and absorption capacity, the pattern of population distribution over space has been identified. There is no major change in the total requirement of area and hence in this aspect, the master plan boundary will be useful for spatial extent for 2031 Infrastructure Plan and for the remaining years. Visionary estimation for requirement of physical Infrastructure will be attempted.

The physical extent of the city is also expected to also be incorporated as Master Plan suggested with the availability of physical infrastructure. As per UDPFI Guidelines Medium town density: 100-115 pph. As per trend developed area density assumed 125-135 pph (following other town with same class of population & growth pattern) New area density assumed for planning is 75-100 pph for 2036 & 2051, respectively.

16.1.3 Local Ground Water Sources:

Borewells. In addition to the three-surface water i.e. Ramganga, two water channels within the City and more than 150 bore wells supply water to small-localized pockets. Service reservoirs in different colonies receive water from the bore wells and distribute this water through their distribution network. While many bore wells are fitted with submersible pumps, remaining bore wells are fitted with hand pumps. Ground water is available at a depth of 10.98 m in post monsoon to 9.80 m in pre monsoon in year 2021 (Source: https://jjmup.org/wq/gwd.php)

Total supply from the bore wells is estimated to be about 143 MLD as per Nagar Nigam provided data. Due to scanty rainfall in last few years and excessive drawl to arise the water shortage, the ground water table is lowering rapidly, resulting in the failure of many bore wells with hand pumps. The ground water is also reported to contain slightly high fluoride contents. The transmission mains are pre-stressed concrete pipelines. There are four zones in water supply as under:

Water Availability in Project Area in year 2021

Water Supply: -

Coverage = 51%

Domestic Connection (Unmetered) = 95370

Installed Capacity for Ground Water Supply = 143 MLD

Volume of water produced through Ground Water (Power Pump) = 138 MLD
Volume of water billed from Domestic Connection = 109 MLD
Volume of water billed from Non-Domestic Connection = 1 MLD
Total Volume of water unbilled (free supplies to Public Taps) = 0.8 MLD
Water Supply frequency = 30 days (8 hours per day)
*(Source SLB 2019-20)

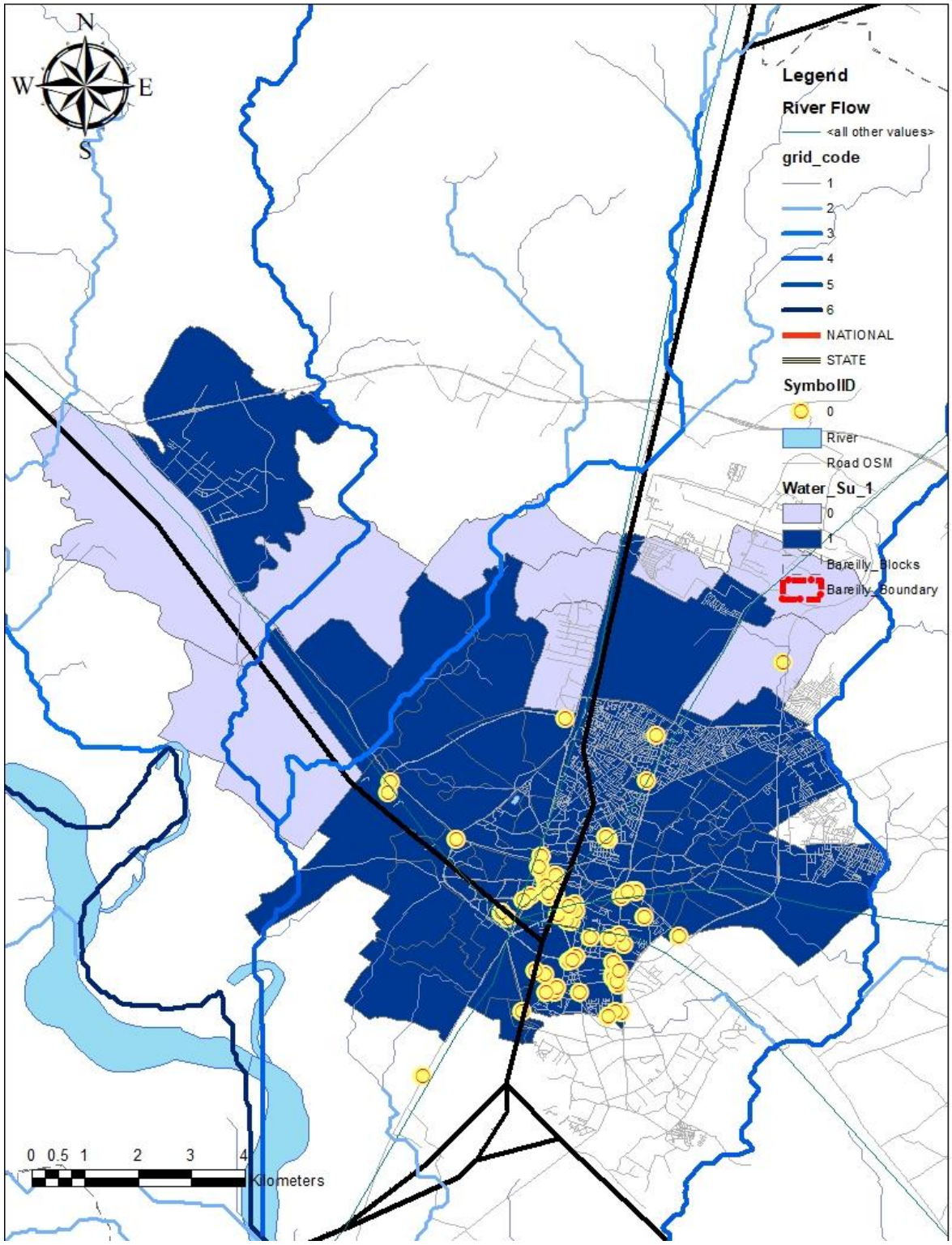


Figure 16-1: Water supply coverage in Nagar Nigam area within Planning Boundary

HHs Water Demand: -
Year 2021 by considering @150LPCD= 165 MLD
Year 2051 = 301 MLD

Industrial Use:
Not available
Estimated: 30 MLD by PCB
Need Augmentation and DPR Preparation

Connection
Length of distribution network = 578.20 km

Basis of above analysis the availability of water supply is only 51% , and even per capita water availability is only 121 LPCD. Gap in water supply collection charges as per SLIP report 55%. Gap in NRW is almost 20% which includes leakage, free water supply to society on festivals, supply through stand post.

Water availability within municipal area is also different. On account there are more than 200 water bore wells serves city through network system . But total 25 elevated storage serve city as under.

The Green area is having full supply. Yellow area is under smart city area having full supply, blue and red area is having partial supply need augmentation of work. The details of water supply hand pumps are as shown in Fig 1.1 .
Total Water reservoir is 42
Total Hand Pump- 84
Total Water pump is 68
Total supply water bore wells are 17
Total mini bore wells are 8

16.1.4 AREA WISE WATER AVAILABILITY ANALYSIS

Bareilly city has 80 wards. Out of total wards 38 wards are having full connection through water supply network. Addition to that in Smart city area ABD area few wards area having all 100% water supply connection. But total 7 Wards are connected partial areas and two areas still do not have any connection under Amrut 1.0. As per Nagar Nigam Water Balance report total water supply is on today is 76.29 MLD. After total Water source enhancement from 60 to 84 tube wells now per capita availability has increased.

Hydrogeological characteristics of the area shows as under:
Rainfall- The summer monsoon is the major source of rainfall, which generally lasts from mid-October. July and August months are the wettest months.
(b) Temperature: The maximum mean monthly atmospheric temperature has been recorded during the month of May and minimum
(c) Humidity: During the peak monsoon period (i.e. August and September) and in mid (during December) the relative humidity is at highest level ranging between 79% and 84%. While it is lowest around 38% during peak summer month April and May.

(d)Geomorphology (a) In general, the area shows the following distinctive geomorphic units: 1. Lower piedmont plain of Tarai 2. Older alluvial plain or upland 3. Younger alluvial plain or low land 4. Meander flood plain (b) Soils: The soil of the district, can be classified into three major groups, based on its texture and characteristics. Bareilly Type Type-2 (Khadar or low (Upland or Bangar soils) The maximum mean monthly atmospheric temperature has been recorded during the month of May and minimum during January. During the peak monsoon period (i.e. August and September) and in mid-winter season (during December) the relative humidity is at highest level ranging between 79% and 84%. While it is lowest around 38% during peak summer months. In general, the area shows the following distinctive 1. Lower piedmont plain of Tarai 2. Older alluvial plain or upland 3. Younger alluvial plain of the district, can be classified into three major groups, based on its texture and composition characteristics. Bareilly Type-1 (Tarai soils) Bareilly -land soils) Bareilly Type-3

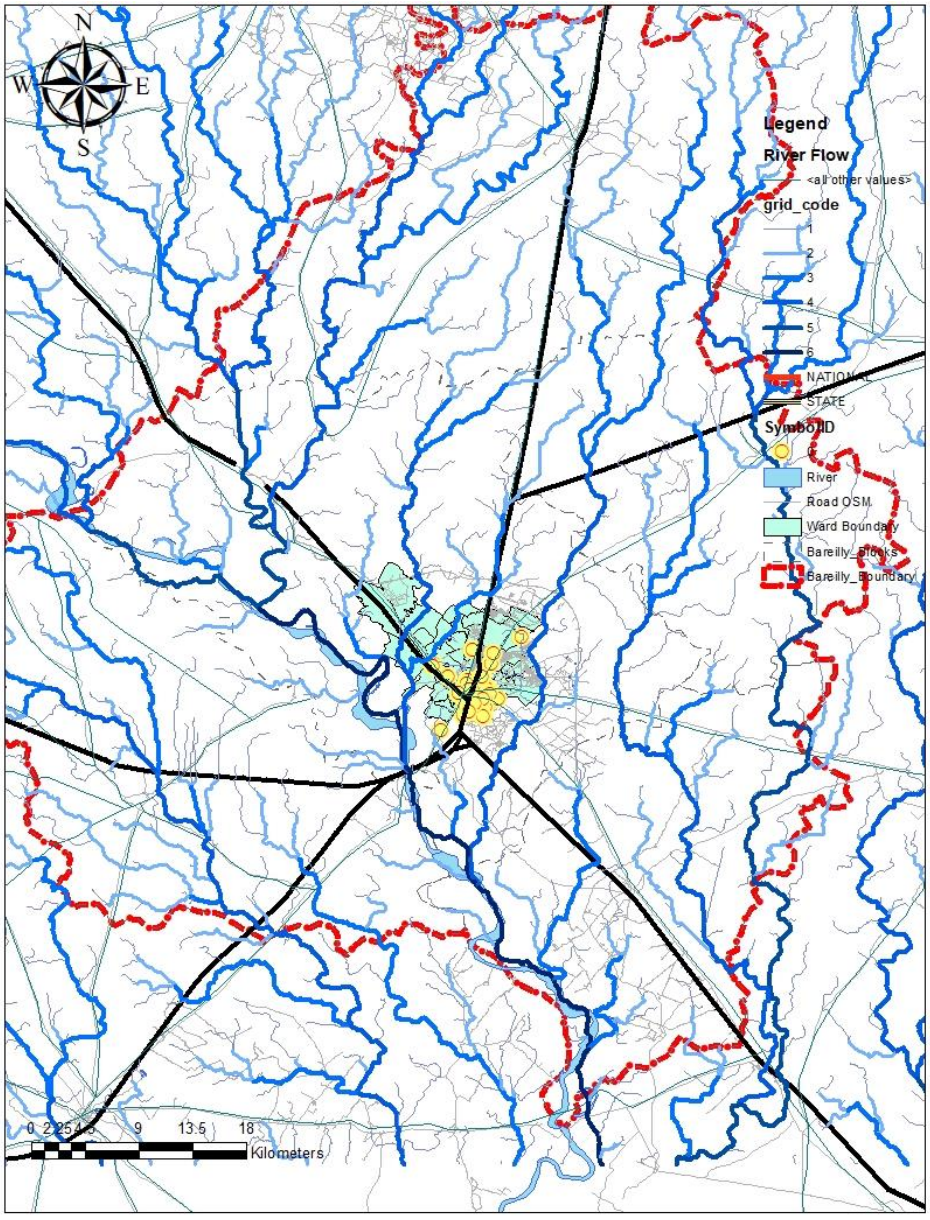


Figure 16-2: Drainage Pattern of Bareilly City

The major three water body's water quality in city is not good. There are several drains intercepts river. These drains are major causes carrying sewerage and Industrial load to water body.

Table 16-2: Details of Water Bodies

Sl. No.	Data Point	Value
1	Total No of water bodies	3
2	No of water bodies with open dumpsites near them	3
3	Number of water bodies with anti-littering messages displayed	3
4	Number of water bodies with sweeping & cleanliness arrangements in place	3
5	Number of Water bodies with twin-litterbins placed in every 50 m of water bodies	3
6	**Number of Water bodies with Trash Cleaners are available to trap the solid waste floating on the water bodies**	3

Source: Reccy Survey

Table 16-3: List of Water Bodies

S.No.	Ward Number	Name of Water Body	Address	Type of Water Bodies	Landmark
1	10	Delapeer Pond	Delapeer Chauraha	Pond	**Delapeer Chauraha**
2	32	Akshar Vihar	Akshar Vihar Park	Pond	**Akshar Vihar Park**
3	**35**	**Sanjay Community Hall Pond**	**Near Elan Club**	**Pond**	**Jain Mandir**

Source: Nagar Nigam, Bareilly

16.1.5 Demand Assessment:

To assess the future demand for all parts of Bareilly within Municipal area Water demand has been assessed by taking 150 LPCD i.e. 135 LPCD with 15% unaccounted water demand of the area.

Table 16-4: water requirements

Water requirement		2021	2026	2031	2036	2041	2046	2051	2071
A	**Municipal Area**	154	168	193	211	229	249	269	422
B	**Cantonment Board**	5	6	6	7	9	10	11	38
C	**Total Villages within Planning Boundary**	38	42	47	53	66	74	82	23
D	**Total Census Towns within Planning Boundary**	13	15	17	19	23	26	29	17
E	**Total Planning Boundary Population**	210	231	263	289	327	358	391	500

Source: Analysis

Under Amrut 2.0 all are to be covered within municipal area to address 155 LPCD which is far higher side than the requirement of MoUD i.e. 135 LPCD. So, there is not to presume additional water augmentation to feed futuristic demand for ultimate project population for 2051. But there are 11 Urban agglomeration, and all villages are within planning Boundary which over the year will be amalgamated as a part of city. To estimate the population enhancement by accounting Rural to urban

transformation and Urban agglomerated towns in city limit referring Master Plan 2031 document total water demand is estimated as under:

a. WASTAGE AND DISTRIBUTION LOSSES:

It has been observed that wastage of water at consumer's end in the City is substantial. Almost 30-40% of water supplied is lost in transmission and distribution.

b. SERVICE CONNECTIONS:

All property connections are unmetered. In addition, there are reported to be about 20, 540public stand posts, supplying water to economically backward households and slum areas.

c. ISSUES :

1. **Scarcity in Source:** Presently only 75% of the population is covered by municipal water supply. Raw water scarcity is experienced in summer, due to lack of flow of present source, Agra Canal water supply network needs to be implemented. Though, under Amrut 2.0 requirement are fulfilling total municipal area.
2. **Exploitation of Ground Water Source**: In the absence of a perennial water source, dependence on ground water continues to be high in the periphery. Apart from the municipal bores, a large number of private bores have been installed in various parts of the city. This has seriously affected the ground water level, which is depleting at the rate of 2 to 3m annually. Thus, the reliability and sustainability of the ground water source is questionable.
3. **Operation of Water Treatment Plants:** The present operation, including chemical dosing and back washing of filters, Chlorine dosing is arbitrary. All the equipment meant for these functions needs to be repaired, if required and a formal system of testing the raw water turbidity, administering the doses based on jar test and back washing of filters, when it is due, needs to be introduced. Additional gas cylinders have to be procured.
4. **System Losses:** Around 30%-40% of the water supplied gets lost during transmission and distribution. Scada system is only commissioning in Smart City ABD area.
5. **Limited Duration of Supply:** At present, the water is supplied only for one hour on fifth day. It is proposed to supply water for 24 hours and hence necessary modification including construction of ESR at each distribution station will be carried out.
6. **Contamination of water due to old service connections:** The consumer connections are of Galvanized iron, which has a life of 7-8 years. These connections are often not replaced on time and leads to the problems of leakage, low pressure and contamination**.**

16.1.6 Vision Plan for Water Supply

So basis of above requisite the water supply vision for 24X7 potable water supply to all area could cover by de centralize use of water and recycle of water as under:

Year	2026	2036	2051	2071
Action Plan	Short Term	Mid Term	Long Term	Outline Plan
Connection				
Water Augmentation from Canal				
enhancement of WTP &Reuse of Water				

16.2 SEWERAGE & SANITATION SYSTEM:

16.2.1 OVERVIEW OF EXISTING SEWERAGE & SANITATION SYSTEM:

Uttar Pradesh Jal Nigam has designed and constructed sewerage scheme under Amrut 1.0 1.0 in Bareilly city and implemented by Nagar Nigam. The proposals under this Detailed Project Report have been framed on the basis of Latest Norms / Standards / Design Criteria contained in the U.P. Jal Nigam No. under the guidelines under Atal Mission for Rejuvenation and Urban Transformation as well as contained in the Manual of Sewerage and Sewage. Treatment, 4th Edition-2012, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, Main and Prominent norms are summarized below.

The estimation has been worked out adopting the base year 2021, Middle Stage Year 2036 and Ultimate Stage Year 2051.

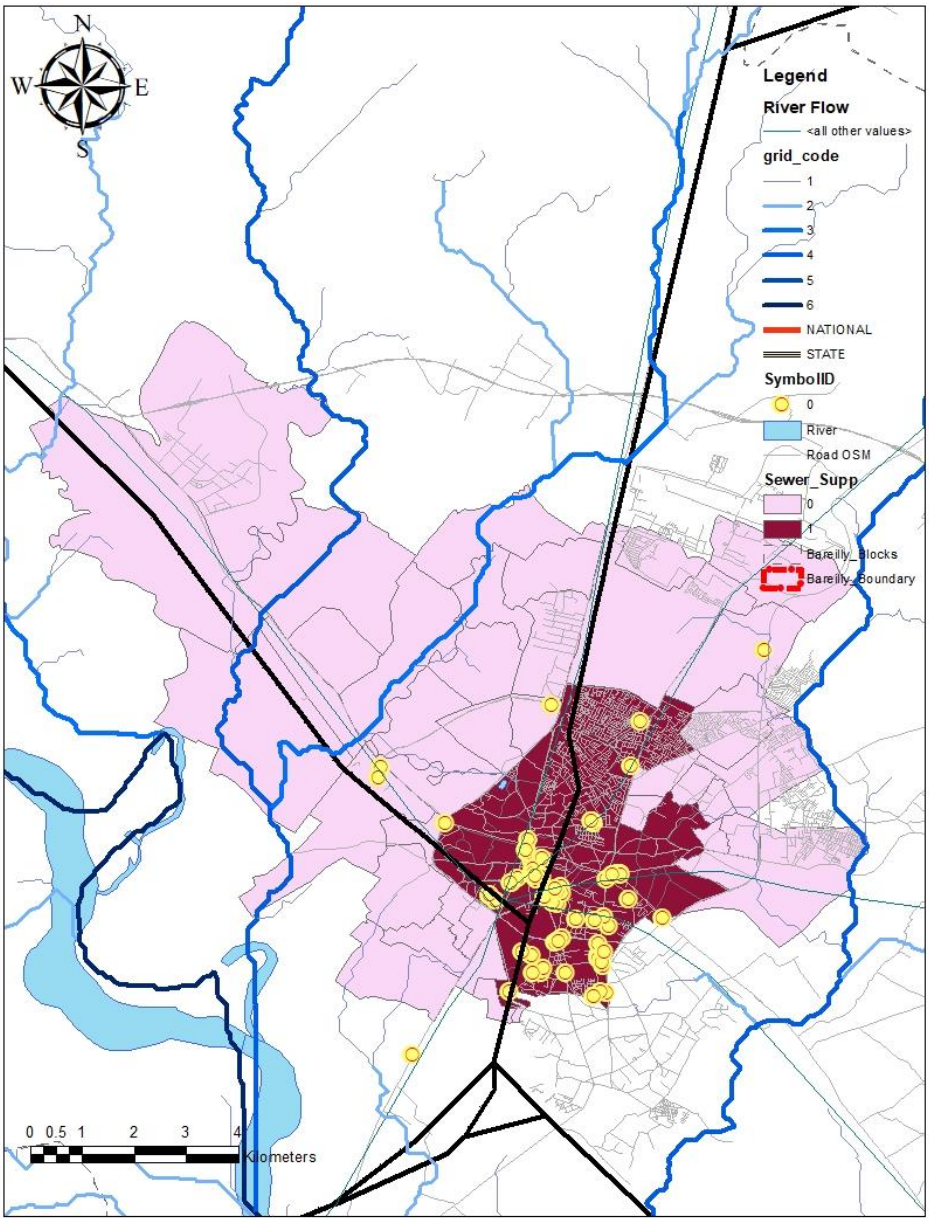


Figure 16-3: Rivers of Bareilly

There are properties with Sewer Connection 65201 and Properties with onsite sanitary disposal are 136275. Total water consumption (billed and unbilled) from ULB and Non ULB sources are accounted 110.8 MLD and volume of wastewater generated from Domestic water consumption is around 88.64 MLD (Source SLB 2019-20)

There is no sewer Treatment plant. Although STP will be set up soon in two sites as shown in following figure.

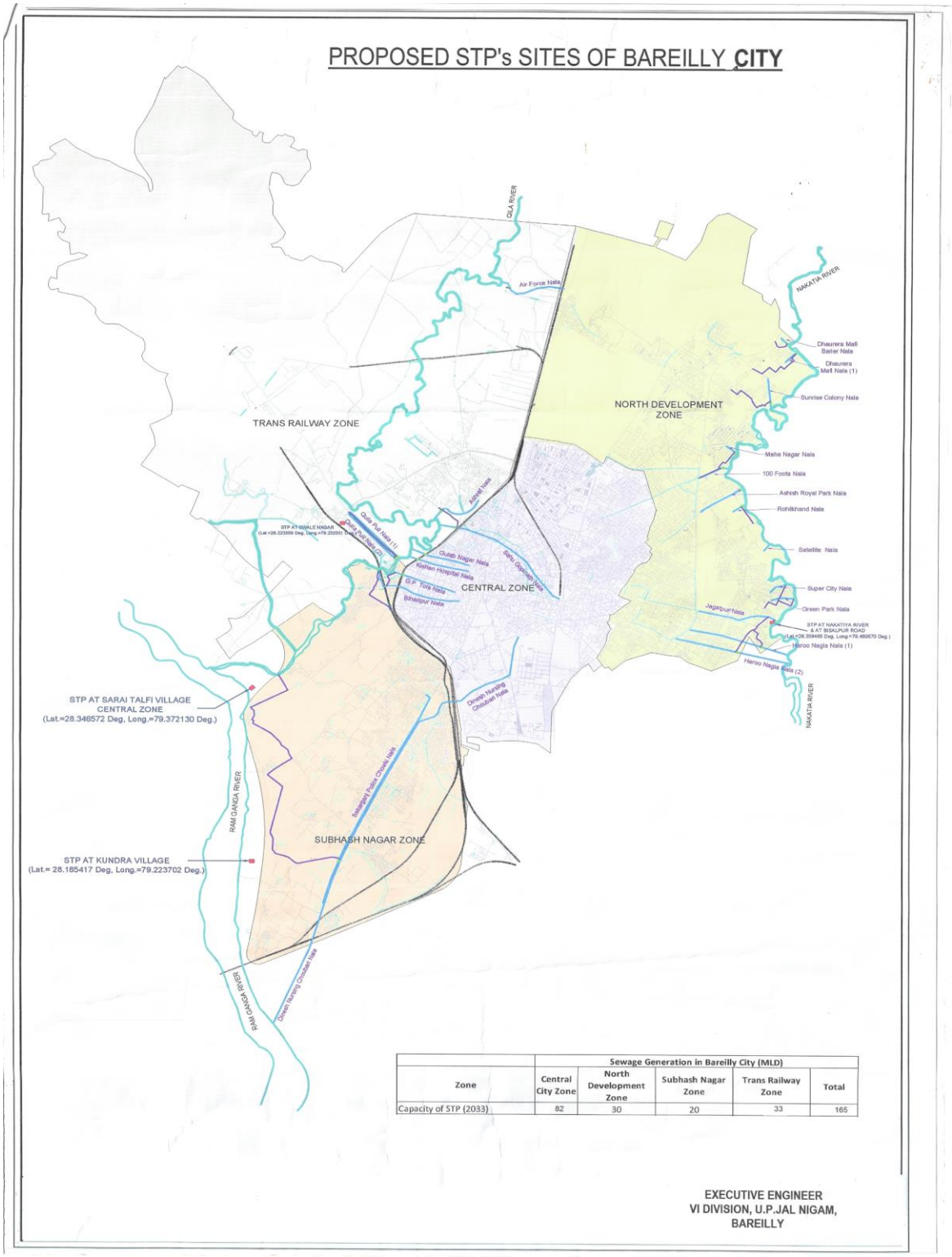


Figure 16-4: Proposed STPs

Total Length of sewerage network = 206.2 km
Total Wastewater produced = 99.2 MLD

Zone	Sewer Lines	
	Length (km)	Area covered (sq. km)
Zone- 1	43	9
Zone -2	71	8.46
Zone -3	59	3.97
Zone -4	33	4.33
Total	**206**	**25.76**

*Source: SLB 2012, NNB

INTERMEDIATE PUMPING STATION AND STP

ZONE-2 : In zone-2 is l 71 Km sewer length with MLD stp based on mid-year 2033 . there is MPS provided in the stp campus.
Zone 3: IPS-2 of I & D work. in zone-3 is proposed under I & D work of Bareilly city of 59 Km length
ZONE-4 : IPS-2 of I & D work. in zone-4 is proposed under I & D work of Bareilly city of 33 km length.
Works incorporated under this Detailed Project Report have been proposed for year of 2033.
Bareilly Smart City ''ABD'' Area is proposed to be covered with sewer system under Smart City Programme. Sewage Treatment Plants will also be provided for Treatment of sewage and discharge of effluent to the effluent management works for irrigation of cultivable land effluent will however by conveyed to the Natural Drainage when not required for Irrigation purposes.
Taking into consideration Topography/Gradient/Slope of Ground/Location of Railway Tracks i.e. from major drains under the Nagar Nigam area Total Smart City ABD area is proposed to be divided into 4 Zones, Zone-1 includes wards/area .
In the proposed sewer system AC Pressure Pipes Manufactured by MAZZA Processing sizes 150/200mm and in higher sizes RCC Non-Pressure Pipes Class NP3 and NP4 have been proposed in accordance with provisions under the Guidelines issued under Atal Mission for Rejuvenation and Urban Transformation (AMRUT) Programme “Manual of Sewerage and Sewage Treatment CPHEEO” Ministry of Urban Development Government of India New Delhi and Relevant code of Bureau of Indian Standards New Delhi.
From the Sewage Treatment Plant effluent will be conveyed to effluent management works i.e. applied for Irrigation iWan agriculture fields during the period effluent is not required for irrigation purposes, it will be discharged into river.
Land requirement for Sewage Treatment Plant: Total Land Requirement for 7 MLD plant on SBR based technology is = 7 x 0.08 hect = 0.56-hectare land is required
Further, drains will be tapped under Namami Gange program

16.2.2 ISSUES:

Over the year Sewerage Generation will be

Table 16-5: Sewerage Generation

	Sewerage Generation	2021	2026	2031	2036	2041	2046	2051	2071
A	**Municipal Area**	123	135	155	169	183	199	215	338
B	**Cantonment Board**	4	5	5	6	7	8	9	30
C	**Total Villages within Planning Boundary**	30	34	38	42	53	59	66	18

Sewerage Generation	2021	2026	2031	2036	2041	2046	2051	2071
D Total Census Towns within Planning Boundary	11	12	13	15	19	21	23	14
E Total Planning Boundary Population	168	185	210	231	262	287	313	400

Source: Analysis

i) Coverage:

The present population of Bareilly is approximately 1554063, as against the combined design population of 1140717 for stage I and stage II sewerage schemes. Thus, even after the Stage II scheme, designed to cover 165 MLD for 2033 whereas by 2036 the discharge within Municipal area will be 169 MLD, the entire present population of the city will not be covered.

ii) Sewer Connections:

Out of total households, only 50 properties have been connected to the sewers. Even allowing for some unauthorized connections, the utilization of the sewer network appears to be extremely poor. The number of properties connected to the sewer network is abysmally small. An urgent and concerted drive to increase the number of sewer connections is called for.

iii) Need of Updated Map of Sewer Network:

Unless an updated map showing all the sewers laid so far is prepared, an action plan to improve the coverage and utilization of the sewerage system will not be accurate or fruitful.

iv) Unauthorized Lifting of Sewage:

Very little quantity of sewage appears to be reaching the treatment plant. Farmers lift the raw sewage from the manholes of out fall sewers and use it for agricultural purpose.

v) Performance of Sewage Treatment Plant

Measurement of sewage flow entering the sewage treatment plant and the characteristics of the influent and effluent needs to be done on a regular basis to know the effectiveness and efficiency of the sewer network and STP.

16.2.3 Vision for Sewerage Plan

Sewerage Vision Plan is to connect each household with sewer line for clean green city plan. Core area is very congested where existing STP could serve city but remaining all part of city should have sewer line. STP should be upgraded. As per requirement of improvement of STP MPS , IPS should be constructed, and trunk line should be enhanced.

Overall city's vision plan for STP area as under:

Year	2026	2036	2051	2071
Action Plan	Short Term	Mid Term	Long Term	
Connection				
STP & ETP				
Reuse				
Decentralized System				

16.3 VISION PLAN FOR STORMWATER DRAIN

16.3.1 Vision Plan for Stormwater Drain

The total length of roads in the City of Bareilly is 832 km out of which only 105 km stretch has closed stormwater drains translating to 12.62%. There are three natural drains in the city namely the Deveraniya drain, Chaubari drain and Nakatiya river/drain. Table 1-1 depicts the characteristic features of the Deveraniya drain while Table 1-2 and Table 1-3 depict the characteristic features of the Chaubari drain & Nakatiya drain respectively

16.3.2 Deveraniya drain

Table 16-6: Deveraniya drain – characteristic features

Sr. No	Description	Remarks
1	Point of origin	Sarai Talfi
2	Co-ordinate	28°20'33.23" N 79°23'02.87" E
3	Point of discharge	River Ramganga
4	Quantity of sewage let into this drain	102.80 MLD
	Water quality in drain	
	Ph	7.20
	BOD (mg/L)	39.8
	COD (mg/L)	80
	TSS (mg/L)	89

(Source: CSP Bareilly)

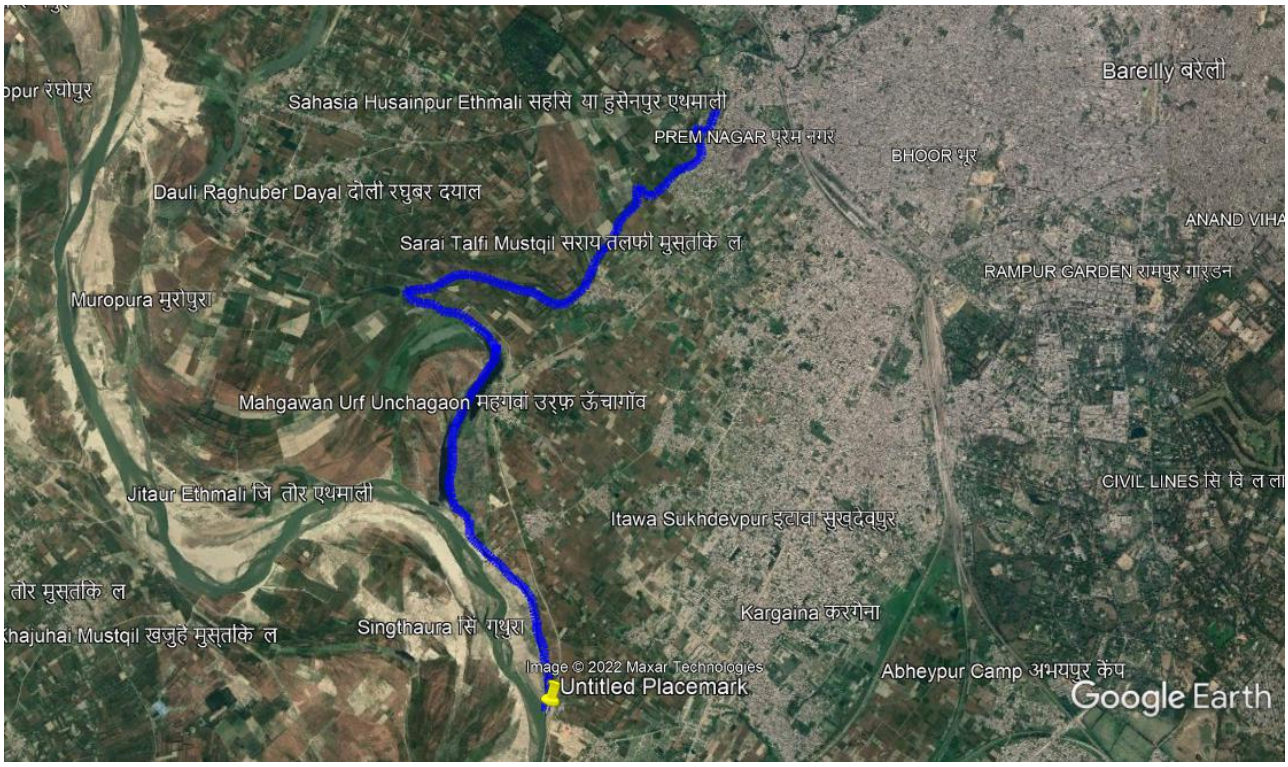


Figure 16-5: Devraniya Drain

16.3.3 Chaubari drain

Table 16-7: Chaubari drain – characteristic features

Sr. No	Description	Remarks
1	Point of origin	Subash Nagar
2	Co-ordinate	28°17'42.85"N 79°23'32.95"E
3	Point of discharge	River Ramganga
4	Quantity of sewage let into this drain	51 MLD
5	Water quality in drain	
	pH	7.1
	BOD (mg/L)	33.2
	COD (mg/L)	200
	TSS (mg/L)	70

(Source: CSP Bareilly)

Figure 16-6: Chaubari drain

16.3.4 Nakatiya drain

Table 16-8: Nakatiya drain – characteristic features

Sr. No	Description	Remarks
1	Point of origin	Deen Nagar
2	Co-ordinate	28°21'34.88"N 79°28'12.04"E
3	Point of discharge	River Ramganga
4	Distance of discharge point from city limits	100 km
5	Quantity of sewage let into this drain	24 MLD
6	Water quality in drain	
	Ph	7.30
	BOD (mg/L)	44.8
	COD (mg/L)	120
	TSS (mg/L)	114

(Source: CSP Bareilly)

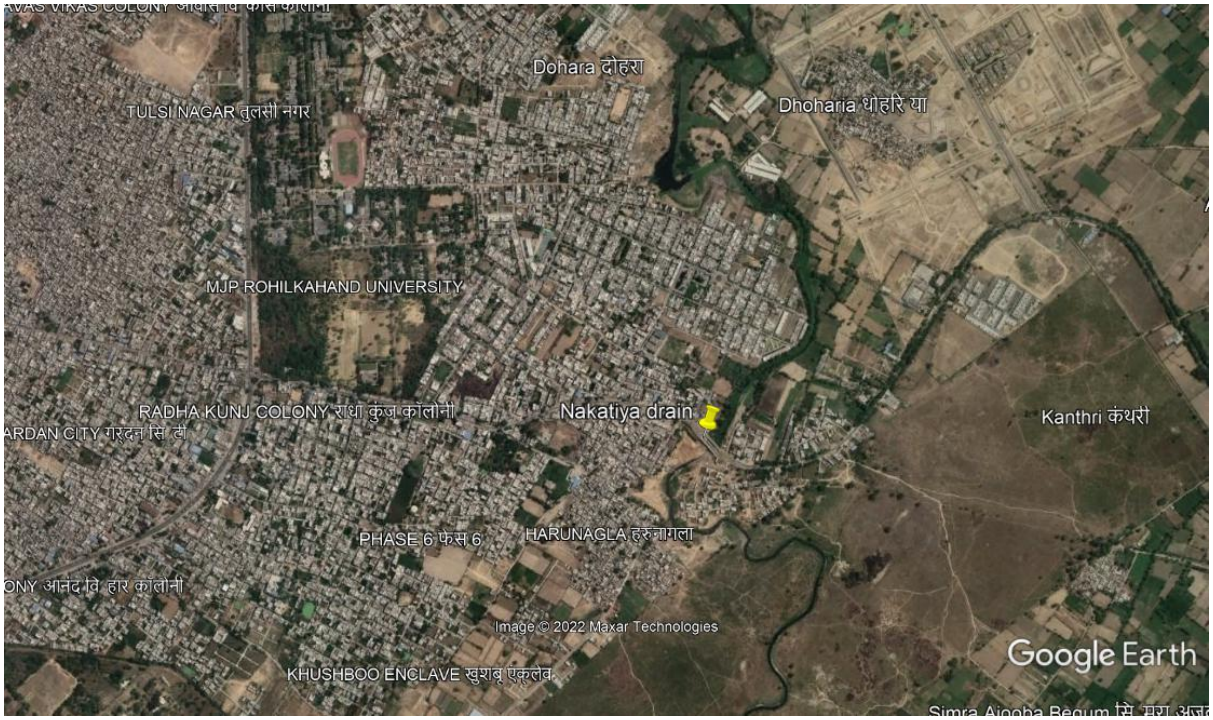


Figure 16-7: Nakatiya drain

16.3.5 Stormwater drain - constraints

- Silting of the drain
- Unlined drains
- Dumping of debris and garbage into the open drains & nallah
- The roads being below the drains top level which cause 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

16.3.6 Stormwater drain – Interventions required

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

16.3.7 Stormwater drain – Suggestions for DPR

- Assessment of ward wise existing storm water drain condition
- 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

Note: *Development of SWD shall be taken care in the city development plan. Hence it is not considered as a separate project in the vision plan proposed list of projects. However, the above suggestions may be considered by the city development authority during the preparation of DPR*

In addition, there is no dedicated provision for storm water drain in many locations and hence, both sewage and storm water drain are mixed together in the nallas. In future, all the house service connections shall be properly connected through sewer network and shall be treated in the STPs to maintain storm water drain as a dedicated facility.

16.4 VISION PLAN FOR SOLID WASTE MANAGEMENT

16.4.1 Existing situation

The total solid waste generated in Bareilly Is 447.18 Tonnes Per Day (TPD). However, at present, the amount of solid waste collected is only 430 TPD . Of the collected solid waste (Nearly) 140 TPD is processed while the remaining 290 TPD is disposed of in the dump yard. At present, there is no household source segregation in place. At present two solid waste management plants exists (I) At Rajau Paraspur (non-operational) and (ii) At Bakarganj, out of which the SWM plant in Rajau Paraspur is non-operational. Table 1-4 represents the background & status of the Rajau Paraspur SWM plant:

Table 16-9: SWM Plant in Rajau Paraspur

Sr. No	Description	Remarks
1	Land Extent	21.20 Acres
2	Capacity	300 TPD
3	Status	Commissioned in 2013 and is abandoned for the past five years
4	Reason For Non-Existence In Operation	Owing to local agitation from citizens as it is located near forest land. Subsequently the National Green Tribunal (NGT), on the grounds of unsafe waste disposal practices, has suspended the functioning of the treatment plant.
5	Facilities Covered	Organic Waste Conversion (OWC) and sanitary landfill
6	Recommendation	Suitably can be relocated to another location which is free from any ecologically sensitive hindrances. The plant thus relocated will be able to reduce the treatment burden of the existing plant at Bakarganj

Figure 16-8: Abandoned approach in Rajau Paraspur SWM Plant

Table 16-10: Represents the background & status of the Bakarganj SWM Plant:

Sr. No	Description	Remarks
1	Land Extent	17 Acres
2	Status	In operation since December 2021
3	Facilities Covered	Bioremediation I.E., conversion of waste to Refuse Derived Fuel (RDF)
4	Salient Features	• Dumping area: 6 acres • Operational hours: 20 • Operating capacity: 600 TPD

		• Incoming waste at present: 350 TPD
5	Operating Mode	Operated by Executing authority through O&M Contractor (10 years contract)

16.4.2 Projected solid waste generation

The solid waste generation, though measured at the city level, should also be measured and calculated for the entire planning area considering in the ambit of the Vision Plan for Bareilly City. Hence, it is imperative to include those additional areas such as the Cantonment Board Area, Town Villages within the planning boundary and census towns in the planning boundary in addition to the existing Municipal Corporation Area. As a result, the total population for the Year 2021 (Base Year), the year 2036 (Intermediate Year) and the year 2051 (Ultimate Year) are considered for the projection of the solid waste generation as well. The ensuing sections discuss the solid waste generation projection for different scenarios. Table below represents the solid waste generation projection for the Municipal Corporation area of Bareilly. Further 2071 Demand will be freezed for visionary outline development planning purpose

Table 16-11: Solid waste generation projection – Municipal Area

S. No	Population projected year	Population	Solid waste generation (TPD)	Organic waste (TPD)	Existing SWM plant capacity (TPD)	Proposed plant in Sathrapur & Rajau	Total plant capacity (TPD)	Gap (TPD)	Inorganic waste (TPD)	MRF	MRF Existing	MRF Proposed	Gap (TPD)	Dumping / Landfill	Existing Landfill	Landfilling Proposed	Gap (TPD)
1	2021	13,11,599	564	338	600	0	600	0	226	56	0	120	56	169	0	280	169
2	2026	15,56,033	669	401	600	0	600	0	268	67	120		-53	201	280		-79
3	2031	17,12,822	737	442	600	0	600	0	295	74	120		-46	221	280		-59
4	2036	19,49,012	838	503	600	0	600	0	335	84	120		-36	251	280		-29
5	2041	21,42,644	921	553	600	0	600	0	369	92	120		-28	276	280		-4
6	2046	24,22,433	1042	625	600	850	1450	0	417	104	120	120	-16	312	280	690	32
7	2051	26,55,075	1142	685	600	850	1450	0	457	114	240		-126	343	690		-347
8	2056	28,94,499	1245	747	600	850	1450	0	498	124	240		-116	373	690		-317
9	2061	39,72,077	1708	1025	600	850	1450	0	683	171	240		-69	512	690		-178
10	2066	45,86,104	1972	1183	600	850	1450	0	789	197	240		-43	592	690		-98
11	2071	53,15,516	2286	1371	600	850	1450	0	914	229	240		-11	686	690		-4

Source: Bareilly Nagar Nigam & Consultant's analysis

Inference:

- The proposed plant in Sathrapur is planned over 10 acres of land with 500 TPD capacity.
- The proposed plant in Rajau Paraspur (disputed land) is planned with a treatment capacity of 300 TPD.
- The proposed plant in Rajau Paraspur (disputed land) will require an area of 20 acres for the proposed installed capacity of 300 TPD in an alternate land parcel since the existing plant is non-operational due to NGT litigations.

- For the purpose of solid waste projection over the planning horizon (2071), it is assumed that the above-mentioned two proposed SWM plants with a combined capacity of 850 TPD shall be developed before the year 2046.
- After the year 2046, the total treatment capacity of all the plants shall be 1450 TPD whereas the required excess capacity of treatment capacity due to population growth for 50-year period (i.e., 2071) is just 850 TPD.
- Hence, the proposed treatment plants namely the alternate plant in Rajau Paraspur and proposed Sathrapur plant will be sufficient to handle the increase in solid waste generation for the entire planning horizon of the Vision Plan thereby eliminating the need for any new solid waste management plant in addition.
- Thus, a need for the development of a new facility doesn't arise if only the municipal area solid waste generation is projected over the project horizon.
- 100% Source segregation to be ensured.
- For, MRF centres and Landfill can be planned for new SWM plant (Inorganic waste) in year of 2023 and 2046 to monetise from the waste and to prevent environmental degradation to the ground.

Figure 16-9: Dumping yard in Bakarganj SWM plant (left) Treatment facility in Bakarganj SWM plant (right)

16.4.3 Proposed project & Area requirement

Table 16-12: Area requirement

Sl.No	Proposed SWM Plant	TPD	Area requirement (in Ha)
1	MRF (20 TPD x 6 Nos)	120	6
2	Landfill (Up to 2046)	280	28
3	MRF (20 TPD x 6 Nos)	120	6
4	Landfill	690	55

For developing a new SWM plant is considering the higher area required when compared to Windrow composting, Refuse Derived Fuel (RDF), Bio methanation, and Landfill technology as per Municipal Solid waste management manual – CPHEEO – MoUD (2016). The implementing agency may look for available new more sustainable technologies during implementation period

16.5 ESTIMATED PROJECT COST & IMPLEMENTATION STRATEGY.

Table 16-13: Estimated project cost & Implementation strategy.

Sl.No	Proposed SWM Plant	TPD	Area requirement (in Ha)	SWM Plant in lakhs	Land Cost (in Lakhs)	Total Amount (in Lakhs)	Implementation year
1	MRF (20 TPD x 6 Nos)	120	6.0	1800	480	2280	For 2023
2	Landfill (Up to 2046)	280	28.0	1484	11200	12684	
			Sub Total (A)	**3284**	**11680**	**14964**	
5	MRF (20 TPD x 6 Nos)	120	6.0	1800	480	2280	For 2046
6	Landfill	690	55	7217	21920	29137	
			Sub Total (B)	**9017**	**22400**	**31417**	
			Total Amount (A+B) = C	**12301**	**34080**	**46381**	

Note:

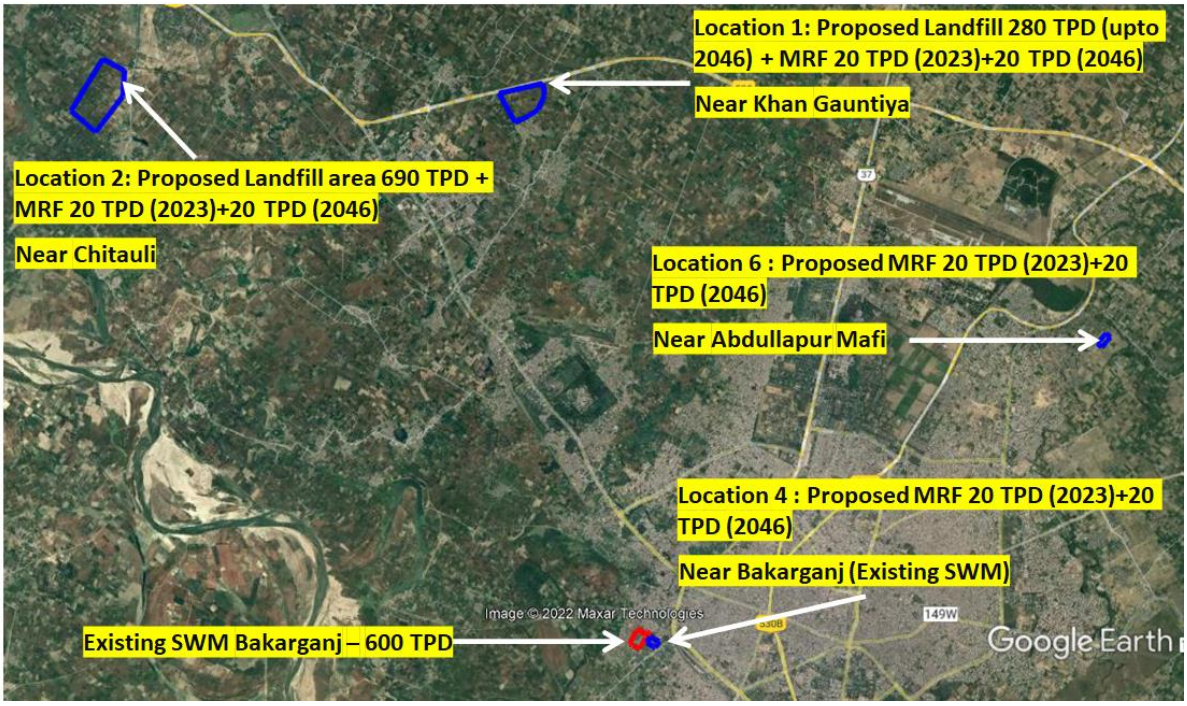
- Cost for developing facility is considered in estimate. It is assumed that land will be provided by Nagar Nigam / BDA.
- MRF cost has been considered based on lumpsum cost as per Advisory on Material Recovery Facility (MRF).
- This estimate is lumpsum and approximate. The values are indicative. However, actual costs will vary from site to site and should not be restricted by the range indicated in the table.
- Land requirement arrived based on the SWM CPHEEO (Central Public Health & Environmental Engineering Organisation) manual.

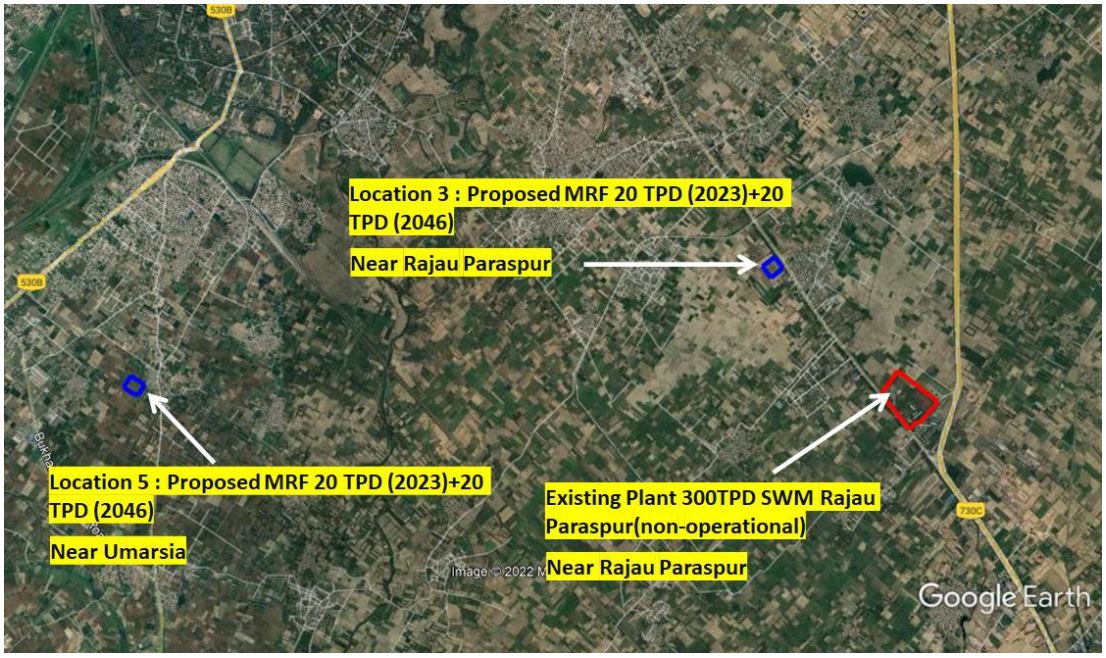
16.5.1 Identified Location for Proposed SWM Plant

Sl.no	Implementation Year - 2023		Implementation Year - 2046		Area	Co-ordinates	Remarks
	MRF	Landfill	MRF	Landfill	In Ha		
1	20 TPD	280 TPD	20 TPD		30	28°26'28.98"N 79°22'22.12"E	Location 1: Proposed Landfill 280 TPD (upto 2046) + MRF 20 TPD (2023)+20 TPD (2046) - Near Khan Gauntiya
2	20 TPD		20 TPD	690 TPD	60	28°26'29.48"N 79°18'1.29"E	Location 2: Proposed Landfill area 690 TPD + MRF 20 TPD (2023)+20 TPD (2046) - Near Chitauli

Sl.no	Implementation Year - 2023		Implementation Year - 2046		Area	Co-ordinates	Remarks
	MRF	Landfill	MRF	Landfill	In Ha		
3	20 TPD		20 TPD		2	28°18'21.62"N 79°28'42.62"E	Location 3 : Proposed MRF 20 TPD (2023)+20 TPD (2046) - Rajau Paraspur
4	20 TPD		20 TPD		2	28°21'34.01"N 79°23'41.76"E	Location 4 : Proposed MRF 20 TPD (2023)+20 TPD (2046) - Near Bakarganj
5	20 TPD		20 TPD		2	28°17'45.12"N 79°24'57.03"E	Location 5 : Proposed MRF 20 TPD (2023)+20 TPD (2046) - Near Umarsia
6	20 TPD		20 TPD		2	28°24'18.19"N 79°28'20.55"E	Location 6 : Proposed MRF 20 TPD (2023)+20 TPD (2046) - Near Abdullapur Mafi

Proposed SWM Plant Location





16.5.2 Waste segregation, collection & transportation

Waste segregation shall be practiced at source. At a minimum level, waste should be segregated into two fractions: wet (green container) and dry (blue container). This system is referred to as the 2-bin system. It is proposed to treat the wet fraction using appropriate treatment technology and as many fractions as possible from the dry waste such as paper and plastic should be sent for recycling. The inert material and rejects shall be sent to landfill facility located in the vicinity of the site.

16.5.2.1 Source segregation and storage

Source segregation is the setting aside of inorganic and organic waste at their point of generation by the generator. Separating waste at source ensures that organic and inorganic waste is less contaminated and can be collected and transported for further treatment. Segregation of waste also optimizes waste processing and treatment technologies. The generation of awareness among the producers and creation of an enabling environment is the key to success towards proper segregation and storage at source. Source segregation will not only provide an efficient way for resource recovery but will also substantially reduce the pressure and pollution at treatment/ landfill sites. Hence, It is suggested to carryout source segregation to reduce the burden of the waste handling agency.

Exhibit N# 1: Inorganic and organic waste

Food wastes of all kinds, cooked and uncooked, including eggshells and bones, flower and fruit wastes including juice peels and house-plant wastes, soiled tissues, food wrappers, paper towels

Paper, cardboard and cartons; Containers & packaging of all kinds excluding those containing hazardous materials; Compound packaging (tetra pack, blisters etc.) and plastics; Rags, rubber, wood, discarded clothing and furniture; Metals, Glass (all kinds), House sweepings and inert (not garden, yard or street sweepings)

16.5.2.2 Segregated collection

Primary collection is collecting waste from industries, households, markets, institutions, and other commercial establishments and taking the waste to a storage depot/ transfer station or directly to the treatment & disposal site is envisaged. Primary collection system is necessary to ensure that waste stored at source is collected regularly and it is not disposed of on the streets, drains, water bodies, etc.

a) Door to door collection through tricycles/ push carts using segregated bins

b) Containers placed on streets and will be collected through suitable method

Depending upon the system of primary collection (collection from the source of garbage), the solid waste intermediate storage facilities shall be envisaged. This is required to:

(1) Optimise the use of transport devices.

(2) Optimise the use of manpower

(3) Timely collection from source and onward treatment/ disposal of solid waste.

16.5.2.3 Transportation

Transportation of the waste at regular intervals is essential to ensure that garbage bins/ containers are not overflowing, and waste is not seen littered on streets. Hygienic conditions can be maintained if regular clearance of waste from temporary waste storage depots (bins) is ensured.

The routing and number of trips of the secondary transportation vehicle shall be worked out depending on the number of containers and the quantum of garbage and the frequency of clearance of the bins contemplated at the waste storage facility. The timings should be fixed in such a way that the container is nearly filled when it is planned for clearance by the transportation vehicle.

Technology options for treatment of MSW

The available technology options for processing the Municipal Solid Waste (MSW) are depicted below.

Exhibit N# 2: Technology options for treatment of MSW

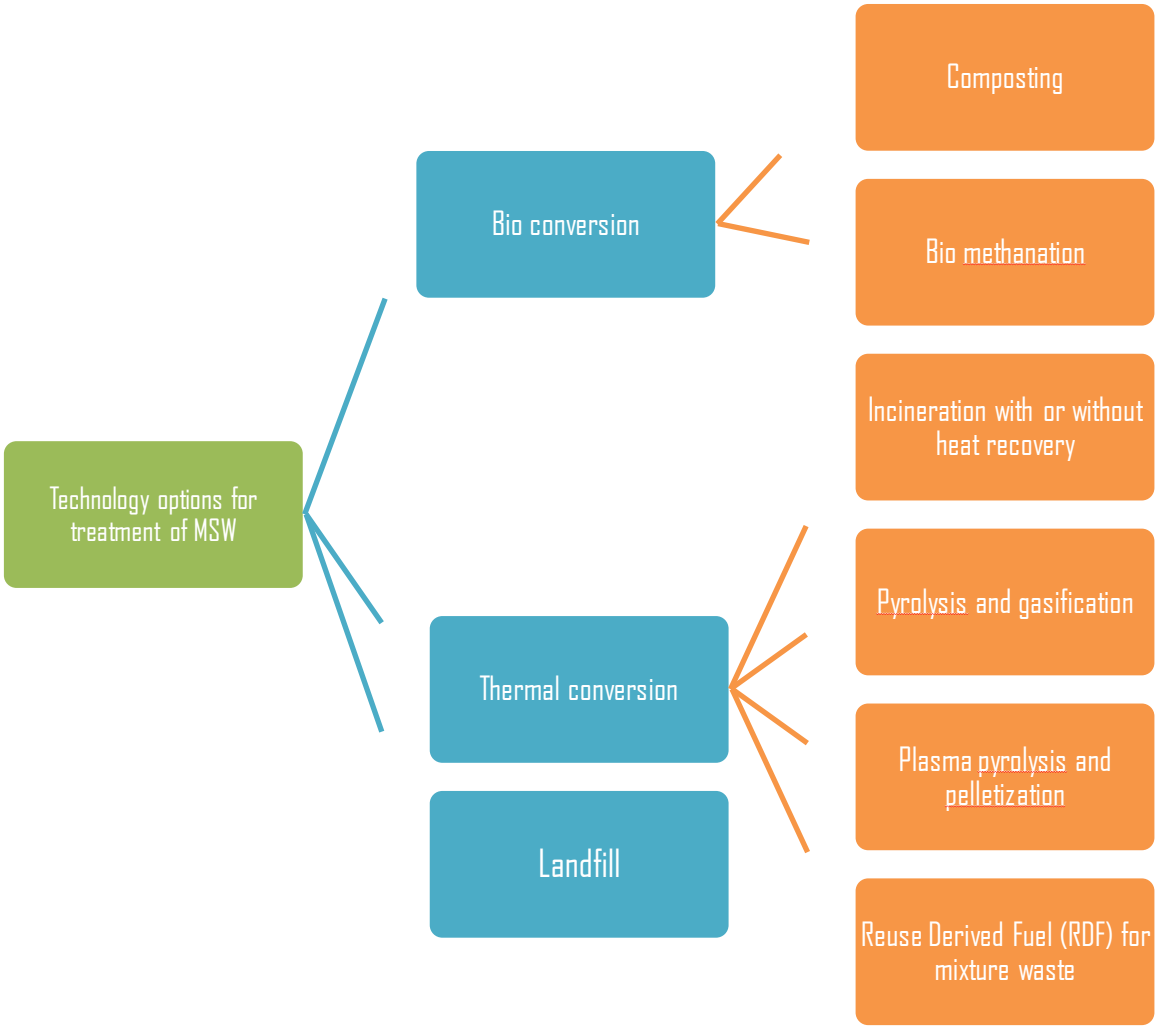


Table 16-14: Comparison of composting, Bio methanation and RDF technology

Parameters	Windrow	Bio methanation	RDF	Landfill
Applicable with population size	Population above 1 lakh to 10 lakhs	Small scale – between 5,000 to 25,000	Small scale – between 5,000 to 25,000	
Facility location	Plant should be located at least one km away from habitation, if it is open windrow composting. The distance could be 500m in case of covered plants.	Plant should be located at least 500 m away from residential areas, for plant sizes up to 500 TPD.	To be located as per the buffer zone criteria mentioned below.	Landfill sites must be located at least 500 m away from residential areas and should abide by the criteria mentioned in MSW Rules and state level guidelines.
Buffer zone (no development zone)	500 m for facilities dealing with 100 TPD or more of MSW; 400 m for facilities for dealing with more than 75 or less than 100 TPD; 300 m for facilities dealing with 50-75TPD of MSW; 200 m for facilities dealing with less than 50 TPD MSW. For Decentralized plants handling less than 1 TPD MSW no buffer zone is required; however adequate environmental controls are required			
Natural environment	Composting in coastal/ high rainfall areas should have a shed to prevent waste from becoming excessively wet and thereby to control leachate generation			Should be avoided in marshy land and in conditions where the ground water table is 2 m from the base of the liner. In marshy land, apart from ground and surface water contamination potential, there could be huge risks due to structural safety of the landfill (slippage and complete breakdown).
Land requirement	High (For 500TPD of MSW: 6 ha of land is required)	Low to moderate for small units: 500 sq. M for 5MT unit For large scale: 300 TPD of MSW: 2 ha of land is required)	For 300 TPD of segregated/ pre-sorted MSW: 2 ha of land is required.	For 300 TPD of MSW: 30 ha of land is required for 20 years.

Parameters	Windrow	Bio methanation	RDF	Landfill
Waste quantity which can be managed by a single facility	25 TPD and above	1-5 TPD at small scale	100 TPD of segregated waste and above	100 TPD inert and above. Smaller landfills are not techno economically viable
Requirement for segregation prior to technology	High	Very high	High	Only inert waste may be placed in landfills as per SWM Rules
Rejects	About 30% including inert if only composting is done	About 30% from mixed waste	Around 30% from mixed waste (For incoming mixed waste for RDF & Incineration Non-combustible material is taken out during the sorting stage)	No rejects
Potential for direct energy recovery	No	Yes	No (feed stock for energy recovery)	Not as per SWM Rules
Technology maturity	Windrow composting technique is well established	Feasibility for segregated biodegradable waste is proven. Not suitable for mixed waste	Quality of RDF should be based on end use, no clear consensus on quality requirements. Burning of RDF below 850°C for less than 2 seconds residence time can pose serious problems of health and environment. Rules regulating characteristics of RDF and guidelines for appropriate use not prescribed by concerned authority.	Sanitary landfill is a proven method for safe disposal of waste, practiced world over. However, it has environmental implications and efforts have to be made to minimize waste going to landfills. MSW Rules only permit inert wastes to be landfilled.

Parameters	Windrow	Bio methanation	RDF	Landfill
Market for by-product/product	Quality compost compliant with FCO 2009 has a good market. IPNM Task Force (vetted by Supreme Court, 1 Sep 2006) has recommended co-marketing of 2-3 bags of compost with 7-8 bags of inorganic fertilizer.	The technology is not fully explored, though it has a potential to generate energy as well as digested sludge manure	Good market potential for RDF. In small cities, RDF plants only become feeders of RDF to large RDF based power plants and cement plants.	No potential, since it is stipulated by the SWM Rules that only inert wastes are to be disposed in landfills
Labour requirement	Labour intensive	Less Labour intensive	Labour intensive (based on current practice).	Only inert wastes are to be deposited in sanitary landfills. Labour intensive but requires considerable technical expertise as well.
Predominant skills for operation and management	Skilled & semiskilled labour	Skilled labour	Technically qualified and experienced staff.	Technically qualified and experienced, and semiskilled staff.
Concerns for toxicity of product	The final product is generally applied to soil and used as manure. Can contaminate the food chain if compost is not meeting FCO norms.			-
Leachate pollution	High if not treated appropriately	High if not treated appropriately	Low	Polluted surface runoff during wet weather, groundwater contamination due to leachate infiltration Moderate to high depending upon the leachate recycling and control systems.

Parameters	Windrow	Bio methanation	RDF	Landfill
				Leachate management during monsoons requires special attention
Atmospheric pollution	Low (Dust, aerosol, etc.). Odour issues	Low Leakage of biogas. Odour issues	Low to moderate (dust, aerosols). Very high if RDF is not burnt at required temperature. Odour issues.	Air pollution and problems of odour and methane emissions if not managed properly.
Other	Fire and safety issues to be taken care of	Fire and safety issues to be taken care of	Presence of inappropriate material in the RDF (chlorinated plastics). Fire and safety issues to be taken care of.	Spontaneous ignition due to possible methane concentration. Fire and safety issues to be taken care of.

Considering the above technology options and comparisons, Bio methanation & Composting is suggested since the quantum of waste to be handled is on a higher scale and considering the implementation of waste to energy concept for SWM plants. Details of Bio methanation technology is provided below.

16.5.3 Bio Methanation Technology

Bio methanation involves controlled biological degradation of organic wastes by microbial activity in the absence of oxygen. The process involves the anaerobic (without air) decomposition of wet organic wastes to produce a methane-rich biogas fuel and a small amount of residual sludge that can be used for making compost. It takes place in digester tanks or reactors, which enable control of temperature and pH levels for optimizing process control. Methane-rich gas produced is suitable as fuel for energy generation. The residual sludge is also produced, which is suitable for enriching compost materials. Input preparation or source separation is required to ensure that waste is free of non-organic contamination.

Anaerobic digestion is best suited to the treatment of wet organic feed stocks such as high moisture agricultural biomass, food waste, and animal wastes including manure and domestic sewage. A prepared feedstock stream with less than 15 percent Total Solid (TS) is considered wet and feed stocks with TS greater than 15-20 percent are considered dry. Feedstock is typically diluted with process water to achieve the desirable solids content during the preparation stages.

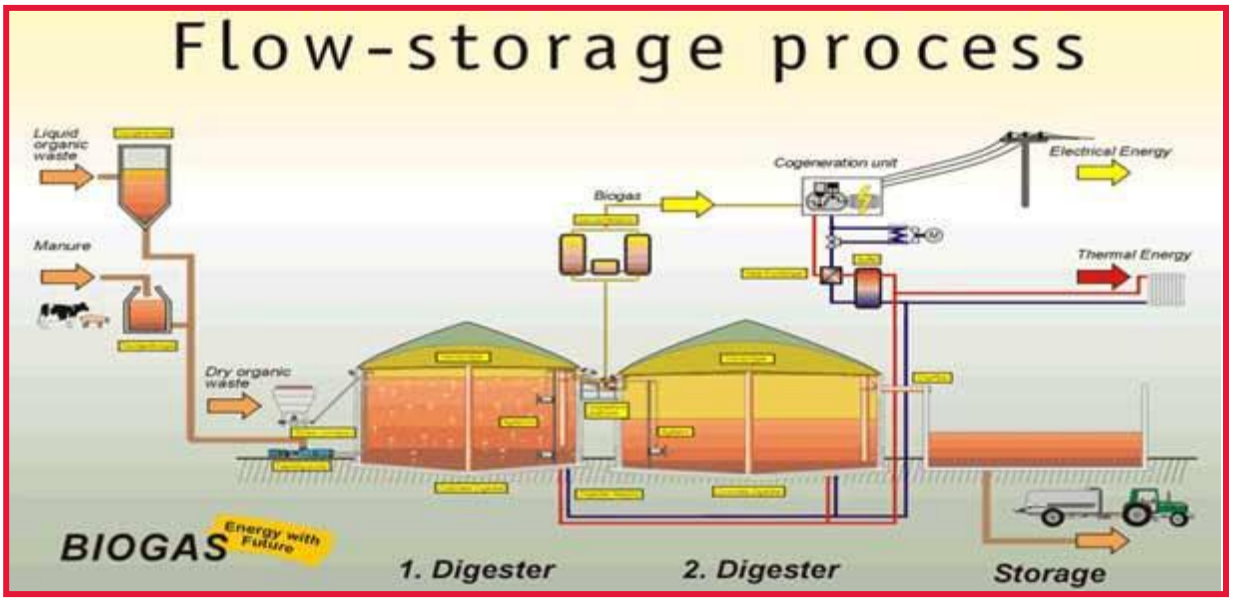
The homogeneity of the feed material is an important parameter from the efficiency point of view. The waste must be sorted so that all inorganic products are removed from the refuse prior to entry into the digester.

Single-stage digesters are simple to design, build, and operate and are generally less expensive. The organic loading rate of single-stage digesters is limited by the ability of methanogenic organisms to tolerate the sudden decline in pH that results from rapid acid production during hydrolysis.

Two-stage digesters separate the initial hydrolysis and acid producing fermentation from methanogenesis, which allows for higher loading rates but requires additional reactors and handling systems.

The solid waste management system needs to be modified and improved to make it compatible with the requirements of bio methanation technology covering source separation collection of solid waste. Otherwise, the applicability will be limited to highly organic and homogenous waste streams such as slaughterhouse waste, market wastes.

Exhibit N 3 :Flow storage process



The yield of biogas depends on the composition of the waste feedstock and the conditions within the reactor. The modern anaerobic digestion treatment processes are engineered to control the reaction conditions to optimize digestion rate and fuel production. Typically, 100-200m3 of gas is produced per ton of organic MSW that is digested. Important Operating parameters controlling bio methanation are:

- **Temperature:** Treatment of waste in anaerobic reactors is normally carried out within two ranges: around 25-40°C known as mesophilic range and higher than 45°C known as thermophilic range.
- **pH:** The anaerobic digestion process is limited to a relatively narrow pH interval from approximately 6.0 to 8.5 pH
- **Moisture:** The moisture content of waste should not be less than 15% as it can prevent decomposition of waste
- **Toxicity:** A number of compounds are toxic to anaerobic microorganisms. Methanogens are commonly considered to be the most sensitive to toxicity
- **C/N Ratio:** Optimum C/N ratio in anaerobic digesters is between 20-30. A high C/N ratio is an indication of rapid consumption of nitrogen by methanogens and results in lower gas production. On the other hand, a lower C/N ratio causes ammonia accumulation and pH values exceeding 8.5, which is toxic to methanogenic bacteria
- **Organic Loading Rate:** Organic loading rate is the frequency and speed at which the substrate is added to the digester. For each plant of a particular size, there is an optimal rate at which the substrate should be loaded. Beyond this optimal rate, further increases in the feeding rate will not lead to a higher rate of gas production. Agitation or consistent stirring of the contents in the digester also plays an important role in determining the amount of biogas produced
- **Retention Period:** The required retention time for completion of the reactions varies with differing technologies, process temperature, and waste composition. The retention time for wastes treated in a mesophilic digester range from 10 to 40 days. Lower retention times are required in digesters operated in the thermophilic range. A high solids reactor operating in the thermophilic range has a retention time of 14 days.

a. Composting

After waste minimisation and recycling systems, the ISWM hierarchy indicates adoption of resource recovery strategies and composting as the third preferred waste management practise, ensuring that waste is processed appropriately to facilitate further use of the material.

Composting is a controlled aerobic process of biologically “digesting” the MSW, so it may be recycled for other purposes—plant nutrient, stabilization of soil in remediation process, or soil amendment for recovery of poor soils. Compost production can be carried out at the decentralized level (home composting, bin composting, box composting, vermicomposting, in-vessel composting) or at a centralised level (windrow composting, in-vessel composting, aerated static pile), depending on the feasibility of implementation. Both processes require significant pre-processing, and only segregated organic matter can be composted. Compost produced should meet with quality criteria specified by the Fertilizer Control Order (FCO), 2009 and 2013.

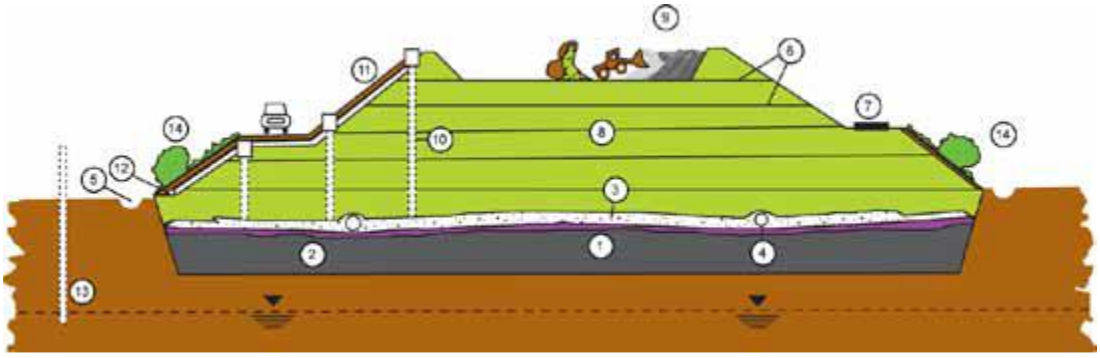
b. Refuse Derived Fuel

Refuse-derived fuel (RDF) refers to the high calorific non-recyclable combustible fraction of processed MSW, which is used either as a fuel for steam and electricity generation or as alternate fuel in industrial furnaces and boilers. The composition of RDF is a mixture that has higher concentrations of combustible materials than those present in the parent mixed MSW. RDF should preferably be co-processed in cement plants. Co-processing of RDF in steel industry and for power generation is also indicated. Internationally, the co-processing of RDF for power generation is technically proven and widely practiced as a part of their waste management strategy.

c. Technical Aspects : Solid Waste Disposal in Municipal Sanitary Landfills

Sanitary landfills are facilities for final disposal of MSW on land, designed and constructed with the objective of minimising impacts to the environment. The SWM Rules, 2016 provides comprehensive regulations on the siting, design, and operation of sanitary landfills.

A modern landfill complying with these requirements is a complex facility with various equipment to minimize environmental impacts. An overview on its basic components provides below



1. Geological barrier	8. Landfill body
2. Impermeable base liner	9. Filling and compacting in layers
3. Drainage layer	10. Gas venting system
4. Leachate collection system	11. Protective cover system
	12. Gas collectors
5. Storm - water drain ditch	13. Groundwater control
6. Bordering dams	14. Re-planting
7. Circulation roads	

- Waste suitable for landfilling

Condition and composition of waste suitable for disposal in a municipal sanitary landfill are regulated by the SWM Rules, 2016. Sanitary landfilling is necessary for the following types of waste:

i. Non-biodegradable and inert waste (by its nature or through pre-treatment).
ii. Commingled waste (mixed waste) not found suitable for waste processing.
iii. Pre-processing and post-processing rejects from waste processing plants; and

iv. Non-hazardous waste not being processed or recycled.

Sanitary landfilling is not allowed for the following waste streams in the MSW:

i. Biodegradable waste or garden waste (composted preferably).
ii. Dry recyclables (recycled preferably); and
iii. Hazardous waste (needs hazardous waste sites with special containment).

❖ Site selection for a landfill

The selection of a suitable site for sanitary landfill is governed by the strategy identified in the state SWM strategy or policy and the MSWM plan of the ULB. The SWM Rules, 2016 provides criteria for the location of the sanitary landfill. CPCB's guidelines for the selection of site for landfilling should be used as a guiding document.

d. Material Recovery Facility

A material recovery facility (MRF) is a place where non-biodegradable or recyclable solid waste collected from the doorstep is segregated, sorted and various components of recyclable waste recovered from it for resale. The MRF accepts mixtures of waste fractions (non-biodegradable or recyclable), and its configuration depends on the several factors like the type, quantity, and quality of incoming waste materials. Here the material is basically segregated into different streams of waste fractions (paper, plastic, packaging paper, bottles etc) which is further sold to intermediaries who supply bulk material to the recycling industries. MRFs also require large storage spaces to temporary store sorted recyclables which can be made available to recyclers in bulk for improved resale value. Depending on the scale of operations and the level of mechanization in the facility, MRFs may be classified as manual or mechanized. Small scale units employ manual MRFs wherein manual sorting process is being carried and it's typically owned, operated, and managed by the informal sector. Large scale units have mechanized MRFs with sophisticated systems and equipment that enable efficient separation of large quantity of material into different fractions.

e. Importance of Operation & Maintenance for Ensured Service Delivery

Irrespective of whether the provision of services is by private contractor or ULB, operation and maintenance (O&M) plan has to be adhered to. The O&M plan to be adopted by the authority either the ULB or the private operator responsible for procurement and management of equipment and facilities. O&M plans developed by private operators should be ratified by ULB. The O&M plan should include preventive maintenance schedules and responsibilities and guidance for breakdown maintenance. It should be the responsibility of the supervisor and operator to regularly maintain and update the O&M plan. It should also indicate procedures for recording, reporting, analysis, and further action.

f. SWM interventions

It is recommended to implement Door to door collection system by engaging private sector participation. Recommended plan for collection and transportation is to move towards bin less system in time bound manner. Although 100 % people's participation for door-to-door collection cannot be ensured right from beginning of project and mixed approach Door to door collection and community bin shall be adopted.

g. Suggestion for effective SWM

Based on the quantum of waste to be handled by Allahabad as mentioned in the above chapters, Windrow composting, RDF and plastic recycling are the technology that can be adopted for processing of municipal solid waste. But it is recommended to use combination of technology rather than adopting any single waste processing technology to increase efficiency of waste treatment. It is proposed to develop Refused Derived fuel facility integrated with Compost plant.

h. Waste to energy and solid waste management solutions

The enormous increase in the quantum and diversity of waste materials generated by human activity and their potentially harmful effects on the general environment and public health, have led to an increasing awareness about an urgent need to adapt scientific methods for safe disposal of wastes, while there is an obvious need to minimize the generation of wastes and to reuse and recycle them. The technologies for recovery of energy from wastes can play a vital role in mitigating the problems.

Besides recovery of substantial energy, these technologies can lead to a reduction in the overall waste quantities requiring final disposal, which can be better managed for safe disposal in a controlled manner while meet the pollution control standards.

16.5.4 Leveraging Success Stories of Other Cities

The best practices leading to successful management of collection, handling, conveyance, and treatment of solid waste in various Indian cities are analysed and a few inferences are attempted in this section.

Table 16-15: Case study of successful SWM practice – Alappuzha

Case Study Location	Alappuzha
State	Kerala
Major Success Factors	Source-level segregation and decentralised solid waste management
	Marginalised community involvement in rag picking
The economic impact on corporation	• Employment opportunities for more than 90 Self-Help Group (SHG) members • Average daily earnings of Rs. 400 per member of SHG through this initiative

	• Waste dumped into water bodies is minimised thereby improving the ecological health of the city
Relevance to Bareilly Municipal Corporation (BMC)	Engaging source-level segregation through the marginalised community will be a Win-Win situation wherein the BMC shall minimise the amount of waste being processed, and it shall employ marginalised communities thereby improving their livelihoods

Source: Atin Biswas, Subhasish Parida et al. 2021, Waste-Wise Cities: Best practices in municipal solid waste management, Centre for Science and Environment and NITI Aayog, New Delhi.

Table 1-8 represents the outcome of the case study of successful SWM practice in Bhopal in Madhya Pradesh

Table 16-16: Case study of successful SWM practice – Bhopal

Case study location	Bhopal
State	Madhya Pradesh
Major success factors	• Source-level segregation • Decentralised solid waste management • Formalising awareness campaigns for citizen participation • Leveraging the informal sector into the channel of formal solid waste management • Marginalised community involvement in rag picking
The Economic Impact On Corporation	• Reduced capital cost for SWM • Decrease in operational expenses by maximising the efficiency • Achieving 100 % source segregation has led to an increase in the efficiency of SWM • Reduced infrastructure costs and augmented the operational revenue by achieving a high rate of material processing
Relevance To BMC	• Engaging citizen awareness programme such as “Carry Your Own Bag” and “Community Composting” are some of the initiatives which can be replicated to attain sustainable sanitation in BMC • Over the long run, the operational efficiency of waste handling can be increased thereby resulting in decreased operational expenditure for BMC

Source:

Atin Biswas, Subhasish Parida et al. 2021, Waste-Wise Cities: Best practices in municipal solid waste management, Centre for Science and Environment and NITI Aayog, New Delhi.

Conclusion

To minimize the environmental impact from waste management and to establish the sustainable sound material-cycle society, reduction of waste that goes into the final disposal by controlling the generation of waste and promotion of recycling are the most important issues. This leads to reduction of the cost required for development and maintenance of facility of waste management as well as to the prolonged life of the final landfill site. Therefore, the priority should be given for

- Reduction of waste at the source of generation; and
- Reduction of waste through reuse and recycling of the waste generated.

Infrastructure design requirement for Proposed projects

A. **Surface drainage – general considerations**

- Deciding the drainage pattern based on the topography of the site.
- An internal drain to be planned along the peripheral site boundary. Which will take care internal and outside catchment area (if required) and transfer it to sub surface drains for conveyance to the ultimate receiving body; and
- Strengthening and widening of the approach culverts to the site is considered to facilitate stormwater drainage.

B. Surface drainage – peak runoff

- The peak runoff and discharge capacities are computed based on the following design parameters.
  - The peak runoff is planned to be computed based on the rational formula: -

    Q = C * I * A / 360

    Where, Q = Quantity of runoff, m^3/s

    C = Coefficient of Runoff

    I = Intensity of rainfall, mm/hr.

    A = Catchment area, ha
  - Given below the coefficient of runoff adopted in the drainage computation:

    0.9 - for built-up area

    0.5 - for road and other paved areas

    0.2 - for greenery and open areas
  - The condition includes maximum annual rainfall intensity of the region for storm drain design (1200 mm -2100 mm annual rainfall as per data from National expert (Environmental)).

C. **Surface drainage – sizing**

- The sizing of the drains is designed based on the discharge capacity of Qc to cater to the estimated peak runoff using Manning's formula: -

  $Qc\ (m^3/sec) = [(1/n) * R^{2/3} * S^{½}] * A$

  Where

  n = Roughness coefficient ($s/m^{1/3}$)

  R = Hydraulic mean radius (m)

  S = Hydraulic gradient (m/m)

  A = Area of a cross-section of the drain (m^2)

D. **Surface drainage – design and scheme**

- The drainage system is planned to cater for the entire development through gravity flow;
- Providing drains on both sides of the roads or internal drain.
- The proposal includes an open trapezoidal drain with stone pitching for the sidewalls and Plain Cement Concrete (PCC) for the base for surface runoff collection, providing easy maintenance of the primary road.
- The proposal includes a rectangular brick masonry drain for the remaining areas for optimisation of the area under drainage
- The considerations include RCC box/pipe culverts of suitable sizes for road crossings.

- Enhancing the groundwater table and reducing water demand through effective rainwater management; and
- Rainwater harvesting through recharging structures is envisaged all along the drain at regular intervals, apart from individual rainwater harvesting through recharging structures at strategic locations.

E. **Storm water Open Channel**

Storm water drains are surface drains which are constructed as open or covered drains with a suitable gradient to carry the storm water flows from the catchment to the safe disposal point. Drainage in the urban context is classified as given below:

- **Tertiary drains:** In urban catchments, tertiary drains collect storm water from sub-zones and convey to the secondary drains.
- **Secondary drains:** These drains collect storm water from tertiary drains and zones. They discharge the storm water into the primary drains.
- **Primary Drains:** In urban catchments, primary drains are main drains that collect storm water from secondary drains and discharge to the safe disposal point.

F. **Construction of Storm Water Drains**

This section discusses the construction of surface drains such as tertiary, secondary, and primary drains. The tertiary drains are generally small drains that are constructed in rectangular section whereas; secondary and primary drains are larger drains that are normally constructed in the trapezoidal section.

❖ **RCC drains**

Tertiary drains are usually constructed in rectangular section either of masonry or reinforced cement concrete. Where it is proposed to construct precast RCC drain, the same should not be less than 50mm thick and should be reinforced with 3 longitudinal bars of 6mm diameter and 2 crossbars of same size in 0.6 m length and mould should be removed after 48 hours then they shall be kept well-watered for a fortnight and after this watering shall be discontinued and the drain should be left to cure for another fortnight before laying. The ground should be kept to the exact shape and slope at which drains are to be laid and the trench will be watered and rammed.

❖ **Brick Drains**

Brick drains can also be constructed of bricks. The brickwork shall be in cement mortar 1:3 and plastered smooth with cement plaster of 1:2, 20 mm thick. A change in the alignment of the brick drain shall be on a suitable curve conforming to the surface alignment of the road.

❖ **Rectangular Section**

In congested urban areas, small or medium drains are constructed in a rectangular section covered with suitable RCC slabs to protect against dumping of solid waste from the local residents. Rectangular drains are normally constructed in hilly regions due to space crunch.

❖ **Trapezoidal section**

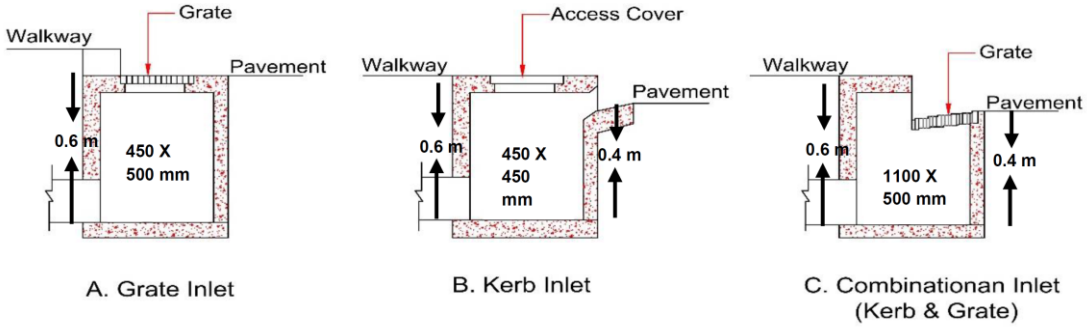
Primary and secondary drains that normally carry a considerable quantity of storm flows are constructed in trapezoidal section. Especially outfall channels that sometimes carry entire storm flows from the catchment are designed in larger sections that often

resemble irrigation channels. In such cases it is preferable to economize the cost by constructing earthen channels with cement concrete lining.

Source: Manual on strom water drainage system, CPHEEO

G. **Storm water inlets**

- Storm water inlets are devices used to collect runoff and discharge it to an underground storm drainage system. Inlets are suitably located on pavements, in gutter sections, paved medians, roadside and at locations of specific requirement.
- **Kerb inlet :** Kerb inlets are vertical openings in the road kerb when they are equipped with the diagonal notches cast into the gutter along the kerb opening to form a series of ridges or deflectors. Such inlets are suitable where heavy traffic is expected.
- **Gutter inlets:** Gutter inlets are horizontal openings covered with one or more suitable gratings through which the flow passes.
- **Combination inlets:** Combined grate and curb inlets are more efficient. These are compound of a curb and gutter inlet acting as a single inlet. Following figures give the details of different types of inlets as shown below



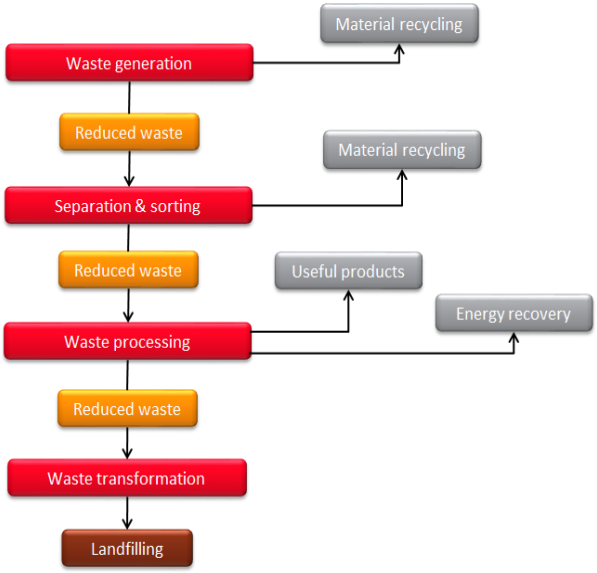
A. Grate Inlet B. Kerb Inlet C. Combinationan Inlet (Kerb & Grate)

Source: Manual on strom water drainage system, CPHEEO

Solid waste Management

- SWM is one of the essential services for maintaining the quality of life and for ensuring better standards of health and sanitation.
- If properly collected at the source, SWM would reduce the number of downstream problems related to transportation and disposal of the same. The solid waste generated in proposed development can be broadly categorised as under:
  - Domestic wastes: kitchen and wood waste, plastic, paper, floor sweepings, etc.
  - Road sweeping and sanitary waste: human waste.
  - Garden and agriculture waste: leaves, branches, plants
  - Roads/building construction waste: earth, asphalt, concrete, brick, plaster, wood, glass, stones.
- **Exhibit No. 1** depicts the role of integrated SWM, to reduce the quantity of solid waste disposed of to land by recovering materials and energy from solid waste.

Exhibit No. 1: Waste reduction by integrated SWM



Source: *Consultant's analysis*

- The project shall reduce landfills caused by waste so that it is minimal. Source segregation of solid waste generated is a prerequisite for recycling. The gardening in the project can effectively utilise composted organic waste. Also, considerations include energy creation through waste.
- The generation rates of residential, commercial areas vary to such an extent that exact quantification of waste generation. However, an attempt has been made to quantify the solid waste generated from various proposed development.
  - Residential refuse : 0.3 to 0.6 kg/capita/day
  - Commercial refuse : 0.1 to 0.2 kg/capita/day
  - Street sweepings : 0.05 to 0.2 kg/capita/day
  - Institutional refuse : 0.05 to 0.2 kg/capita/day

  Source: National Building Code
- Out of the total solid waste generated, 40 percent may be taken as organic waste and 60 percent as inorganic waste. The knowledge of chemical characteristics of waste is important for selecting and designing the waste processing and disposal facilities.
- It is mandatory to implement source, and the activity includes adequate considerations for the planning of collection, transportation of waste within the site area. Users will be required to segregate their waste into the following categories and put it in colour-coded bins.
  - Industrial non-hazardous waste.
  - Bio-degradable waste.
  - Non-biodegradable waste.
  - e-waste like parts of computer, floppies, monitor, cartridges, ribbons.
  - Construction debris, street sweepings.
- From the above, the solid waste treatment facility contemplates treating only organic waste and inorganic segregated wastes to authorized waste processing or disposal facilities or deposition centers either on its own or through the authorized waste collection agency.
- The entire solid waste is planned to be collected and treated in the municipal solid waste treatment plant, Earmarking suitable area for waste storage area within Proposed development.

Chapter 17. SOLAR PROJECTS

17.1 Vision for Solar Projects

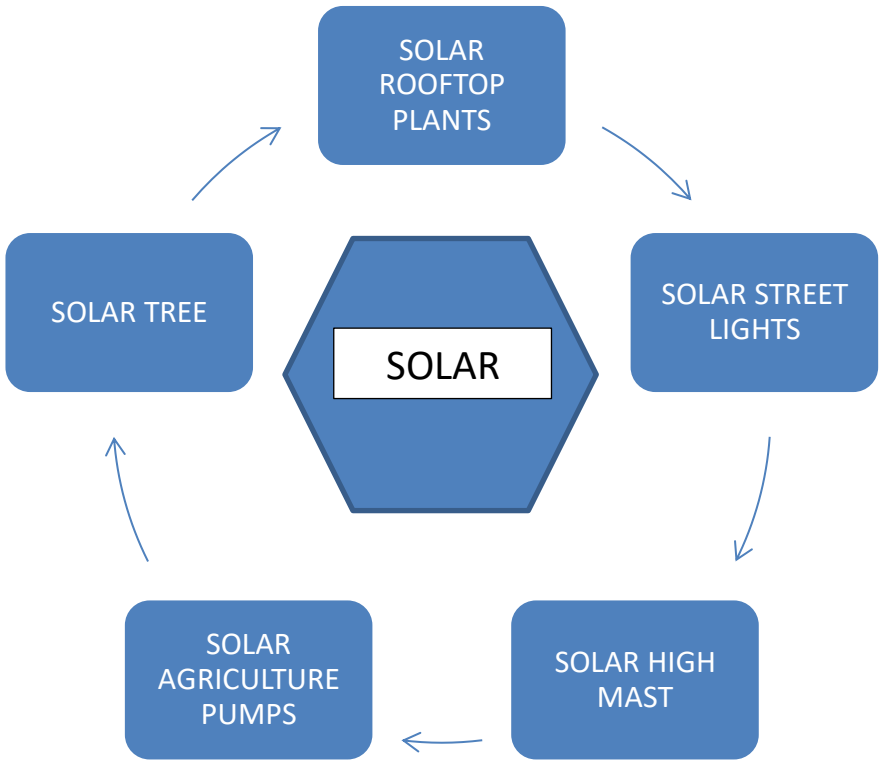


Figure 17-1: Solar Projects Vision

The vision to develop Bareilly a clean, green, pollution free city & self-dependable in power generation.

As the city enjoys ample sunlight to generate solar power from sun, it is advisable to install solar product for daily utilization. Solar power is free of cost & the system life is 25 years with almost zero maintenance cost.

17.1.1 AWARENESS

People from all sectors should be made aware to use solar power & encourage them with the benefits of renewable power. Rooftops for residential should be brought up under subsidized schemes. Solar power for HT consumers should be made compulsory beyond certain limits.

17.1.2 ENCOURAGEMENT

UPNEDA & UPPCL should be flexible in their regulations & policies to encourage people to use solar power, government should float schemes for subsidy for all solar products, should run a campaign through camps.

17.2 REGULATIONS & POLICIES

UPNEDA & UPPCL have very harsh solar regulations & policies. The power tariff is very much high as compared to other states, certain mandate has to be implemented through state government to ease the use of solar power

As state of Maharashtra have police for 500 KW for NET Metering under the nodal agency & DISCOM. Where residential as well as commercial meter holders enjoy full export of extra power generated. They get the rebate in terms of units they exported to grid. Hence making the electricity bills zero.

17.2.1 MNRE SCHEMES

The central government have many schemes that also been carried out along with state agencies. State government should encourage people for such schemes

Many states giving agriculture solar pumps on subsidies rate to farmers

17.2.2 KUSUM

This is specially for farmers, where farmer lends his land for 30 years to the government or to the solar developer. He directly owns the plan with the developer & generate electricity in his farm.

The generated electricity is sold to the government on some fixed rate per unit.

17.2.3 ATAL JYOTI GRAM YOJNA

This is for smart village scheme where whole village runs on solar power.

Sarpanch of selected village is allotted with some funds for which he puts solar plant for panchayat office, solar streetlights, solar pumps, high mast etc.

Government of Uttar Pradesh also should highlight such schemes to reach to the common people.

17.3 SCOPE

As natural coal fields, gas & petroleum have limited stock, the scope of using renewable power which is readily & freely available. One should take this opportunity to bring back India on self-reliable in power sector.

As India is inching towards number one position in renewable sector.

17.3.1 ONLINE OPEN PLANT

One should install a demo solar park to give real time generation, its utility & advantages over grid power. Solar power for farmers, hotel industries, private hospitals & commercial establishments etc. should be made compulsory.

Also, to identify the HT consumers for installation of solar power plants.

17.3.2 FINANCE

Finance through banks / financial institute can be made easily available to the customers wants to install solar products.

17.3.3 ONLINE APPLICATION

A separate portal for online application for NET Metering on UPPCL webpage.

17.3.4 EPC PLAYERS

They will play an important role to gain momentum to this industry, many skilled workers & engineers should be encouraged to build their carrier in solar.

17.3.5TECHNOLOGY

Separate subject can be added to study renewable energy into technical board & universities, where practical & research development syllabus can be incorporated along with theory.
To attain these following systems is suggested & proposed.

17.4 VISION & PROJECT COMPONENTS

17.4.1SOLAR ROOFTOP PLANTS

This system has most advantages amongst all systems. It is self-power generation unit for self-use. It can be installed on rooftops & on ground. This system has capacity of 1 KW to Megawatts depending on requirement & demand.
As UPNEDA & UPPCL regulations & policies do not entertain NET Metering above 10 KW, however it is advisable to incorporate zero export device in system to restrict export of solar generated energy in to the grid.
As Uttar Pradesh (UPPCL) have highest electricity tariff in India (Rs.8.5 / Unit) it is always advisable to install solar power plants.
The initial cost to install solar plant is on higher side but the return of investment is about 3-4 years. Such plant can be on grid or off grid.
Battery backup can be an added feature for plants where no grid is available,
This system can also be compatible with DG set
During the period of 25 years the user gets free of cost power. No Co2 is emitted in atmosphere in the process. The capacity of plant can be calculated by electrical bill analysis & plant size is determined. After mapping, civil layout, checking electrical parameters final design is done.

17.4.2 SOLAR STREET LIGHTS

Semi or fully integrated solar streetlights can be installed on main streets, lanes of city. This unwired system will increase aesthetic view of city. The atomized Standalone plant can also be installed at the maiden of lane or small solar parks can be set up at free unused land.
These solar lights are self-operated, automatically gets ON / OFF works dusk to dawn & have the operation capacity for 4 days without charge.
The battery & LED Light fixture in same housing whereas the panel is mounted on same pole. Such lights can also be used at gardens, public places, hospitals etc. And where there is no grid available.
It comes in LED wattage of 9 to 100 Watts.

17.4.3 SOLAR TREES

This is again very useful system which requires less space to install, very attractive solar power plant in shape of tree.

It can be installed anywhere in office premises, hospitals, schools & collages & gardens.
This comes in capacity of 1 KW to 5 KW with sitting arrangement equipped with CCTV & mobile charging station.

17.4.4 SOLAR FLOATING PLANT

Such plant can be installed at river banks the capacity ranges from 5 KW to 500 KW depending on the length of river bank.

17.4.5 SOLAR HIGH MAST

Such lights are designed for city squares / chowks, bus stands, parks, railway station & hospitals.

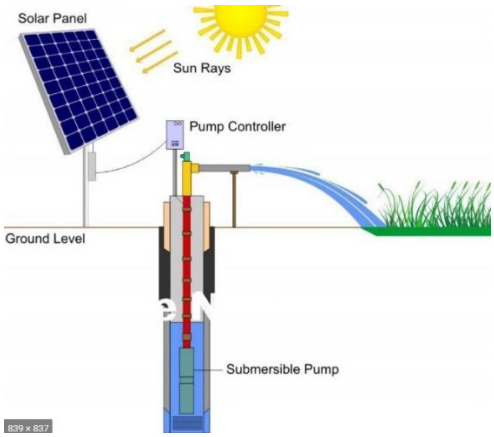
LED Lights fixture, Solar panel & Battery is mounted on top of hexagonal pole. This is also atomized system equipped with CCTV surveillance.

17.4.6 SOLAR AGRICULTURE PUMPS

Such solar installation can be used for pumping station, filtration plants, tube wells, overhead tanks, irrigating agriculture land & on wells.

The system is combination of solar panels with controller, AC/DC pumps (Mono block or submersible) This works in day time uses solar power to pump water.

It comes in ranges of 1 HP to 50 HP.



17.4.7 SOLAR EV CHARGING STATIONS

As increase in use of Electrical vehicles (2-3 & 4 wheelers) solar EV charging stations need to be installed at main terminals of city, it requires very less space comes in range of 3 & 5 KW.

17.4.8 SOLAR WATER HEATER

As many consumers uses electrical geysers for hot water, heavy power is use in such equipment's, to avoid heavy energy & bills one should install solar water heater.

Specially hotel & hospital need 24 hours hot water. Such SWH comes in capacity of 100 – 10000 LPD. The SWH are of two types: Flat platted & Glass tubes. The average storage of hot water is about 48 hours.

Solar boiler plant can be used for industrial purpose.

The average calculation / thumb rule is 25 Liters / person.