Government of
Uttar Pradesh

VISION DOCUMENT
Taj Trapezium Zone

Final Report

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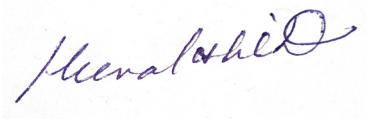
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ABBREVIATIONS

AAQM - Ambient Air Quality Monitoring
ADA - Agra Development Authority
AMC - Agra Municipal Corporation
AMRUT - Atal Mission for Rejuvenation and Urban Transformation
ASI - Archaeological Survey of India
BDO - Block Development Officer
CBWTF - Common Bio Medical Waste Treatment Facility
CGSC - Central Government Special Committees
CPCB - Central Pollution Control Board
DA - Development Authority
DC - District Collector
DH - District Head quarters
DIC - District Industrial Centre
DoA - Directorate of Archaeology, Govt. of Uttar Pradesh
DoH - Department of Horticulture and Food Processing, UP
DoT - Department of Tourism, Lucknow
ETP - Effluent Treatment Plant
FD - Forest Department
FWD - Forest and Wildlife Department
GSDP - Green Skill Development Programme
GP - Gram Panchayat
GWD - Ground Water Development
HRIDAY - Heritage City Development and Augmentation Yojana
IIDD - Infrastructure and Industrial Development Department
IIDDUP - Infrastructure and Industrial Development Department, Uttar Pradesh
INTACH - Indian National Trust for Art and Cultural Heritage
IWRD - Irrigation and Water Resource Department
MC - Municipal Corporation
MLD - Million Litres Per Day
MoEF & CC - Ministry of Environment, Forest and Climate Change
MSME - Ministry of Micro, Small and Medium Enterprises
NDMA - National Disaster Management Authority

NGO - Non-Government Organization

PWD - Public Works Department

RADPFI - Rural Area Development Plan Formulation and Implementation Guidelines

RRDD - Representative from Rehabilitation and Resettlement Department

SDG - Sustainable Development Goals

SISI - Small Industries Service Institute

SPCB - State Pollution Control Board

STP - Sewage Treatment Plant

TCPO - Town and Country Planning Organization

TTZA - Taj Trapezium Zone Authority

ULB - Urban Local Bodies

UNESCO - United Nations Educational, Scientific and Cultural Organization

UPEDA - Uttar Pradesh Energy Development Agency

UPHSSP - UP Health System Strengthening Project

UPIWRD - Uttar Pradesh Irrigation and Water Resource Department

UPJN - Uttar Pradesh Jal Nigam

UPPCB - Uttar Pradesh Pollution Control Board

UPSIDC - Uttar Pradesh State Industrial Development Corporation

UPSRTC - Uttar Pradesh State Road Transport Corporation

UPTD - Uttar Pradesh Tourism Department

URDPFI - Urban and Regional Development Plan Formulation and Implementation Guidelines

WQM - Water Quality Monitoring

1. INTRODUCTION

1.1 Background

The Taj Trapezium Zone is situated within the western part of the great plains of India or the Ganga Basin. Historically this region has always been significant due to its proximity to the seat of power, or in other words Delhi - *Indraprastha* in ancient times, *Dilli* in the Mughal Period and finally *NCT Delhi*. Both Agra and Delhi have the distinction of nestling within them one of the finest examples of Islamic Architecture with the Taj Mahal at Agra, having the distinction of being one of the seven wonders of the world and a World Heritage Site, and perhaps the most visited monument in India. The area is part of the Braj Region – a region which still resounds with the anecdotes of Shri Krishna, bringing a large number of devotees from India and abroad. With the significance of the region, an assured tourist and pilgrim traffic, there is a great potential for growth of the region.

All things born and created follow a cycle of growth and decay, but our efforts should prevent this decay and increase the longevity of the resource for future generations to enjoy and benefit from it. Today we stand collectively – all stakeholders, to address this concern with appropriate efforts and to summarise in the words in the Order of the Hon'ble Supreme Court of India on 28th August 2018, that we should understand **"there would be no second chance…"**.

Concerns regarding the environmental threat to the Taj Mahal was voiced in the Hon'ble Supreme Court through a Public Interest Litigation filed by the noted "Green" Advocate Mr. M.C.Mehta. The Writ Petition No. 13381/84-M.C.Mehta V/s Union of India & others raised several issues pertaining to the environmental pressures on the monument as well as the socio-economic and physical conditions of the city. The concern has been articulated in the landmark judgement of Hon'ble Justice Shri Kuldeep Singh dated 30/12/96, **"The Taj is threatened with deterioration and damage not only by the traditional causes of decay, but also by the changing social and economic conditions which aggravate the situation with even more formidable phenomena of damage and destruction."**

Originating as a result of the Writ Petition No. 13381/84-M.C.Mehta V/s the Union of India & Others, the Taj Protection Mission refers to a group of projects intended to check the deterioration of the Taj Mahal on account of the environmental pollution. The Central Pollution Control Board delineated the Taj Trapezium Zone (TTZ) in 1983, on

the basis of the weighted mean wind speed in twelve directions from Agra to Mathura and Bharatpur. The boundaries of the zone were made keeping in mind the effect of any pollution source in this zone on the critical receptor- The Taj Mahal. This area was declared as an **"Air Pollution Protection Area."**

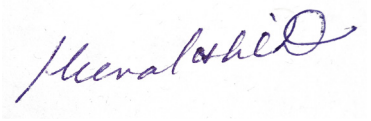
Preceding the 1996 judgement and following it many studies were commissioned on identifying the factors deteriorating the Taj Mahal. These studies have also indicated an improvement in air quality. First, the Court ordered that the polluting units in the vicinity of the Taj Mahal be identified. Mainly foundries; glass and bangle manufacturing units; and chemical and engineering industries were found to be using coal and other polluting fuels. The court also ordered that the Gas Authority of India Ltd would supply cleaner fuel-natural gas-to these units. The court, in its 1996 judgement and subsequently, asked for many other things to be done such as creating a green belt; building a bypass for heavy traffic; ban on brick kilns within 20 km from the Taj; supply of uninterrupted power so that the use of generators is negated; and ban on diesel-driven, light-duty vehicles and three-wheelers within 500 metres of the monument. The court-ordered air quality-monitoring stations, located both near the Taj and in the industrial outskirts of the city, to prove the difference.

Inspite of the above efforts the Taj Mahal and its environs is still under threat. It needs to be assessed if there are new sources of pollution that were not accounted for; or is it because of non-implementation of the directions of the court or is it because of development pressures and activity intensity that is threatening the monument.

The Hon'ble Supreme Court of India had again upheld the protection of Taj and its environs, in its Order dated 08.12.2017:

"……In our opinion, a detailed and comprehensive vision document and plan with a futuristic perspective which can protect and preserve the Taj and its environs and indeed the Taj Trapezium Zone spread over six districts of Uttar Pradesh and District Bharatpur in Rajasthan for a few hundred years at least should be prepared. This exercise will require expertise from all stake holders including those concerned with cultural heritage, historical heritage, environment and wild life, etc. etc. and of course, prevention of pollution. The concerned authorities will consult not only officials but also persons from the civil society including the petitioner Mr. M.C. Mehta, who has spent more than 33 years in making efforts to protect the Taj and its environs……

In view of the above mentioned court order, dated 8th October 2017, the Department of Tourism, Government of Uttar Pradesh, vide its Letter D.O. No. 989/ Agra-TTZ/ 2017 dated 27th November 2017 has invited the School of Planning and Architecture, New



Delhi to prepare the Vision Document and Comprehensive Action Plan for protection of Taj Mahal and its surrounding Environment. An agreement was signed between the Taj Trapezium Authority, Agra and School of Planning and Architecture, New Delhi on 15th March 2018 for preparation of a vision document for sustainable development, environmental and heritage protection of the area along with a comprehensive action plan in reference to the environment and other matter based on the principles of "Sustainability". A draft Vision document was to be submitted within four months after signing of contract followed by the Final Vision Document within two months after incorporating the suggestions.

1.2 Terms of Reference

The Terms of Reference as per the Agreement between SPA Delhi and Government of Uttar Pradesh dated 15th March 2018, are as follows:

It is proposed to create a vision document for sustainable development, environmental and heritage protection of the area along with a comprehensive action plan in reference to the environment and other matter based on the principles of "Sustainability". This should elaborate on:

- Sustainable Tourism (infrastructure and activities)
- Environmental preservation and protection.
- Sustainable Transportation and movement networks.
- Measures for protecting and preserving the Heritage assets and its immediate environs.
- Measures for promoting sustainability in developmental projects.
- Promoting appropriate industry and sustainable commercial activity
- Social and Economic sustainability within the local community
- Examining and proposing a range of differential measures from urban to rural in the affected zone.

This document needs to be done for the immediate vicinity of the Taj Mahal and the broader TTZ area. This document may work as a guideline based on which the TTZ Authority and relevant City Development Authorities / Municipal Corporations align their current and future development plans. The document shall also include consultation with the requisite stakeholders of the area.

Output

- Review of the Existing projects and proposals in the zone
- Draft vision statement for sustainable development, environmental protection and

preservation

- Stakeholder Consultations
- Vision Document including Comprehensive Action Plan (including short term and long term measures)
- Suggesting modalities for execution of the proposed measures.

1.3 Formulation of TTZ & Chronology of Events

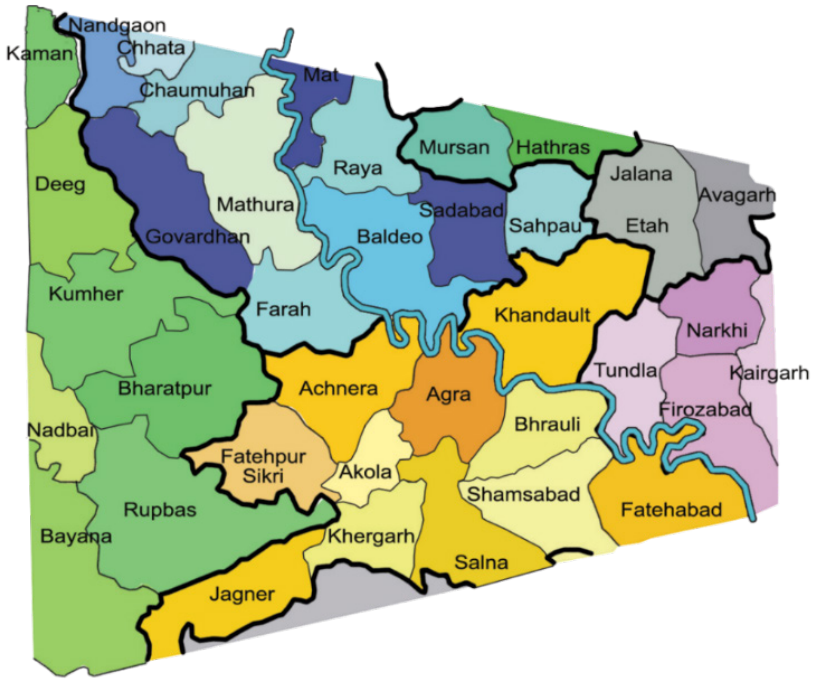
The Taj Trapezium Zone (TTZ), which is in the form of trapezium, is bounded between $26^0$45'N & $77^0$15' E to $27^0$45'N & $77^0$15'E in the west of Taj Mahal and in the East of Taj Mahal between $27^0$00'N & $78^0$30'E to $27^0$30'N & $78^0$30'E. The TTZ is spread over 6 Districts:

1. Agra: State of Uttar Pradesh
2. Mathura: State of Uttar Pradesh
3. Firozabad: State of Uttar Pradesh
4. Hathras: State of Uttar Pradesh
5. Etah: State of Uttar Pradesh
6. Bharatpur: State of Rajasthan

The Taj Trapezium zone also includes small parts of Aligarh and Dhaulpur. The region as a whole encompasses an area of 10,400 sq. kms. The Central Pollution Control Board delineated the Taj Trapezium Zone in 1981-82[1] on the basis of the weighted mean wind speed in twelve directions from Agra to Mathura and Bharatpur. The boundaries of the zone were made keeping in mind the possible effect of pollution sources in this zone on the critical receptor - the Taj Mahal. This area was declared as an "Air Pollution Protection Area". There was a ban on new units of "High Polluting Nature" or the expansion of the existing units was not to be permitted. Apart from being part of TTZ, each of these regions has its own importance in the contribution to the region's economic growth. The natural and cultural setting in each administrative unit varies widely and promotes sectoral development accordingly. The region covers sensitive areas such as the Taj Mahal in Agra, Keoladeo National Park in Bharatpur, Soor-Sarovar bird sanctuary in Agra, and Mathura & Vrindavan are important religious destinations.

1 COMPREHENSIVE ENVIRONMENTAL MANAGEMENT PLAN (CEMP) FOR TAJ TRAPEZIUM ZONE (TTZ) AREA, CSIR-National Environmental Engineering Research Institute (NEERI), December, 2013;pg 1.4

Map 1.1 Taj Trapezium Zone



Sources: www.cpcb.nic.in , accessed on 3-01-2018

Concern for the environmental protection of the area around the Taj Mahal began in 1973 following the decision of the Government of India (GOI) to set up a Petroleum Refinery at Mathura. This was followed by setting up of an Expert Committee under the Chairmanship of Dr. S. Varadharajan, in 1974 to study the impact of the proposed Refinery. While the work on the Refinery started, controversies rose relating to the environmental status of the area. In 1984 Advocate Shri. M.C. Mehta filed a writ petition before the Supreme Court against GOI, Mathura Refinery, U.P. Govt. and other Govt. departments. The petition requested that they be directed to take suitable measures including the shifting of the Mathura Refinery to conserve the Taj Mahal from the threat of air pollution caused by Mathura Refinery.[2] This was followed by formulation of many expert committees to look into various aspects of development of the area, many studies recommendations for pollution abatement, waste management, water augmentation etc. Many Court Orders to direct and enforce environmental management in the zone showcase the continued concern for the area and a need to get the recommendations implemented. The December 1996 Order resulted into closure of polluting industries and switching over to clean fuel or natural gas for manufacturing. The formulation of the Taj Trapezium Zone Authority in 1999 was to have a dedicated body to oversee the area, manage and direct development to ensure environmental protection of the area.

2 Ibid.; 1.3

Many development projects were formulated with the court itself directing afforestation and plantation, barrage across river for water management etc. The Environmental Management Plan, CPCB; 2002, Comprehensive Environmental Management Plan for Taj Trapezium Zone, NEERI, 2013, various Master Plans for the cities within the area, YEIDA proposed townships, AMRUT, SMART City , HRIDAY, City Mobility Plan etc. have also formulated many projects covering many sectors and addressing short term, medium term and some long term time frames.While the concern for the environment has been addressed by the Government authorities, court directives, proposed and implemented projects etc, however the implementation of the proposals, policies and court directives requires a sustained effort.

1.4 Policies & Programmes w.r.t Sustainable Development Goals

India is committed to pursue the implementation of the SDG agenda through close collaboration between the national and sub-national governments as well as active participation of all other relevant stakeholders. Bi-annual reviews are proposed to be conducted with the state governments for identifying good practices as well as challenges and undertaking the appropriate course corrections. The SDG implementation process has started yielding valuable insights. Documentation and dissemination of such experiences coupled with the extension of technical support for resolving problem areas will be the key functions of a knowledge management system to be coordinated at the national level. Relevant ministries and stakeholders for each of the SDGs have been already identified. Given the interconnectedness of the SDGs, relevant strategies for enabling collaboration among different actors will be developed as part of the overall implementation process. Additionally, consultations and capacity building activities at the national and regional levels will be continued.
Uttar Pradesh Sustainable Development Report (UP SDR), submitted in July 2018, is framed in perspective of SDGs. It is proposed to take care of reforms with identifying possible areas of interventions with respect the agenda 2030 of SDGs. The SDR is divided into Five Themes with Nineteen chapters including growth enablers with growth engines.[3]
Action Points for the States/UT's w.r.t implementation of SDG goals, include

- SDG wise mapping of schemes, departments and budgets for all the goals and targets

3 http://www.lkouniv.ac.in/site/writereaddata/UploadNews/corrigendum/pdf/C_201807011918228678.pdf UTTAR PRADESH Sustainable Development Report (UP SDR) An Outline, July 2018, accessed on 27-10-2018.

- Identifying indicators for schemes wherever needed
- Identifying data sources & nodal officials for collecting/managing data
- Analysing adequacy of current interventions, identifying critical gaps & devising suitable interventions.
- Convergence of all departments & stakeholders in planning at Panchayat, Block & District levels
- Training/Capacity Building (State, District, Block & Panchayat) for implementation & monitoring.
- Reviewing the performance of districts on the priority indicators.
- Regular update to NITI Aayog on the progress under priority indicators as well as the related schemes.[4]

It is thus important to relate any proposed development intervention to the themes identified by the Government of both Uttar Pradesh and Rajasthan w.r.t SDG Goals to avoid duplication of efforts and to take benefit of the management, monitoring and implementation aspects.

1.5 Methodology, Scope and Limitation

The Hon'ble Supreme Court of India has directed for the preparation of a Vision Document for a few hundred years. A brief overview of the approaches for preparation of a document of this nature brings forth some methodologies followed:

1. Strategic Environmental Assessment - Strategic Environmental Assessment (SEA) is a multi-disciplinary tool that evolved from Environmental Impact Assessment (EIA) as a document prepared to assess the environmental impacts of policies and programmes on environment. It identifies the key challenges of the area under study and includes people's participation and paves way towards sustainable development. It outlines the key safeguards for any project that is proposed under the policy or program to ensure protection of environment and sustainable development. This is currently not followed in India.

2. Perspective Plan[5] - Perspective Plan, formulated for a 20 to 30 year period, of a State includes State Urbanization Policy and State Land Utilization Policy. The plan is based on state resource mapping and analysis and assessment of potential resources. It addresses the long term policies regarding development of infrastructure and resource mobilisation.The scope of this plan covers the social, economic, environmental and

4 http://niti.gov.in/writereaddata/files/NITI-Aayog-SDG-Presentation-to-States.pdf; accessed on 27-10-2018

5 URDPFI Guidelines, GOI 2015, page 6

spatial development goals, policies and priorities relating to the activities that have spatial and financial implications.

The purpose of a perspective plan is to provide an overall framework for preparation of detailed plans. Therefore it serves as a guide for urban local authorities and regional development authorities in preparation of the regional and development plans. Till now no such plan has been prepared.

3. Regional Plan[6] - Regional Plan is prepared for the area identified as formal or functional region, which could be state/ interstate/ district/ inter-district, investment region or special area. If region so identified is interstate, all such states will need to prepare sub-regional plans for their respective area. For a regional plan for a normal region, the key contents to be included are - A.Introduction of the Region B.Analysis of regional resources C.Projected requirements D.Major proposals and projects E.Implementation Plan. Currently National Capital Region has been preparing regional plans.

4. Leitbild Approach[7] - The approach outlines a particular paradigm for landscape planning that embodies a transdisciplinary approach in which lay-people and experts develop both goals and strategies for realising their joint visions. It assesses the biophysical parameters of an area to arrive at areas available for development. These are then discussed and modified with inputs from stakeholders. The approach was followed in preparation of Zoning Atlas for siting of Industries at District level by Central Pollution Control Board. This is a detailed exercise and can be at various scales.

The above methodologies are for formulating development approaches to address a time frame of 20 to 30 years. The development trajectory can be visualised or predicted on the basis of past trends, and projections can be made or scenarios developed based on assumptions related to policies and programmes for a few decades. Assumptions for predicting development scenarios for a vision document for 100 years would be difficult as policies and programmes for ten decades from today would be a function of issues covering many sectors, unfolding over time and difficult to visualise today. However, addressing the parameters that are needed for “Sustainability or Sustainable Development “or sustenance of resources - both natural and cultural are valid irrespective of time. Also, all actions that promote the “5 Ps” of Sustainable Development – Planet, People, Prosperity, Peace and Partnership should be promoted”.

6 Ibid.; pg.

7 Klug, Hermann; An integrated holistic transdisciplinary landscape planning concept after the Leitbild approach, Ecological Indicators, ELSEIVER,Volume 23, December 2012, Pages 616-626

The present document thus emphasises the protection and regeneration of the natural and cultural resources as a long-term measure and addresses issues relating to socio-economic status, development trajectory as they exist today by strategies and recommendations to promote concepts of sustainability as short, medium and in some cases as long term measures.

METHODOLOGY

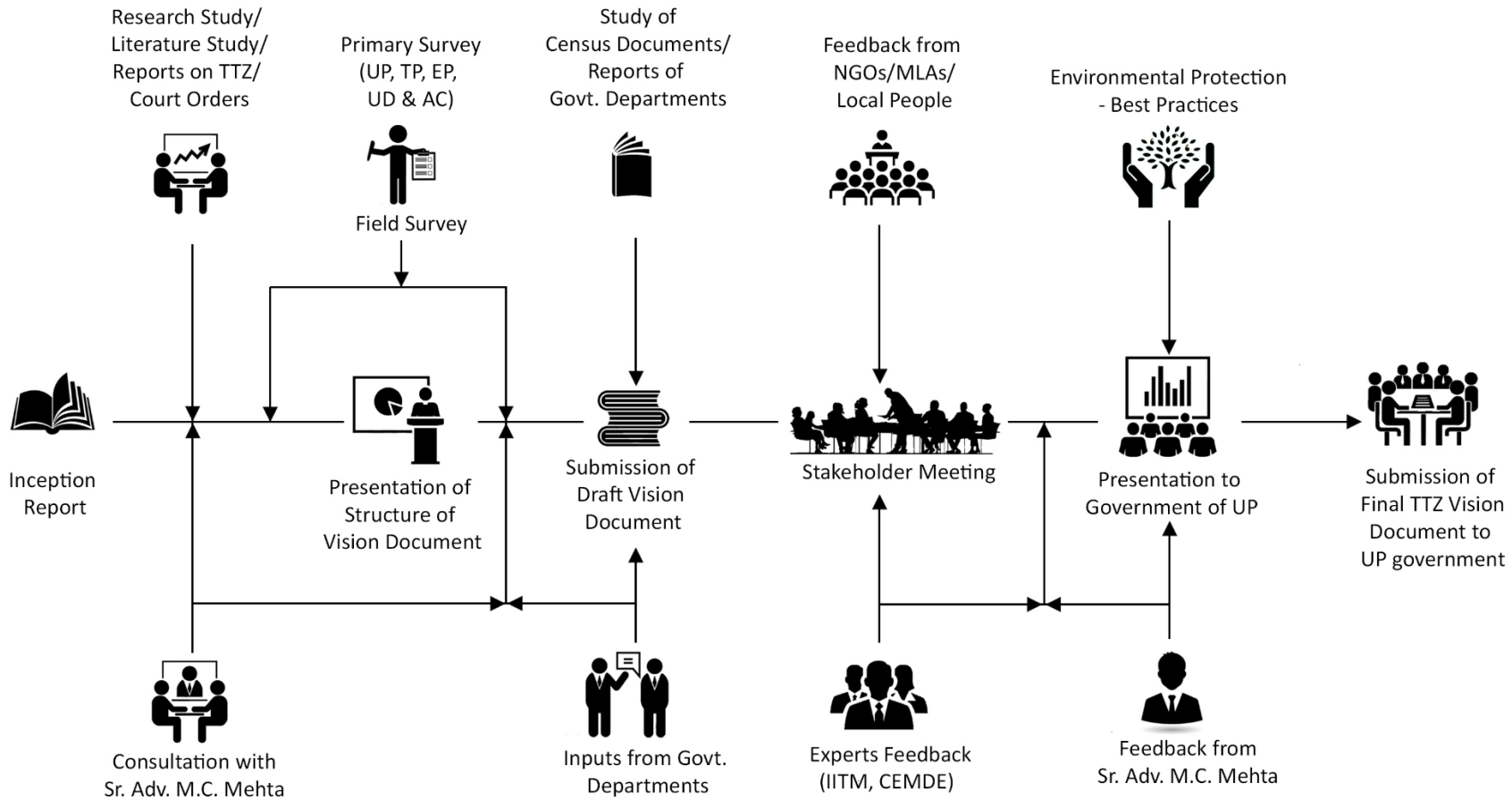
The preparation of the Vision Document included studies of various reports on Taj Trapezium Zone, scientific studies relating to resource status and conservation etc. This was followed by field surveys to identify heritage resources, infrastructural status etc., stakeholders meetings before finalizing the draft document. After submitting the draft document to the Government of Uttar Pradesh many more feedbacks were received. 404 feedbacks were received upto 15th September, 2018 followed by 40 feedbacks upto 15th November, 2018 and 140 upto 28th November, 2018. **The document has been updated upto 21st November, 2018.** The feedbacks have addressed data updation, rephrasing of sentences, additonal information, examples for best practices and malpractices and suggestions for the Vision Document.

Based on the feedbacks received, the document has been finalized. However, the data and details of projects need to be verified on ground before sourcing it. This is because the information was varying across feedbacks. The data can be verified from the concerned department and project details from the project proponent.

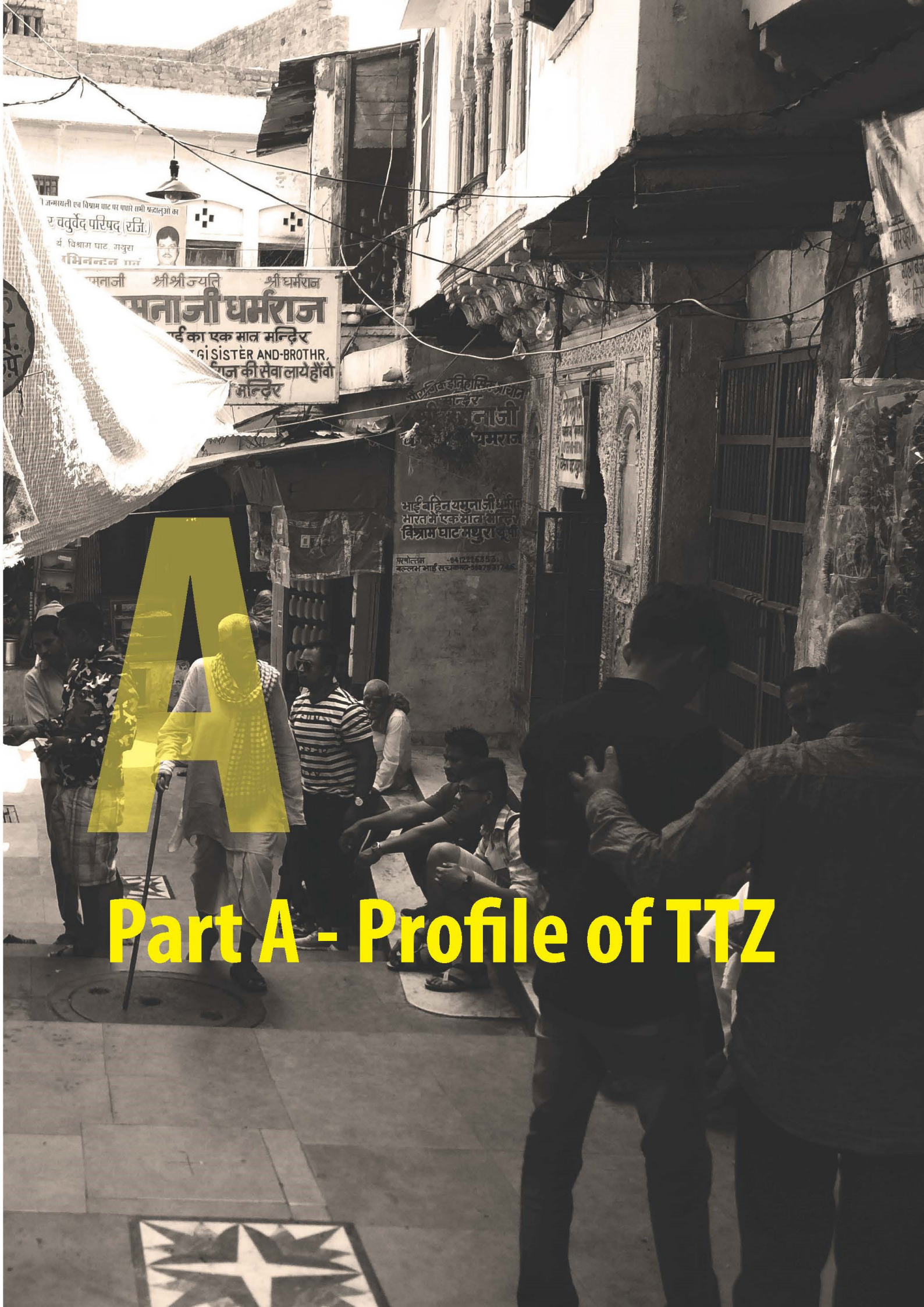
The Minutes of the Meetings related to interactions with stakeholders available in the Annexures of this document consist of many valuable suggestions applicable at regional level, city level and at Taj precinct level. Since most of them are applicable at project level,hence they are beyond the scope of a Vision Document. However, they should be considered while carrying out projects in the area as applicable.

The final document is a comprehensive approach to address the issues of Sustainability incorporating the suggestions of various stakeholders and inputs of experts from the fields of resource management.

Figure 1.1 Methodology



Source: SPA Delhi



A

Part A - Profile of TTZ

2. NATURAL RESOURCE PROFILE OF TTZ

2.1 Location

The Taj Trapezium Zone (TTZ) is a 10,400 sq. km area around the Taj Mahal, comprising of five districts of Uttar Pradesh and parts of two districts of Rajasthan. The TTZ has been declared as an "Air Pollution Protected Area" (MoEF, GoI in 1983), as a strategy to protect and conserve the Taj Mahal, a UNESCO world heritage site, from potential damage due to air pollution. The Taj Trapezium Zone (TTZ), is bounded between $26^0$45'N & $77^0$15' E to $27^0$45'N & $77^0$15'E in the west of Taj Mahal and in the East of Taj Mahal between $27^0$00'N & $78^0$30'E to $27^0$30'N & $78^0$30'E. It is located in Semi-Arid Biogeographic Zone. River Yamuna is the major river which runs from east to west.
The TTZ comprises of about 40 protected monuments including three World Heritage Sites - the Taj Mahal, Agra Fort and Fatehpur Sikri. The zone is dotted with numerous unprotected and unidentified heritage sites which link India to its glorious past. It is a popular tourism destination and offers huge development potentials with respect to tourism, heritage and tourism-centric economy. TTZ is so named since it is Taj Mahal specific as per location and intent and is shaped like a trapezoid.[8]
The total population is 1,00,38,878 with a decadal growth of 21.6% (18.6% in rural and 19.94% in urban). Percentage of urban population is about 32% of the total population.

2.2 Physiography

Taj Trapezium Zone lies in the Ganga Yamuna Plains and is characterized by vast alluvial plains which merge with the Aravalli outcrops in the south-east and the Vindhyan plateau in some places in the south.

Bharatpur District

Bharatpur and Nadbai tehsils consist of plain and levelled area, on the other hand, Bayana and Roopwas tehsils have hilly area. The general feature is that of alluvial plains, fairly well-wooded and bordered with detached hills in the north.

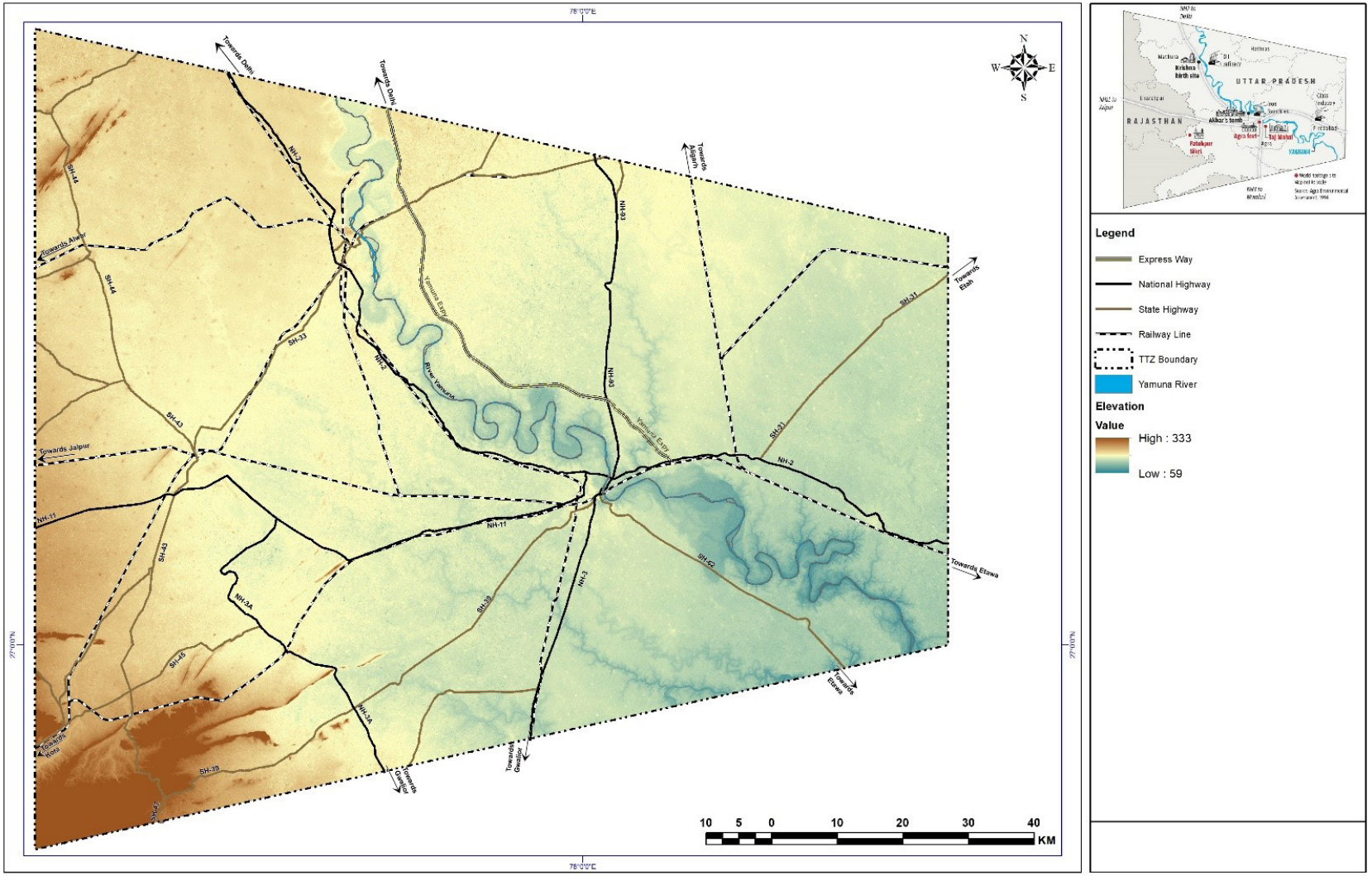
Mathura District

It is more or less a plain sloping of the rate of 0.25 metre per kilometre from north to south in the direction of the river's course.

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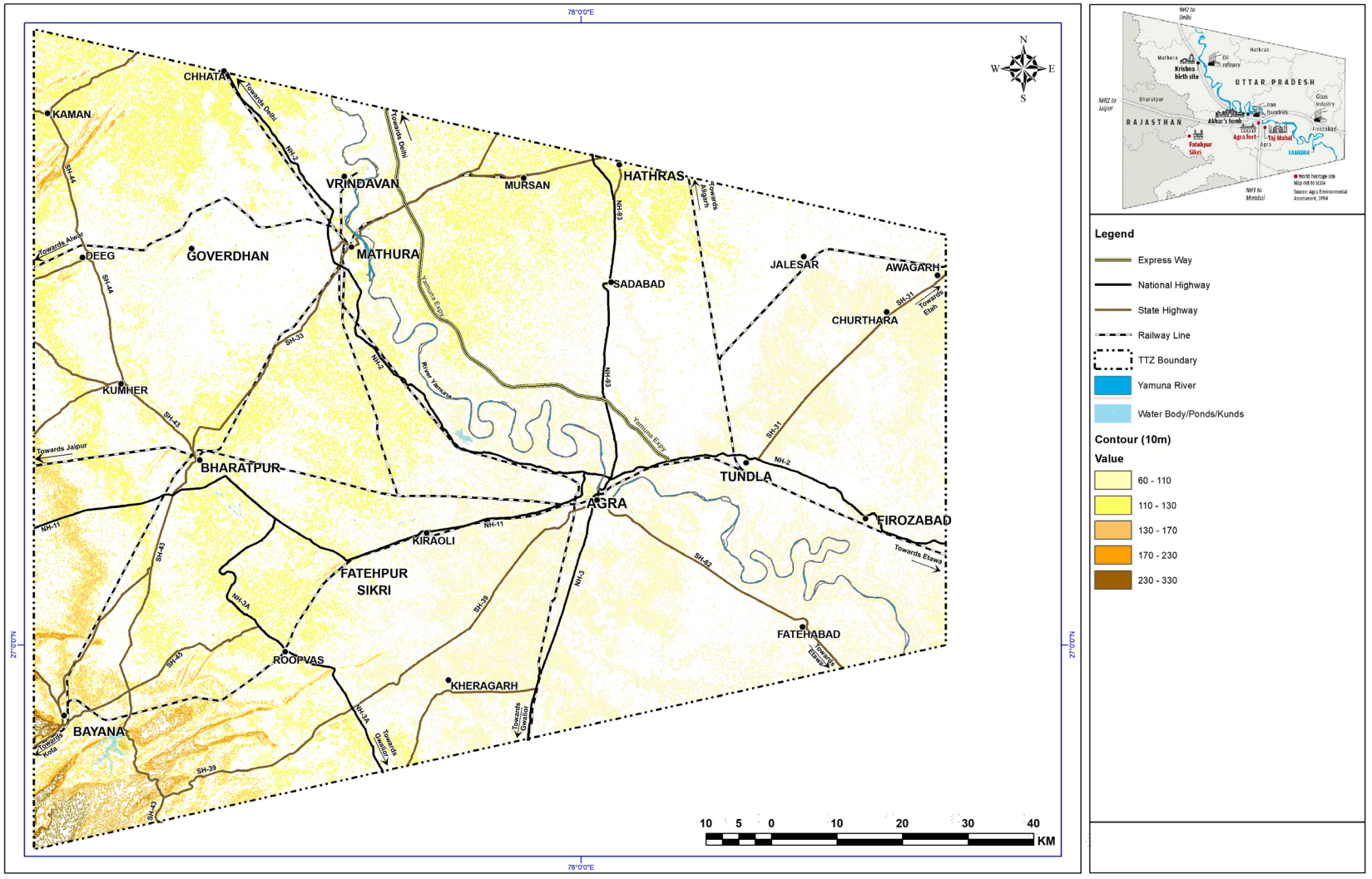
8 Parliament of India Rajya Sabha, Department-Related Parliamentary Standing Committee On Science & Technology, Environment & Forests, Two Hundred Sixty Second Report On Effects of Pollution on Taj, July 2015

Map 2.1 Elevation Profile



Source: Generated in GIS; SPA, Delhi

Map 2.2 Contour (10 m Interval)



Legend

- Express Way
- National Highway
- State Highway
- Railway Line
- TTZ Boundary
- Yamuna River
- Water Body/Ponds/Kunds

Contour (10m)

Value

- 60 - 110
- 110 - 130
- 130 - 170
- 170 - 230
- 230 - 330

Source: Generated in GIS; SPA, Delhi

Low hills- nowhere higher than 261 metre above sea level in a few scattered spots rise on the Bharatpur border. In the two western tahsils, Mathura and Chhata, lie the only hills of the district which are outlying spurs of the Aravalli system. On the southernmost hill stands the village of Rankauli, the village of Dibhala in the centre and at the northernmost is the sacred village of Barsana. Some 16 km. further south-east is the Giriraj or Annakut hill, commonly known as Govardhan. All these hills are of ancient quartzite. Physiographically the district can be divided into two micro regions: Nandgaon- Govardhan Plain and Yamuna Khaddar.

Agra District

On the basis of geology, soils, topography climate and natural vegetation, the district is divided into following divisions.

Etmadpur Plain: This region is situated in the north eastern part of the district which is flat alluvial plain sloping towards south.

Yamuna Khadar: It lies parallel to Yamuna River on both sides. The average width of this tract is approximately 10 to 15 kms. The slope is according to flow direction of the Yamuna River: Since it is a major river, the imprints on the land surface are very prominent. The meanders and ravines are the main topographic feature.

Agra Plain: This region is situated in the central part of the district. Being situated in the heart of the district, the infrastructures of the tract are fully developed. It has an advantage of both physical and cultural attributes. It is a flat plain sloping towards south east direction. Except a few rivulets, the area is completely devoid of any major stream. A few rocky knobs are located nearby Achhnera town.

Kheragarh Uplands: This region is situated in the western part of the district. The surface in dissected by numerous rivulets which are flowing in the west of Jagner. The surface between Kheragarh and Jagner are comparatively higher. There are rocky knobs spread over in this belt.

Chambal Ravines: The region is situated in strip along the Chambal River. The general slope is towards east. It is a ravines tract and not suitable for agriculture. The width of the ravines varies considerably at different places

Hathras District

The district is a level plain conforming to the topography of the doab. The low land area of the Ganga and Yamuna rivers are known as Khadar. This area is sandy plains lying between Ganga and Yamuna. On the basis of the factors like geology, soils, topography, climate and natural vegetation the district is divided into two micro regions: Hathras alluvial plain and Sadabad plain.

Etah District

The tract in the south of Kali Nadi is continuous series of troughs and depressions. There is a rolling chain of sand hills with large areas of firm soil. The district is divided into three micro regions; Middle Kali Plain, Isan-Arind Plain and Sengar Plain.

Firozabad District

On the basis of geology, soil, topography, climate and natural vegetation the district has been sub-divided into three sub micro regions ; Isan – Arind Plain, Firozabad Plain and Yamuna Khadar.

2.3 Drainage

The rivers and streams of TTZ consist of the Yamuna and its effluents most of which are seasonal.

Bharatpur District

The district has no perennial river. Gambhir, Banganga and Ruparel are the main seasonal rivers which sometimes create havoc during monsoon by causing flood in the district.

Mathura District

The rivers and streams of the district consist of the Yamuna and its two effluents, the Pathwaha and the Jhirna or Karwan both of which become fairly torrential in the monsoon season. Yamuna divides tahsil Mat from the tehsil of Chhata.

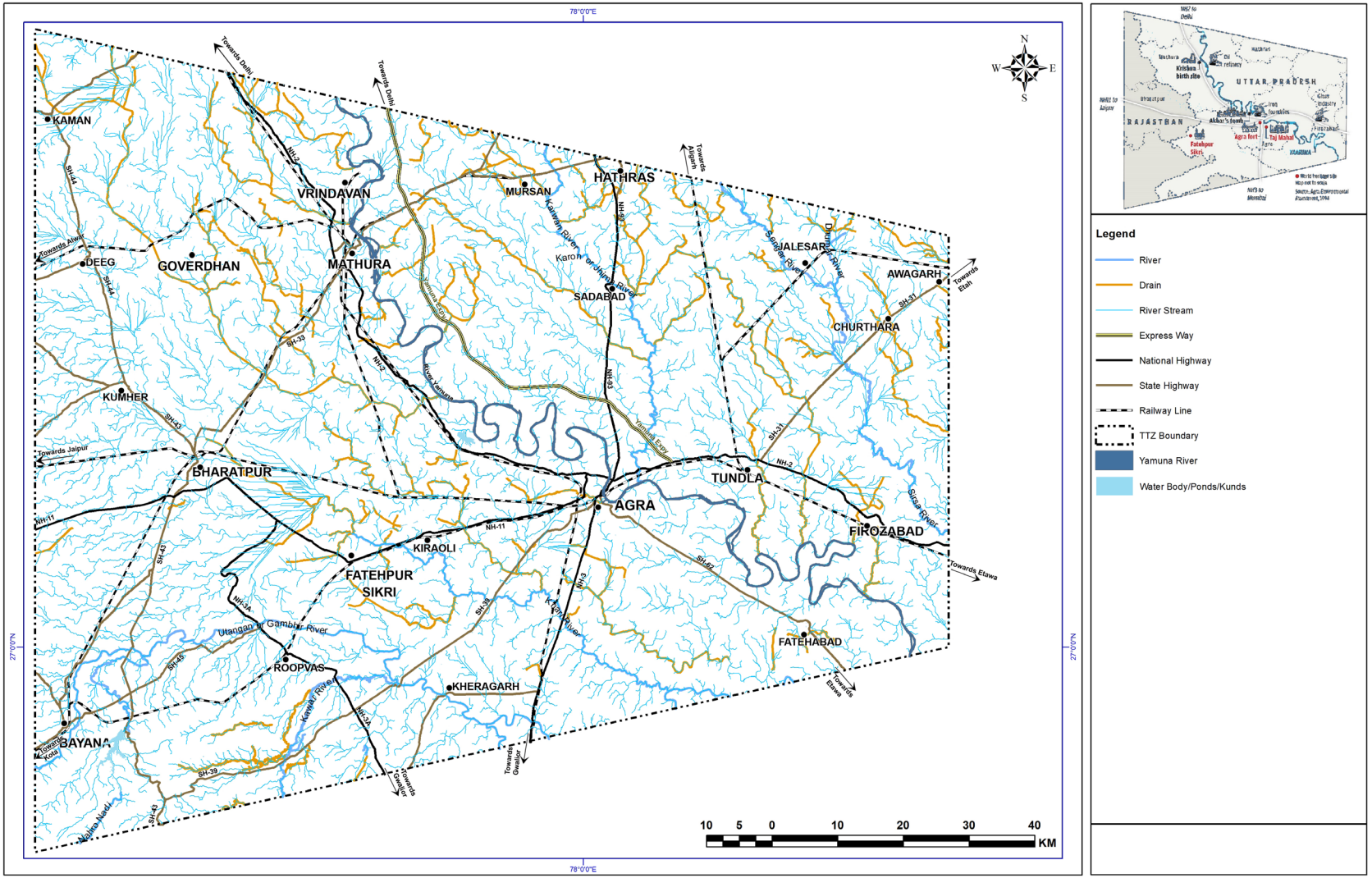
Agra District

The major rivers of the district are Yamuna, Chambal and Utangan. Yamuna enters from Mathura distric tin the north east and divides the district Firozabad and Etmadpur tehsil of Agra district flowing through northern boundary and enters into Etawah district. The tributaries of this river are Jhara, Sirsa and Sanger. Utangan River enters in the district from western side towards Rajasthan and joins river Yamuna after a span of 16 kms. River Kiwar Parvati and Khari are the tributaries of this river.

Hathras District

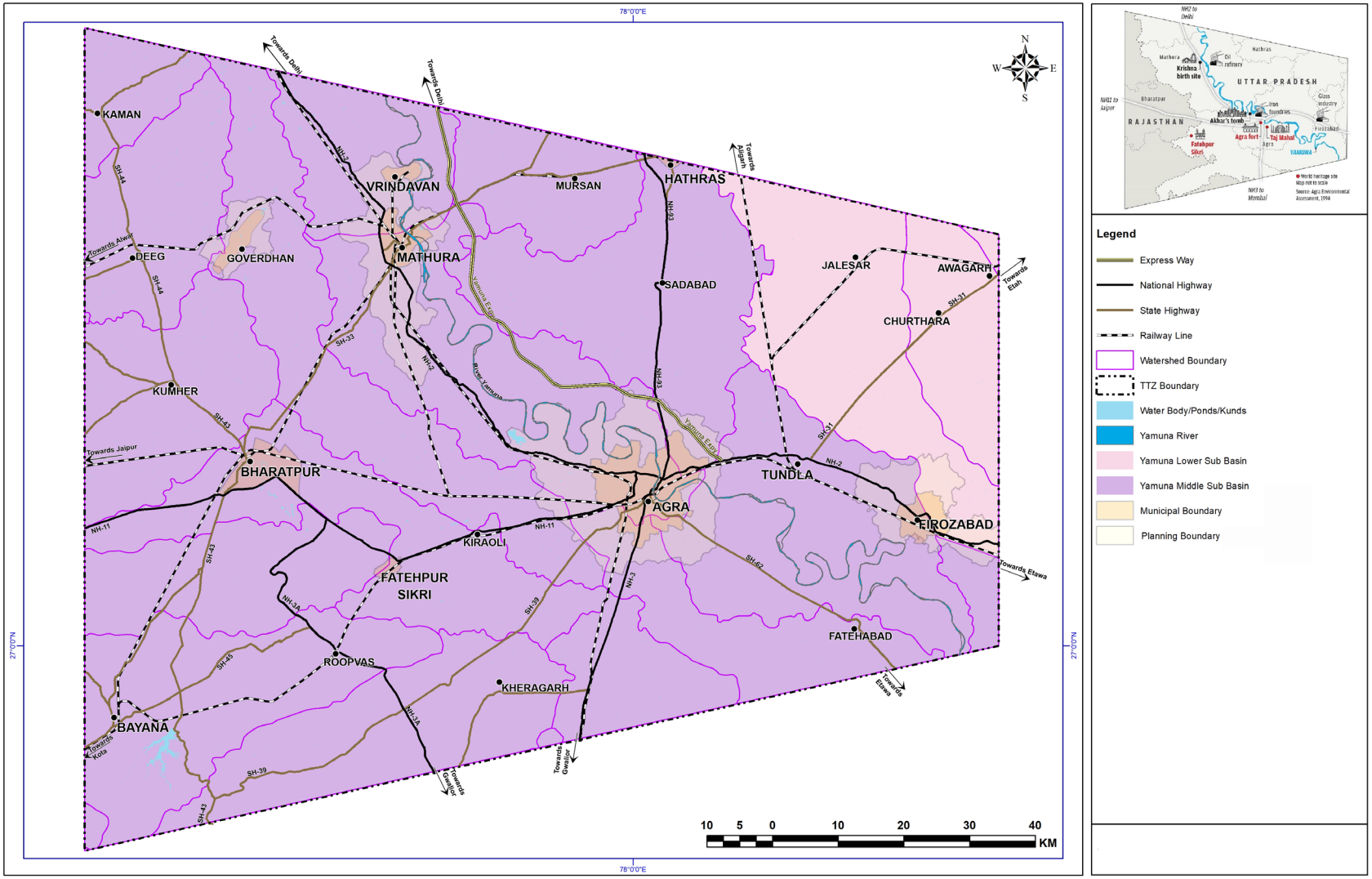
The main river of the district is Karban, one of the tributary of Yamuna which flows around 86 Kms in the district. It forms the arterial drainage line for the district Aligarh. This stream is also known as the Karom. It is a natural water force that flows towards southernly direction through

Map 2.3 Drainage Network



Source: SOI Toposheet, Generated in GIS; SPA, Delhi

Map 2.4 Watersheds

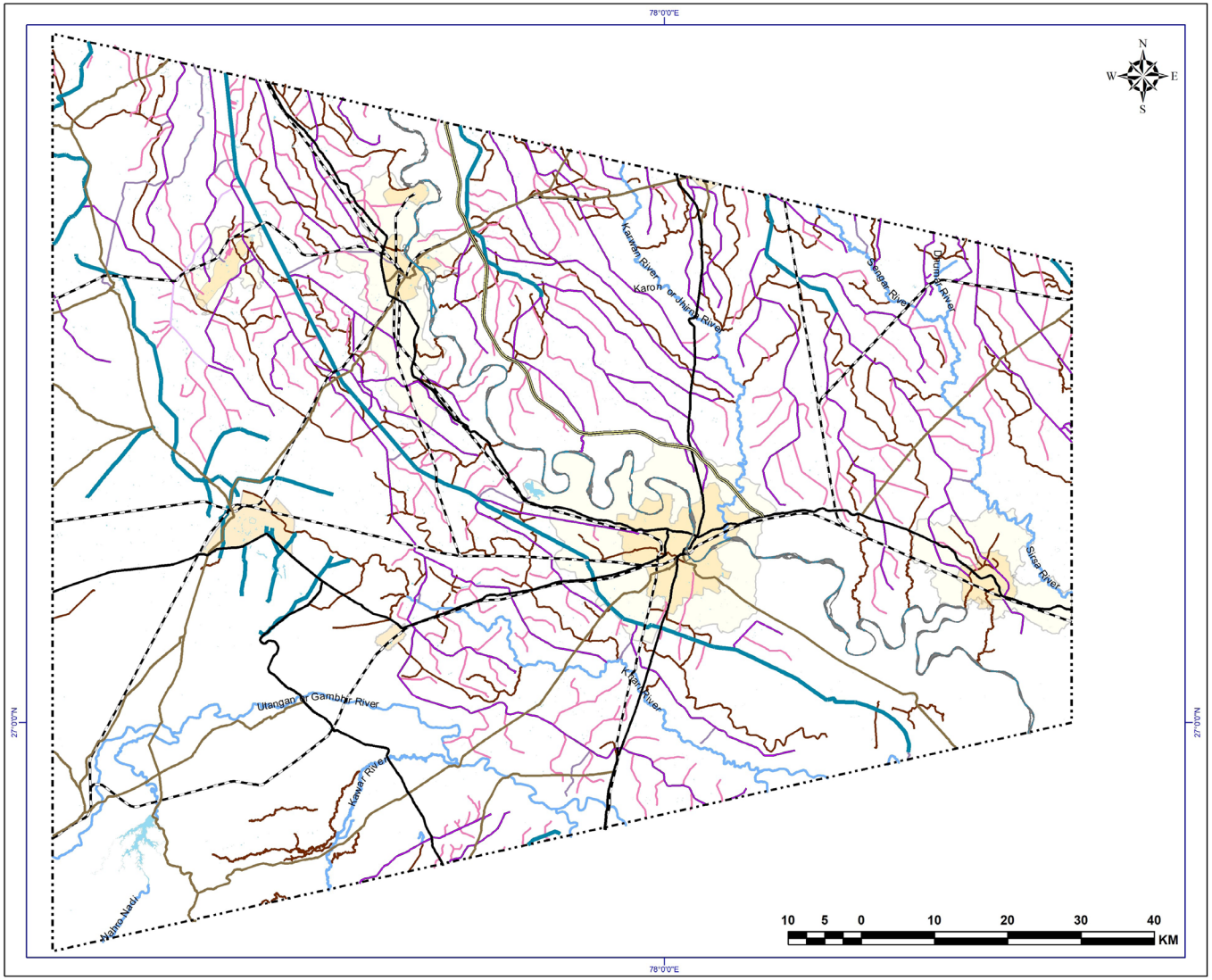


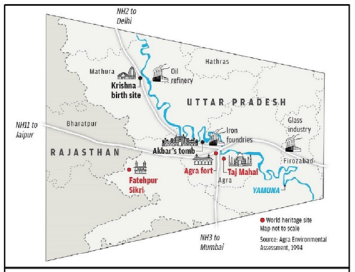
Legend

- Express Way
- National Highway
- State Highway
- Railway Line
- Watershed Boundary
- TTZ Boundary
- Water Body/Ponds/Kunds
- Yamuna River
- Yamuna Lower Sub Basin
- Yamuna Middle Sub Basin
- Municipal Boundary
- Planning Boundary

Source: http://cgwb.gov.in/watershed/ , Generated in GIS; SPA, Delhi

Map 2.5 Canal Network



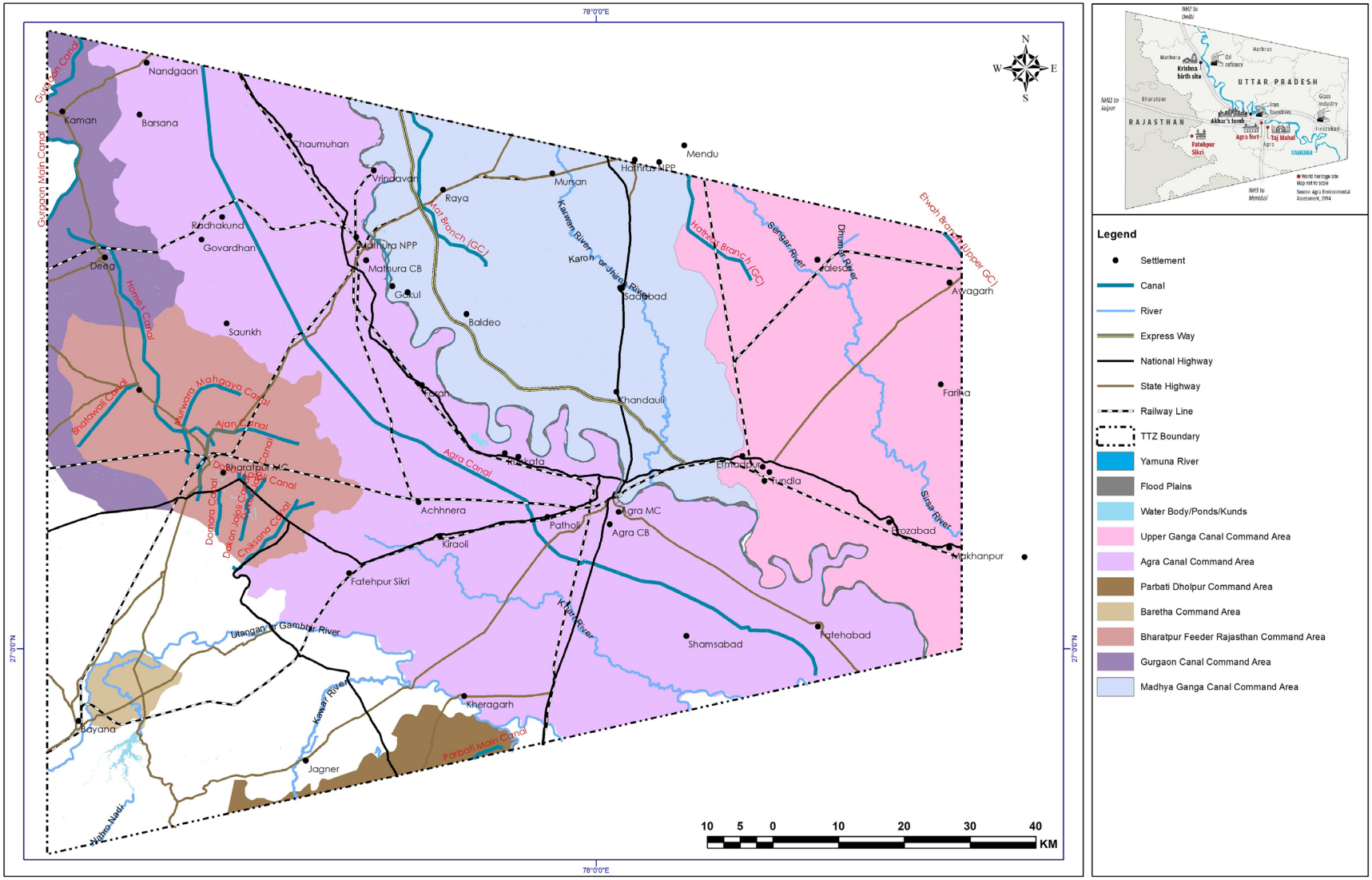


Legend

- Canal
- Distributary
- Feeder
- Minor
- Escape
- Drain
- River
- Express Way
- National Highway
- State Highway
- Railway Line
- TTZ Boundary
- Water Body/Ponds/Kunds
- Yamuna River
- Flood Plains

Source: SOI Toposheet

Map 2.6 Command Area of Canals in TTZ



Source: WRIS, India

Tahsil Sadabad of Mathura district to join the Yamuna, close to the Agra district.

Etah District

The chief rivers of the district are the Kali Nadi, the Isan, the Rind, the Sengar and the Bagarh.

Firozabad District

The main river of the district is Yamuna which flows towards south boundary from Agra. Other two rivers which come from Etah are seasonal rivers. There is no specific lake in the district, some ponds and tanks are found in the district as well. Yamuna khadar slope is according to flow direction of the Yamuna River. Since it is a major river the imprints on land surface are very important. The meanders and ravines are the main topographical features. River Sirsa and Sengar flow parallel through Firozabad plain. The area along the stream is dissected and is well developed being a flat plain. Drainage is according to slope of terrain, the course being North- West to South-East. The Isan, Sirsa, Arind and Sengar rivers imposed by fertile cachhar lands.

2.4 Ground Water

The stage of development of Ground water in most of the blocks has reached critical stage with decline in recharge and increase in extraction. The pre-monsoon and post-monsoon levels of ground water are showing a declining trend with increased salt concentration near industrial areas.

2.4.1 Depth to Water Level

Bharatpur

Groundwater usually occurs at shallow depths ranging from 25 – 30 m to less than 5 m and at places almost at ground level after rainy season. In most of the area, groundwater is phreatic, but semi confined conditions occur in the central and eastern parts of the district. These major ground water potential units separated by two major aquicludes are referred to as 1st, 2nd, and 3rd aquifers. The thickness of alluvium in Banganga basin varies from 120 to 180 m. In the southern part (Gambhir River basin), generally single phreatic aquifer is encountered. The thickness of alluvium ranges from 60 to 100m. The maximum thickness of aquifer tapped is 18m in the depth range of 36 to 100m.

Mathura

The shallow aquifer group occur down to depth of 50.0 mbgl where as deep aquifers group exist between the depths ranging of 135 - 185 mbgl. The aquifer material is

generally composed of fine to medium grained sand. Kankars are invariably associated with sand and clay in older alluvium plain. Ground water occurs under unconfined to semi-confined conditions in the shallow aquifer group and semiconfined to confined condition in the deep aquifer group.

Agra

As per the data of NHS (National Hydrological Survey) during year 2012, depth to water level in phreatic aquifer varies from 2.19 to 45.58 mbgl during pre-monsoon period. In the western parts of area including Fatehpur Sikri, Achhnera and Jagnair,. the water level rests at a depth ranging from generally 2.00 to 10.00 mbgl .The influence of canals has been observed in the canal command areas of Achhnera and Fatehpur Sikri blocks where the depth to water level is comparatively shallower which may be due to the subsurface infiltration from canal. Such conditions are also prevailing in some pockets along canals. The depth to water levels in hard rock terrain of Jagnair block generally range between 7 and 10 mbgl. In the eastern and south-eastern parts of area specially in the vicinity of Yamuna river i.e. in Bichpuri, Shamsabad, Fatehabad, Pinahat, Bah, Jaitpur Kalan, Khadauli and Etmadpur blocks deeper depth to water level conditions exist and depth to water levels in these areas generally varies from 10 to 35 mbgl. The deepest depth to water level has been recorded in Yamuna-Chambal doab in the Shamsabad & Fatehabad areas. In the south-eastern ravenous parts of the younger alluvium along Chambal river water levels generally rest at more than 30 meters depth range below ground level.

Hathras

The top silty/ sandy beds mixed with kankar are the top most parts of the Aquifer Group – I, down to depth to about 30 mbgl generally supports the dug wells. The ground water in the zone occurs under water table unconfined conditions. In II (depth ranges 115.0 to 200 mbgl) and III (depth ranges 230m to bedrock). In these Aquifer Groups the ground water occurs under semi-unconfined, semi-confined to confined conditions.

Etah

The Ist aquifer group, occurring just below the top clay layer is regionally extensive with variable thickness attaining the maximum thickness of 80 metres, The IInd aquifer group occurring generally 110 to 160 mbgl consist of fine to coarse sand admixed with kankar and the IIIrd aquifer group, generally gravels and 240 (±20) m, to 290 (±20) m comprises of fine to coarse sand admixed occasionally with kankar and gravels

respectively. During the pre- monsoon the depth to water level ranges from 4.25 mbgl (at Baghwala I) to 11.88 mbgl (at Jalesar) and in post-monsoon water level ranges from 3.32 mbgl (at Bhagwala) to 11.02 mbgl (at Jalesar).

Firozabad

Alluvial tract of Firozabad district is underlain by sands of various grades, gravels, silt and clay). The result of exploratory drillings indicates that in the south-western parts of the district, where Vindhyan sandstone has been encountered at different depths as basement, the alluvium sediments attain the minimum thickness. The depth ranges from 0-80 meter in 1st Aquifer, 100-140 meter in 2nd and 180-300 meter in 3rd Aquifer.

Bharatpur

During pre-monsoon (May, 2011), depth to water level in the district varied from 1.6 to 24.48 mbgl. Generally, over major part of the district, the depth to water level varies between 5 and 20 mbgl. During post-monsoon (November, 2011), depth to water level varied from 0.34 to 28.08 mbgl. Depth to water level upto 10 mbgl has been observed in Kaman, Nagar, Deeg, Kumher, Sewar, Bayana and Roopwas blocks. Major part of the district has recorded rise in water level up to 2m. Rise of more than 4 m has been observed in Bayana block. Decline of upto 2 m in water level has been observed in Nagar, Weir, Deeg, Kumher, Sewar, Nadbai and Roopwas blocks.

Decline of 2 to 4 m was observed from small pockets in eastern parts of Deeg, Kumher and Sewar blocks and northern parts of Nagar block.

Mathura

In Mathura pre-monsoon water level varies from 2.65 to 14.34 mbgl. In post-monsoon period depth to water varies from 1.33 to 14.00 mbgl. Seasonal water level fluctuation varies from -0.15 to 3.85 m.

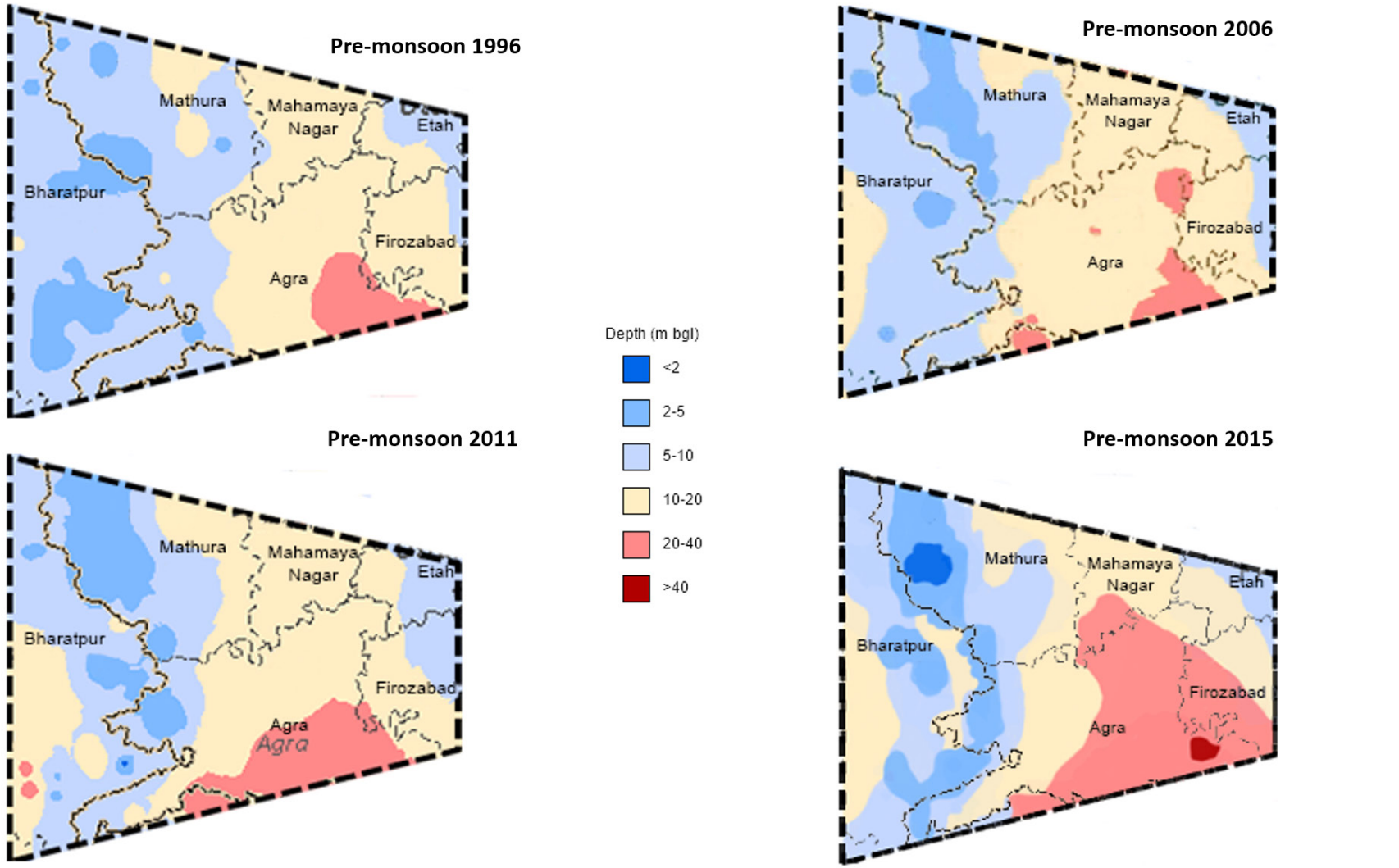
Agra

The NHS data for the year 2012 shows that the water level fluctuation between pre and post-monsoon period varies in general from 0.28 to 7.75 meters Rise, and 0.14 to 0.76 m fall. The seasonal rise in water levels are more prominent in the hard rock terrain of Jagnair block and also in Achhnera & Fatehpur Sikri blocks under canal commands.

Hathras

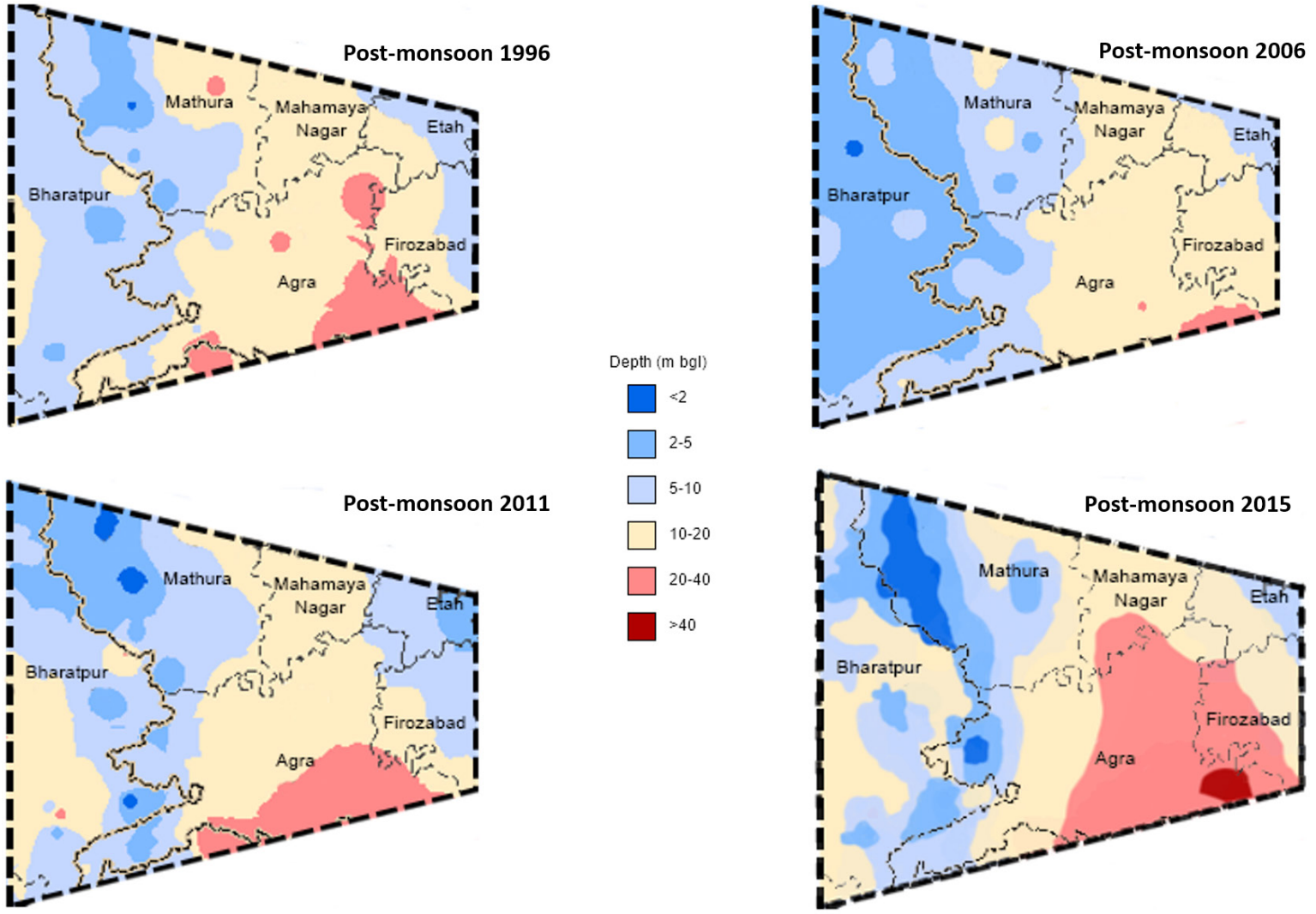
The depth to water level during pre-monsoon period varies from 3.54 to 17.03 mbgl while during post-monsoon ranges between 1.82 and 17.70 mbgl.

Figure 2.1 Ground Water Levels (pre-monsoon)



Source: CGWB Reports 1996, 2006, 2011 and 2015

Figure 2.2 Ground Water Levels (post-monsoon)



Source: CGWB Reports 1996, 2006, 2011 and 2015 2.4.2 Water Level Fluctuatio

Etah

The seasonal fluctuation in water level varies from 0.06 m to 1.62 m. The maximum fluctuation is observed at Jaisukhpur (1.62 m).

Firozabad

The pre-monsoon water level varies from 2.42 to 25.10 mbgl. In post-monsoon period depth to water varies from 1.55 to 25.25 mbgl. Water level fluctuation varies from 0.23 to 1.38 meters. Shallow water levels are observed in canal command areas.

2.5 Climate

Bharatpur District

The climate of the district is normally humid and dry. It becomes extremely hot during summer and extremely cold during winter. The annual normal rainfall of the district is 663.9 mm. The rainy season remain active from 2nd week of July to 3rd week of September in the district.

Mathura District

The climate of the district is characterized by an intensely hot summer, a cold winter and general dryness throughout the year except during the south –west monsoon. Intensity of heat is highest in May–June. The minimum temperature generally ranges from 5-7^0 C (January) to 20-25^0 C (May) and the maximum temperature from around 20-25^0 C (January) to 35-40^{0}C (May). At times due to weather disturbances spell of cold weather occurs with temperature going down below the freezing point of water. Rainfall averages around 600-750 mm, which in general increases from the south-west towards the south-east. Dust and thunder storms also occur in the summer season while occasional fog occurs in the winter.

Agra District

The climate of the district is characterized by an intensely hot summer, a cold winter and general dryness throughout the year except during the south west monsoon. The cold season from December to February is followed by summer which continues till about middle of June. The southwest monsoon then ushers in the rainy season which continues till the end of September, October and November are post monsoon season. The geology of the neighbouring state of Rajasthan affects the climate of the district. The maximum temperature during hot touches 40 to 45^0 C while during winters it comes to 6 to 5^0 C. During the year the annual rainfall was recorded about 900-1000 mm. except during the brief south west monsoon season when the relative

humidity in generally between 60 to 70 percent, all over the district is dry. The skies are generally clear or lightly clouded, become cloudy on some days in cold season when the district is affected by western disturbances. Winds blow generally from south-west to west direction or from east to south east. Occasional fog occurs in the winter.

Hathras District

Climate of the district is characterized by a hot summer, pleasant and general dryness except in the monsoon season. The cold season sets in from about the middle of November to early March and is followed by the hot season which lasts till about the middle of June. The south – west-monsoon season is from the middle of June to about the third week of September. The period from the last week of September to the middle of November may be termed the post monsoon season. The climate of the district is coldest in the month of January and hottest in the month of June. The maximum temperature during the year was as much as 40-45^0 C and the minimum was 5-8^0 C. In the summer season dust laden scorching westerly winds blow quite often and heat is intense. With the onset of the monsoon during the third week of the June, the day temperature decreases considerably. Winds are generally light with a slight increase in force during the summer and early part of the monsoon season.
During the period from October to April the winds blow mostly from directions between North and West. During monsoon season winds are predominantly from South East and East.

Etah District

The climate of the district varies between the extreme heat and cold the hot weather is characterized by an intensive hot weather in summer and it is intensely cold during winter. The year may be divided into four seasons. The cold season, running from the middle of November to the whole month of February, followed by the hot season extending from March to the whole month of June. The period from the month of July to the month of September constitutes the south-west monsoon season and the succeeding period lasting till the middle of November is the post monsoon season. The mean daily maximum temperature in May is about 41°C and the mean daily minimum, about 27°C. The summer season is intensely hot with the maximum temperature on individual days raising up to 46°C. Hot dry dust laden winds which blow during the summer make the weather very uncomfortable. With the onset of the monsoon in the district by the third week of June there is rapid decrease in the day temperature. Due to the increased moisture in the atmosphere even in the monsoon season the weather is oppressive in between the rains. After the withdrawal of the monsoon by

about the third week of September there is a rapid decrease in the night temperature while there is a slight increase in the day temperature. It is only after October that both the day and night temperatures decrease rapidly. January is the coldest month with mean temperature of about 22°C in day and 8°C during nights. The district is periodically under cold waves because of western disturbances. The average annual rainfall during 2008 was recorded 722 mm and actual was 1025 mm.

After rains weather becomes humid and cold winds are generally light except in summer but during April to June strong hot winds called “loo” generally blow from west to east. During October to April the winds blow mostly from north and west.

South- easterlies appear in May. During the monsoon season the winds are predominantly from the south–east or east. During the cold season western disturbances affect the weathers, over the district and a few thunder storms also occur. Dust storms occur during the summer. Fog may occur during the cold season.

Firozabad District

Agra being near to Rajasthan affects the climate of Firozabad. On the whole it is dry continental type except during the monsoon season.

Dust storms and westerly hot winds are common in summer. During summer season the temperature rises upto 42-45^{0}C and falls down to 20-24^{0}C in winters. Average rainfall of the district is 600-700 mm.

2.6 Flora and Fauna

The Taj Trapezium Zone lies in the Semi-Arid Biogeographic region which is characterized by Dry Deciduous Forests and Thorn forests. Apart from forest ecosystem, scrublands and wetlands are present in the region.

Bharatpur District

The forests are mainly found in Bayana, Weir, Roopwas, and Bharatpur tehsils of the district. The forest of Bharatpur district falls under Central India Dry Deciduous type Dhok or Dhad (Anogeissus pendula), Khair (Acacia catechew) as the main spices. The other trees found are Arunj (Acacia leucopholea), Dhak (Butea monosperma), Ber (Zizyplus mauritiana), Kachnar (Bauhinia racemosa), Kurchi (Hollrrhena anti dysenterica), Birbira (Dichrosta chys cinerea), Hingot (Balanites Aegyptiaca) and Jharber (Ziziphus mummualaria). Besides this Babul (Aceciamilotica), Kadam (Mitragyan parviflora), Kabuli kikar (Prosopis juliflora), Karil (Kapparis decidua) are also found.

Due to the presence of the Keoladeo National Park (KNP) which is a Ramsar Wetland Site and a World Heritage site. Siberian cranes, pelicans and other varieties of birds migrate to this area during winter. Local birds are mainly egrets, painted storks, ibises, cormorant, saras cranes, spoon bills and open billed storks, darter besides common parakeets, crows, babblers, patridges and weaver birds, The carnivore found in the district consists mainly of hyena, jackal, fox etc. in this area.

Mathura District

It is evident from the names given to different places in the ancient history that in older days this area was full of forests, grass land and pastures. Its forests were hunting grounds during Mughal period for the royal family members. The deciduous type of tree and tropical scrub and thorns are found in some patches. Babul, Shisham, Bargad and Neem are the main trees. Forest department has raised the plantation of Babul, Kanji, Siris, Khoir and Pipal. The wild animals are disappearing owing to the intensive cultivation, reclamation of wasteland and cutting of jungles. The leopard, Hyena, wolf and blue bull or Nilgai are seen in hilly tracts to west near the Bharatpur border. Wild boar are frequent in the ravines and Khadar of Yamuna which also swarms with crocodile and tortoise. The jungle cats, characal, jackal, fox, black buck rarihe deer, hog deer hare monkey and langur are also sighted here and there. The common birds are peacocks, ducks, partridges, and saras. Peacocks are a common sight all over the district. Reptiles are common in the district especially in the rural areas. The chief being the gharial, crocodile, monitor, lizard, garden lizard, python. Cobra, dhaman or rat snake, water snake, black barred snake, pond turtle, patar and Yamuna kachhua. The monitor lizard is found in every parts of the district. About 25 different species of fishes are available in the river lakes, streams, ponds etc. in the district.

Agra District

The district in botanical sense has been divided into three major divisions. First ravine land along the river Yamuna and Chambal. Second non ravines or doab land along river Yamuna and Chambal and third Kheragarh area. The forests in the first division are of dry owing to low moisture. The ravines part comprises of dry and ushar land, the soil composition is Kankar prone. Plantation on both sides of Agra canal are included in protected forests. The main species of trees found in the forests are babul, neem, sheesham, jamun, mango, amaltas and tamarind. In the right bank of river Chambal dense and large size trees are in ample number. The forests in the district are divided into four categories–protected forests along canals, reserved forests, unclassified forests and road side forests.

Hathras District

The total forest area of the district is under the control of forest department. The plantation along the river bank and road side have been raised for this purpose. There are no reserved forest as such in the district. The protected forest tracks along the river bank and road sides contain trees like Shisham, Babool, Mango, Jamun and Mahua etc.

Etah District

There are no forests in the district. There is ample scope for forestry as forest department is undertaking afforestation drive in the district to augment the forest cover. Under social forestry schemes, fruit and non-fruit bearing trees have been planted along road sides. The important trees are Dhak, Babul, Shisham, Jamun, Mango, Siris, Kanji, Neem, Imli, Semal, Gular, Bel, Ber etc. There is substantial area under Orchards of Mangoes, Guavas, Papaya, Banana, Ber, Jamun, Jack fruit and Tamarind. The ornamental trees generally found in the private gardens and on the canal banks are Kachnar, Amaltas, Ashok and Gulmohar. The longer and stouter reeds, called Senta, used for making chicks and thatching are also found in the district. The Khas grass is also found in the swampy ground and Patera is found in wet and water-logged tracts. The other grasses found in the district are Dab, Dub, Anjana and Siru etc. There are no special varieties of wild animals in the districts as the forest area is very small. Wild dog (ban kutta) and blue bulls are found in most part of the district, Leopards and wild Pigs are found in Dhak jungles. Small animals like foxes, Jackals and hare are also numerous; snipes, pea, fowls, pigeons, peacocks, ducks and partridges are common birds found in the district.

Firozabad District

The district is backward in forest wealth. Most of the forest of the district comes under Tundla C.D.Block and Firozabad C.D.Block.

Table 2.1 District wise Forest Cover in 2007

District Name	Geographical Area	2007 Assessment				% GA	Change 2005-07	Scrub
		V. Dense Forests	M. Dense Forests	Open Forests	Total			
Agra	4027	0	67	209	276	6.85	0	70
Etah	4446	0	9	90	99	2.23	-1	0
Firozabad	2361	0	4	43	47	1.99	3	26
Hathras	1840	0	1	22	23	1.25	-2	0
Mathura	3340	0	5	55	60	1.8	-2	6
Bharatpur	5066	0	34	202	236	4.6	0	90

Source: Working Plan of Forest Department

Table 2.2 District wise Forest Cover in 2017

District Name	Geographical Area	2007 Assessment				% GA	Change 2015-17	Scrub
		V. Dense Forests	M. Dense Forests	Open Forests	Total			
Agra	4041	0	63	209	272	6.73	4	64
Etah	2431	0	1	30	31	1.28	-3	0
Firozabad	2407	0	5	44	49	2.04	0	24
Hathras	1840	0	1	22	23	1.25	-1	0
Mathura	3340	0	4	56	60	1.8	5	3
Bharatpur	5066	0	22	207	229	4.52	13	79

Source: Working Plan of Forest Department

2.6.1 Protected Areas

Keoladeo Ghana National Park in Bharatpur District and Soor Sarovar or Keetham Wild Life Sanctuary in Agra District are the two protected areas in the TTZ. As per Eco-Sensitive Zone Notification a 10km zone around the area is a regulated area for control of activities around these areas.[9]

Keoladeo Ghana National Park in Bharatpur District

Keoladeo National Park or Keoladeo Ghana National Park formerly known as the Bharatpur Bird Sanctuary is a famous avifauna sanctuary that hosts thousands of birds, especially during the winter season. Over 230 species of birds are known to be resident. It is also a major tourist centre. It was declared a protected sanctuary in 1971 and is also a World Heritage Site. It is a man-made and man-managed wetland, designated as a Ramsar site under the Wetland Convention in 1981.[10]

Soor Sarovar or Keetham Wild Life Sanctuary in Agra District

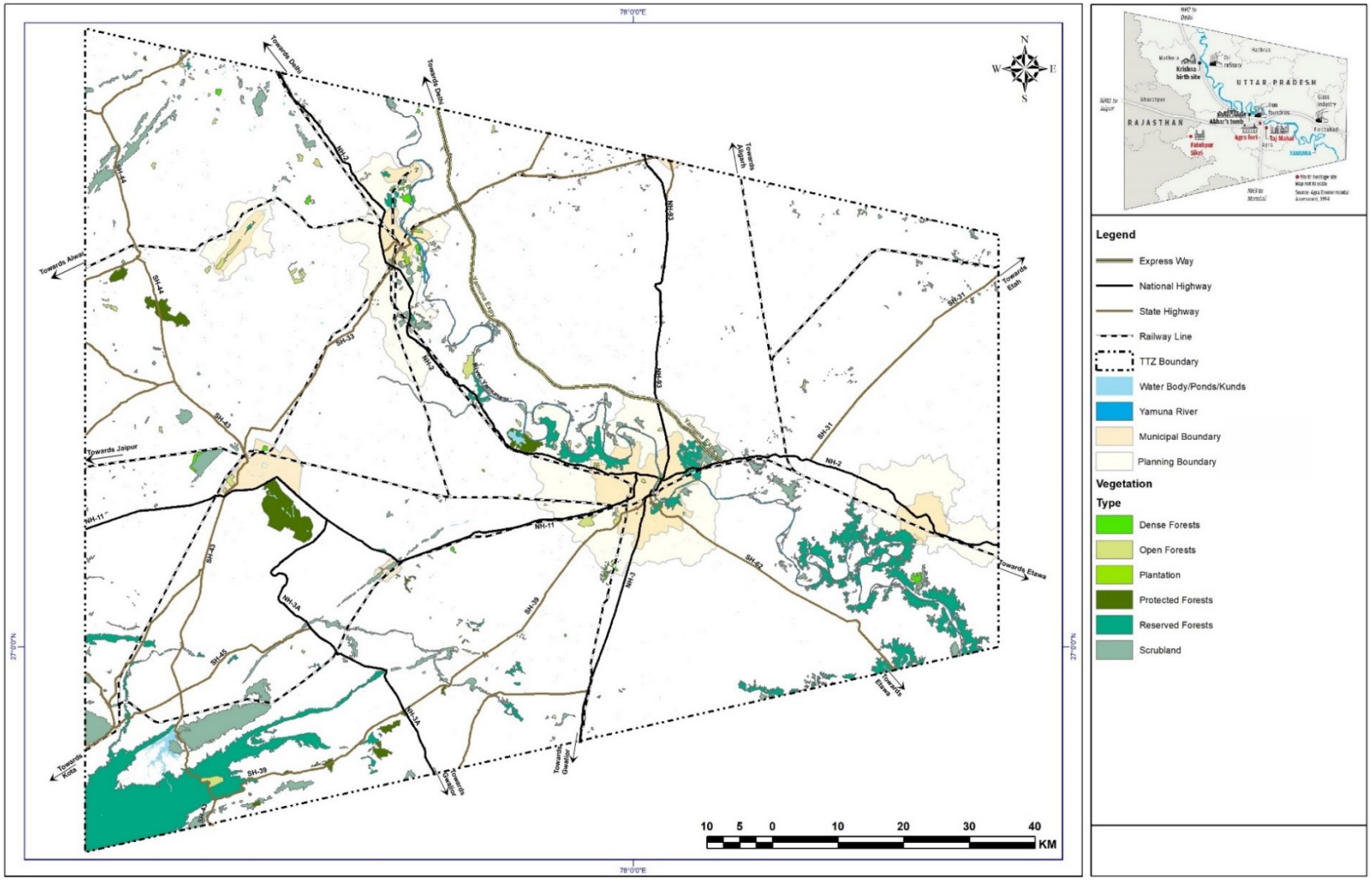
Soor Sarovar Bird Sanctuary, also known as Keetham Lake, was established in 1991 by the Uttar Pradesh Forest Department. It is home to more than 165 species of resident birds & migratory birds. The sanctuary also has the population of more than 300 of pythons. It is also one of the biggest bear rescue centre of India for dancing bear.[11]

9 Guidelines for Eco-Sensitive Zones around Protected Areas, MoEFCC, 9th February 2011

10 277.S.O. 2809 [13.10.2015] Draft ESZ Notification on Keoladeo National Park

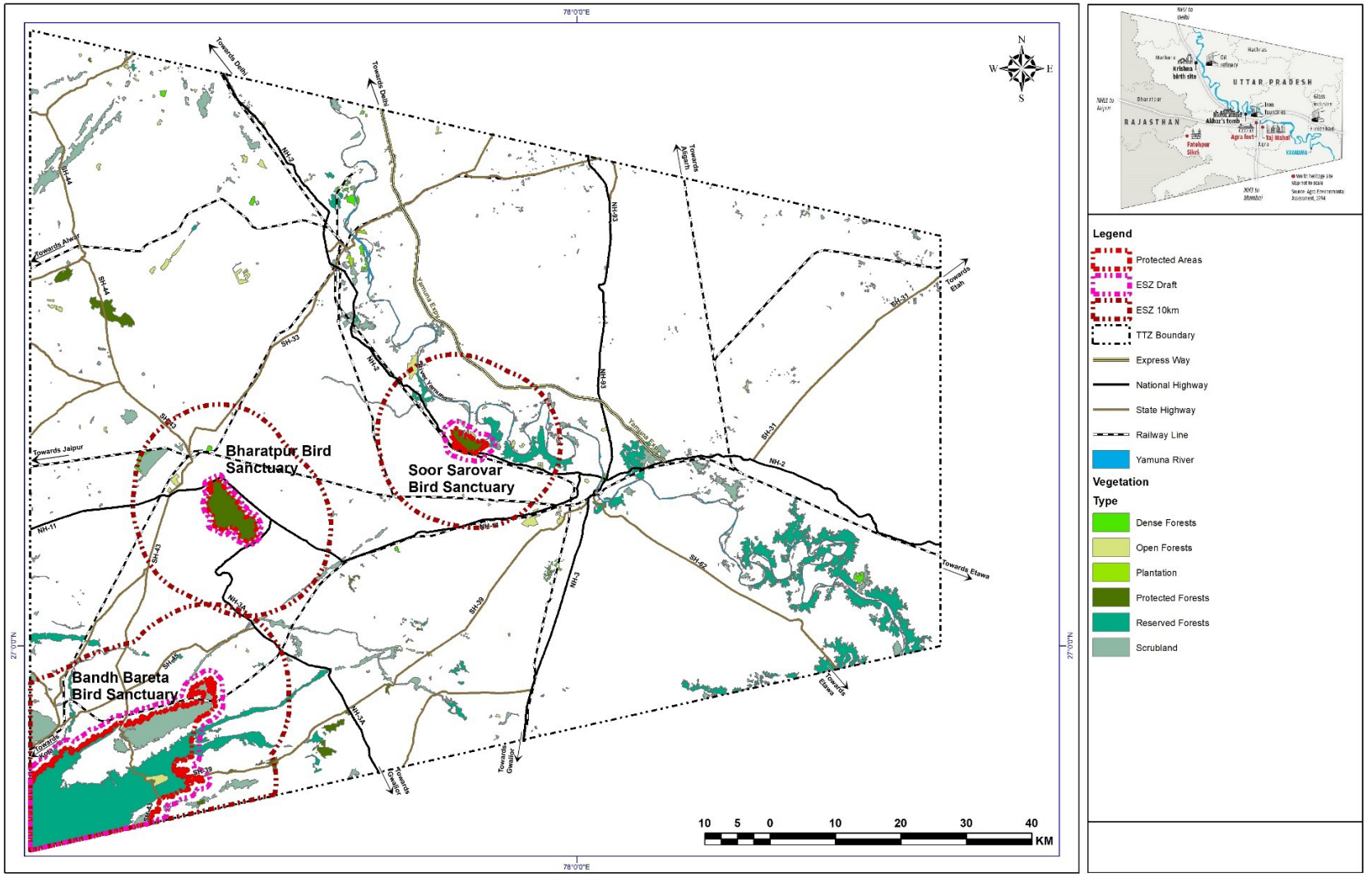
11 348.S.O. 1728(E) [24.04.2018] Draft Notification declaring Eco Sensitive Zone around Soor Sarovar Bird Sanctuary

Map 2.7 Forests in Taj Trapezium Zone



Source: Survey of India Maps

Map 2.8 Protected Areas in Taj Trapezium Zone



Source: Survey of India Maps, MoEF&CC Notification on ESZ

Eco-Sensitive Zone of Bandh Baretha Sanctuary in Bharatpur District

The Eco-Sensitive Zone of Bandh Baretha Wild Life Santuary, in Bayana Tehsil falls in the TTZ Area.[12]

2.7 Minerals and Mining

Bharatpur District

About 3 percent of the total geographical area of the district possesses mineral wealth. Minerals are mainly found in Bayana, Kaman, Weir, Deeg, Roopwas, Nagar Pahari and Bharatpur areas of the district. Silica sand, sand stone, mill stone, masonry stone, churt, slate stone, clay etc. are the main minerals found in the district.

Mathura District

The scope of mining in the district is scanty. Only Kankar and Clay are available. Sand stone is available in a limited quantity at Barsana and Nandgaon but owing to the religious sanctity attaching to the hill, it is not quarried. Similar sandstone is also found at Govardhan. Kankar is abundant in the district particularly in the bangar and that found in the east of Yamuna is larger, hard and has an ashy-blue colour while that in the west is small, soft and light in colour Black Kankar, which is used in masonry work. Clay suitable for making bricks, toys and utensils is found almost everywhere in the district.

Agra District

Agra is one of the poorest districts so far as availability of minerals and mining is concerned. The stone-mines are there in community development block Jagner and Fatehpur Sikri. Stone plates found in Tantpuris being used for roofing. Sandstone is extracted from river Yamuna and Chambal and being used as a raw material in the construction of houses. Clay, kankar, brick, and pottery clays are the useful materials found in district.

Hathras District

No important mineral is found in the district. Kankar, Reh and Clay are the three natural deposits in the district. Otherwise the district is totally devoid of economic mineral deposits. The lime stone conglomerate known as Kankar is found almost in all parts of the district.

Etah District

The geology of the district does not reveal any valuable minerals except ordinary clay,

12 MoEF&CC Notification 31st August, 2015

kankars and and reh. The only minerals of importance are “Kankar” found throughout the district and saline efflorescence known as “reh” found in pargana Marehra. Kankar is used for metal ling road and making lime. Reh is mostly utilized by local washer men. Sand is found in the beds of rivers of the district. Clay is found everywhere in the district and is used for preparing bricks and other earthen wares. There are no prospects of mining and quarrying in the district.

Firozabad District

Regarding minerals the district is very poor. It abounds only in sand which is found on the banks of river Yamuna, 5 Km. away towards south and is used as a building material.

2.8 Soil Profile

Bharatpur District

The major soils found in the district include medium-brown loamy, deep –brown loamy, deep dark brown sandy and red gravelly loam hilly soils. Soil in the district is suitable for production of Mustard and pulses and also good for production of potato, Bajra, jowar and barley.

Mathura District

The classification of the soils in the district are mainly the bangar or uplands - the soils vary from dumat (rich loam) to bhur which is constituted of deposits of blown sand and fine dust, Dumat is not plentiful in the district and found only in tahsil Mat and the northern tract of Chhata. Piliya (light yellow loam), which has a large proportion of sand is not plentiful in the district and is more workable after irrigation than daumat. Dahar or pure clay is found only in the Khadar area or lowlands. It is hard and unyielding and responds to the plough only if it is moist. In the behar (the ravines of the Yamuna) the soil becomes impoverished by drainage resulting in very poor harvests. The soils found in river beds are called by a variety of names such as tardabua, jhawar, kunda, jhada and khapra, The general soils around the jhils and ponds is Chiknot which is also called bhabra in some villages. In the district arables oil considered important according to the facilities of irrigation available and no accessibility. Generally the prevailing soil of the district is an easily workable and productive piliya, rising in places to rich brown loam. According to the settlement report of 1924, there were the following types of soils in the district–Gara barha-I, barha-II, barha III, puth, khadar I and khadar.

Agra District

The district abounds loam and domat soils.The variety land found of Pilia, Chiknot, Potani, arwara possess major content of calcium and lacks phosphetic acid, Nitrogen, and bio-chemical elements. The soils along river belt is most fertile. The soil colour is yellowish in Agra, Fatehabad and Etmadpur tehsils.

Domat mixed with sand with light yellow brownish soil is found in the upper area of Agra, Fatehabad and Kiraoli tehsil while in the lower khadar area sandy loam with light acidic mixture is found. In major portion of Etmadpur mostly kankar mixed with salt is found. In the south west corner of tahsil Kheragarh and nearby mountainous area of Fatehpur Sikri, Sandy soil with light red brown is available. In the dry state it resembles red colour. In the northern part of Bah tahsil, on the river side of the Yamuna, the soil is like Bundelkhandi it is mostly clay in rainy seasons. On the south portion of it black soil is found which has maximum productivity for jowar and gram.

Hathras District

The soil in the district is mostly alluvial but it varies from region to region based on the several proportions of the composition. The variety of soil matia in all tahsils Peelia in Sasni tahsils or prcknot in Sikandra Rao tahsils, usar and barren land in all tahsils. Again Khadar in Sadabad Bhur in Sasni and Sikandra Rao tahsils and other variety of land in all tahsils.

Etah District

Soils comprise Domat, Matiyar, Bhur or sand and stiff clay and loam and reh. For the purpose of assessing and settling land revenue; the soils of the district were classified in the beginning of the present century. This classification has generally closely adhered to the traditional, local distinctions of the soils and the same holds true even today. The soil belonging to the saline- alkaline group of soils and the good patches only are suitable for cultivation. Sandy loam soils are fertile but stand in great need of irrigation. Good Rabi and Kharif crops are obtained where irrigation facilities are available.

Firozabad District

The district is situated in ‘Doab’ of the rivers Ganga and Yamuna and alluvial soil is marked by excess of ‘domat’’ and ‘pilra’. It is fertile ‘cacchar’ land.

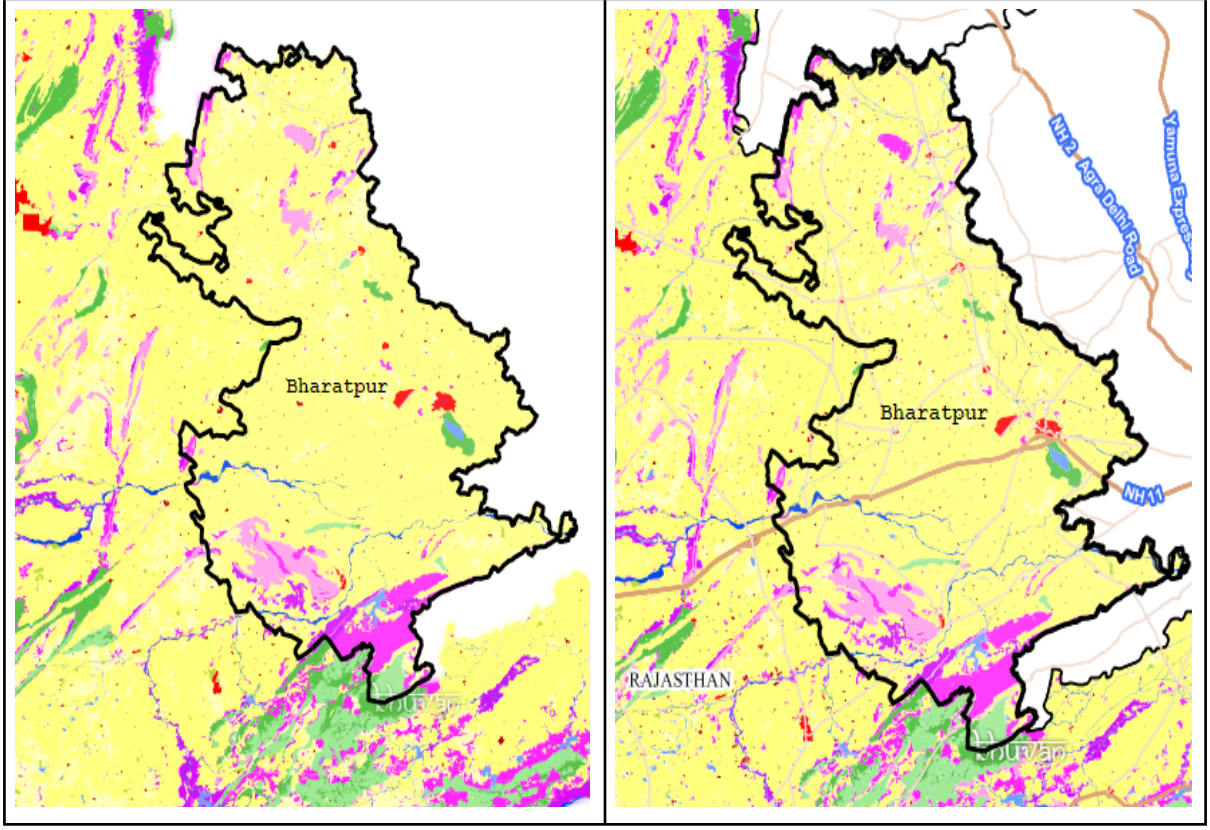
2.9 Land Cover and Land use Pattern

The utilization of land depends upon physical factors like topography, soil and climate

as well as upon human factors such as the density of population, duration of occupation of the area, land tenure and technological advancement of the population. There are spatial and temporal differences in land utilization due to the continued interplay of physical and human factors. The land use and land cover of six districts are studied from the images of Bhuvan Portal. Data were selected for detecting land use changes two time periods from 2005-06 and 2011-12 year respectively.

Bharatpur District

Figure 2.3 Land use and Land cover of Bharatpur District in 2005-06 and 2011-12



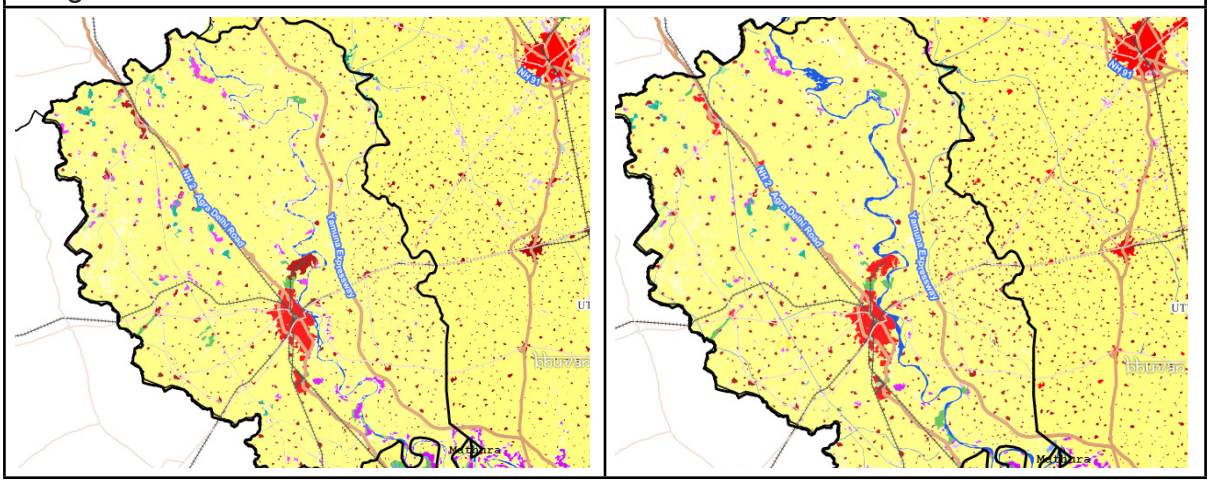
Source: Bhuvan Portal

Built up area has increased by .01% whereas area under agriculture has increased by 5%. Other land use land cover area are mostly same.

Mathura District

The urban built up area in Mathura district has increased whereas rural built up area has decreased which denotes some rural portion is converted to urban area as 6 villages have become 6 census towns in the same period. There is 0.52 sq. km mining area also noted in 2011 land use data.

Figure 2.4 Land use and Land cover of Mathura District in 2005-06 and 2011-12

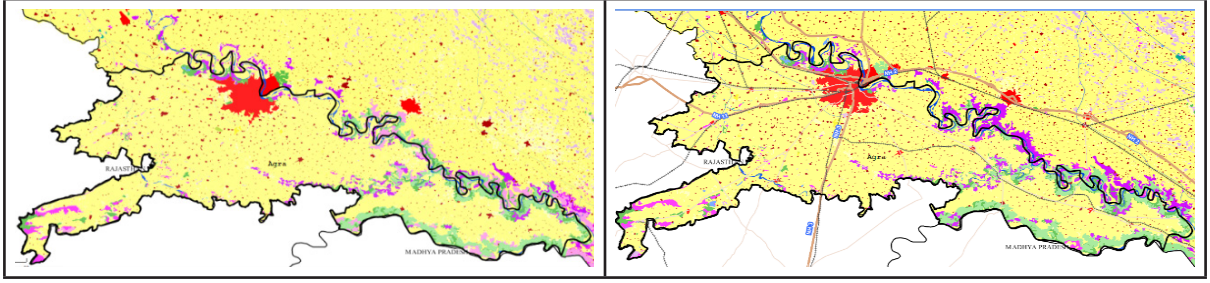


Source: Bhuvan Portal

Agra District

Both the rural and urban built up area have increased by 0.3% and 0.5% respectively and area under forests have increased marginally.

Figure 2.5 Land use and Land cover of Agra District in 2005-06 and 2011-12

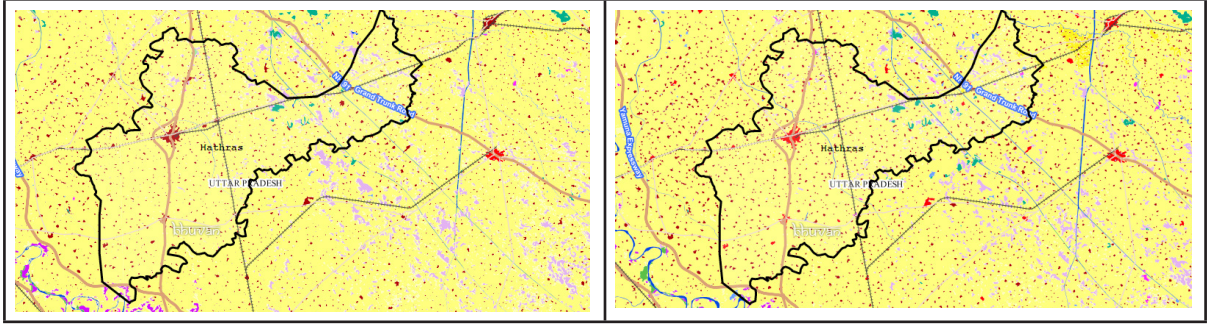


Source: Bhuvan Portal

Hathras District

In Hathras district though 3 census towns are added in 2011 the urban built up area has increased marginally. The area under agricultural plantation has increased 0.28% to 0.76%.

Figure 2.6 Land use and Land cover of Hathras District in 2005-06 and 2011-12



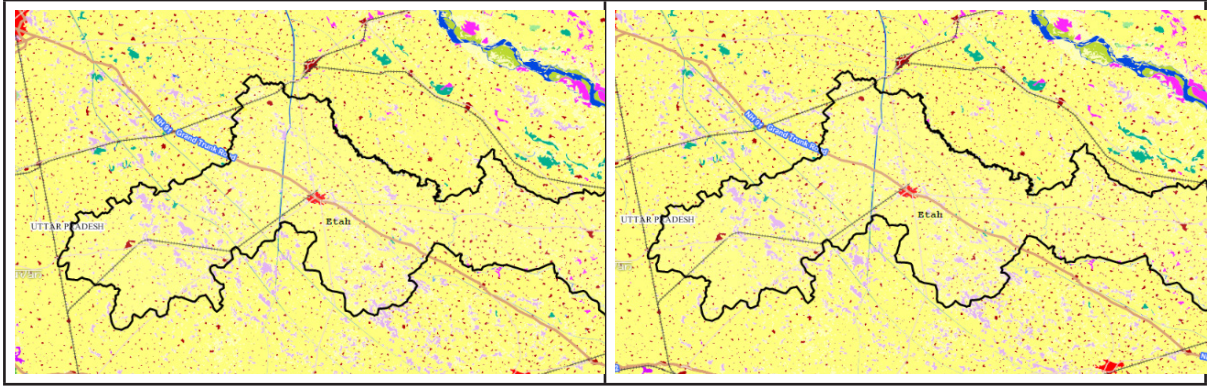
Source: Bhuvan Portal

Etah District

In Etah district urban built up area is also slightly increased from 6.41 sq km to14.32

sq.km.

Figure 2.7 Land use and Land cover of Etah District in 2005-06 and 2011-12



Source: Bhuvan Portal

Firozabad District

In Firozabad district the rural built up area has decreased and urban built up area has increased. The urban built up area is increased from 27.63 sq. km to 45.61 sq.km and notably the area under forest cover reduced 34.96 sq.km to 15.38 sq. km from 2005 to 2011. With high and cropland has increased by 5% in 2011-12.

On the whole there has been increase in built up area and area under agriculture in the region.

2.10 Energy

Under the Department of Additional Sources of Energy, Government of Uttar Pradesh, UPNEDA (Uttar Pradesh New & Renewable Energy Development Agency) many programs are underway in urban and rural areas.

No power generation plant of UPPCL is installed in TTZ area. ONe 5MW Solar power plant is commissioned in the month of March 2018, situated at village Nagla Girdhar, Block Gokul, District Mathura in TTZ area by UP NEDA and Mini solar power plant is installed/under installed by cold storage owners/other industries (according to official suggestion).

Solar City program is being implemented by the MNRE, Government of India in identified cities to reduce 10 per cent consumption of power by use of renewable energy sources with their conventional energy needs and through energy efficiency. In addition to the above other objectives of the scheme are- to empower urban local bodies to face the energy challenges.[13] For implementation of the plan an amount of Rs. 50 lakhs for each solar city and Rs. 5 lakhs for green campus is being provided by the MNRE and it has been proposed to provide prevailing grant by the

13 http://www.upneda.org.in/programmes-under-grid-solar.aspx

Government of India as applicable to various projects in public/industrial/beneficiary-oriented schemes. The scheme is to be implemented by the municipal corporation and for Technical Guidance and approval of projects necessary action has to be taken by UPNEDA. Under the solar city in Uttar Pradesh, cities of Agra, Moradabad and Allahabad have been identified and under the Green Campus scheme Dayalbagh, Agra has been selected.

In rural areas major programs are - Remote Village Electrification Programme, Solar R.O. water plant at state primary schools and Installation of Solar Power Packs for the poor in rural areas as follows:

- Solar PV Panel-120 Watt
- Battery 12-volt, 120 ampere hour tubular plate
- L.E.D. Light - two of 05 watts and one of 07 watts
- Fan- ceiling of 25 watts D.C.
- Additional Point - for Mobile Charging.

2.11 Pollution

2.11.1 Air Pollution

It is important to note that whole of the TTZ Area is considered under the sensitive area category of CPCB Standards.

- By considering the whole TTZ area to be under sensitive zone, levels of SO_2 are found to be well below the corresponding CPCB Standard value of 20 µg/m^3, whereas NO_2 levels are approaching the Standard value of 30 µg/m^3.
- $PM_{2.5}$ and PM_{10} levels are substantially high (4 times) than the prescribed Standard value of 40 µg/m^3 & 60 µg/m^3.
- SO_2 and NO_2 levels are found to be high in winter than in summer and this may be attributed to the burning of coal and other materials for heating purpose during winter.

In addition, Benzene, Toluene and Xylene (BTX) are also monitored simultaneously along with PM_{10}, SO_2 and NO_2 at the Agra Nagar Nigam site using continuous air monitoring system. Air quality standards promulgated by CPCB for benzene is 5 µg/m^3 (annual average). The benzene levels recorded were found much below the CPCB standards for benzene. National standards for toluene and xylene are not available at present.

Bharatpur

There are three air monitoring stations at Bharatpur- RIICO,Office Building, Khadi Gramoday Samiti, and R.O., R.S.P.C.B. Building. Analysis of data in pat three years indicates that NO_2 levels were much below the applicable CPCB standard, whereas $PM_{2.5}$ and PM_{10} levels were found to be almost all the time above the standard. (100 µg/m^3 ranging between 180-250 µg/m^3)

Mathura

There are two air monitoring stations at Mathura – R.O. U.P S.P.C.B and at Combined Effluent Treatment Plant. The Figure s indicate that gaseous pollution levels are much below the standards, whereas PM_{10} concentration levels are much above the standards. (100 µg/m^3)

Agra

In compliance with the Hon'ble Supreme Court's Orders dated 7.11.2000, the CPCB has set up and is operating four ambient air quality monitoring stations at Taj Mahal, Itmad-ud-Daulah, Nunhai and Rambagh.

The CPCB has established one Central Analytical–cum-Calibration Laboratory, as was suggested by the Mahajan Committee. UPPCB has also established regional laboratories in Agra, Mathura and Firozabad.

In all, there are 8 ambient air quality monitoring (AAQM) Stations operational in Agra city.

Table 2.3 Parameters Monitored in AQM Stations at Various Locations

Sl. No.	Monitoring Agency	Number of Sations	AQM Location	Type of Location/ Area	Parameters Monitored
1	CPCB, RO, Agra	4	Taj Mahal	Sensitive Area	SO_2, NO_2, RSPM & SPM
			Etmad-Ud-Daulah	Sensitive Area	
			Rambagh	Residential/Commercial	
			Nunhai	Industrial Area	
2	ASI, Agra	1	Taj Mahal	Sensitive Area	SO_2, NO_2, RSPM & SPM
3	UPPCB, RO, Agra	2	Bodla (UPPCB Building)	Residential Area	SO_2, NO_2, RSPM & SPM
			Nunhai	Industrial Area	
		1	Agra Nagar Nigam Office	Commercial Area	SO_2, NO_2 & PM_{10}

Source: UPPCB

Out of 8 air quality monitoring stations, 7 are monitored using manual systems, whereas one station is equipped with continuous analyzer, which is installed at Agra Nagar Nigam Office. The automatic station is operated and maintained by M/s Envirotech Ltd., New Delhi.

- SO_2 & NO_2 levels are found to be high in winters than in summer. This may be attributed to mainly low wind speed and inversion phenomena resulting out of drop in temperature.
- The annual average SO_2 level in any year was much below the CPCB Standard of 20 µg/m^3 for the sensitive area category.
- AQ Data indicates higher levels of NO_2, $PM_{2.5}$ and PM_{10} at Nunhai when compared with that of other four locations where the annual average NO_2 level in any year was found to be below the CPCB Standard of 30 µg/m^3 for the sensitive area category.

Firozabad City

- Air quality data is being monitored at three locations in Firozabad city. These locations are Raja-ka-Tal (residential area), Tilak nagar (mixed use area) and CDGI (industrial area).
- Analysis of air quality data indicates similar pattern in variation in gaseous pollutants (SO_2 and NO_2) and particulate matter. In general, highest pollution is observed at industrial area site followed by the residential area and the lowest at the mixed used area site. This pattern is more or less similar for all the pollutants.
- In general, highest levels of pollutants are observed during winter (December-March), followed by the summer (April-June), and the lowest during monsoon (July- September).

Sources & Issues of Air Pollution in TTZ Area

Comprehensive Action Plan for Reducing Air Pollution as per guidelines of Central Pollution Contrrol Board has been made and enforced in Agra for strict control of air pollution. In the said action plan detailed department wise action points are laid down based upon the prevailing air quality index. The District Magistrate regularly monitors the progress of the implementation of action plan. A web portal (www.upecp.in) is also functional wherein regular progress and action taken report by 20 departments are is updated.

Industrial Sources

The major air polluting industries (127 units) in Agra include Cupola, Induction furnace, Rubber, Chemical and Engineering industries, which are currently using CNG supplied by GAIL and are reported to comply with the standards laid down by MoEF. Appropriate air pollution control systems (APCS) have been installed in all these air polluting units.

- There are about 180 glass-based industries manufacturing mainly glass bangles, glass beads, glass rods, glass tubes/shell, glass wares and glass blocks. DG

sets are installed in almost all the glass industries in Firozabad District, which are mostly based on natural gas.

- Mathura Refinery is the largest source of air pollution in Mathura. Besides, there are other small & medium scale industries in the region.
- Due to proximity to the Keoladeo National Park, industries could not be developed in the Bharatpur region. Presently, Perfect Sanitary Pipe and other small and medium scale industries manufacturing/producing agricultural equipment, tin container, animal fodder etc. are operating in Bharatpur.
- Apart from the organized sectors of air pollution, there are a large number of small scale/cottage/household activities which contribute towards air pollution. As in Agra, besides Foundries, there are nearly 120 Petha (sweet item) manufacturing units, and also more than 2000 halwaiis, 500 kumhars and bharbhujas, which use coal, cow dung, wood and agro-wastes.Average wood consumption in each Petha unit is found to be 5 kg/day, whereas coal used is about 4 kg/hr. Thus, the total daily consumption of all the Petha units is estimated to be about 500 kgs of wood and 4.7 tons of coal.
- Mathura refinery has installed all required air pollution control system along with adequate stack height as per the norms under the Environment (Protection) Rules. The stack emissions monitored earlier have been found to be meeting the prescribed norms.
- As confirmed in the minutes of 42nd meeting of TTZ Authority dated 06.06.2018, no petha unit is operational on coal as fuel. Further, it is also recorded that random inspections are carried out and any coal based such units if found, is closed immediately.
- Besides above, almost 95% Halwaiis are using commercial LPG as fuel to control the air pollution.
- District Administration has formed inspection teams comprising of officers from Nagar Nigam Administration, Police and Pollution Control Board. Regular drives are carried by the inspection team which take action onsite against such defaulter units.

Vehicular Sources

- Other than industries, vehicular population is the major contributor to air pollution in Agra. As per the records of RTO, Agra, total number of vehicles in Agra district have increased from about 4.0 lakhs to 6.4 lakhs in a span of 8 years (from 2003-04 to 2010- 11) with an overall annual average growth rate of about 7.6%.

- Besides the movement of registered vehicles in the Agra and TTZ area, a large number of all categories of vehicles come from nearby states/cities like Delhi, Rajasthan (Jaipur, Alwar, Dhaulpur etc.), Madhya Pradesh (Gwalior), UP (Mathura, Firozabad, Aligarh etc.). Movement of all these vehicles for tourist as well as commercial activities also result in significant air pollution through vehicle exhausts.
- According to the study carried out by CRRI (2002), the total number of vehicles entering and leaving the Agra city was 72300 (81%), whereas 19% vehicles (16950) passed through the city. The total pollution load generated from the vehicles in 2002 was estimated to be 17.93 tons/day of CO, 10.28 tons/day of HC, 3.61 tons/day of NOx and 0.91 tons/day of PM. This was observed to be much less as compared to the other mega-cities like Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad and Kanpur.
- Traffic Volume Count Figure s indicates high movement of vehicles at Kotwan (Mathura), as compared to Fatehpur Sikri and Saiyan. Secondly, movement of trucks is also high, particularly at Saiyan and Kotwan.
- The conditions of the roads in the TTZ, in general, are either not adequate or not in proper condition, thus movement of traffic on such roads leads to significant dust pollution.
- Central Pollution Control Board has been made and enforced in Agra for strict control of air pollution. In the said action plan detailed department wise action points are laid down based upon the prevailing air quality index. The District Magistrate Comprehensive Action Plan for Air Pollution Control as per the guidelines of regularly monitors the progress of the implementation of action plan. A web portal (www.upecp.in) is also functional wherein regular progress and action taken report is updated.
- For the control of vehicular emission, BS-4 emission norms are implemented in Agra and only BS-4 complying vehicles are registered.
- Also, Cleaner Fuel CNG is being supplied in Agra for vehicular, commercial and industrial use. Presently 90,000 kg/day CNG is dispensed for vehicular purposes in Agra. Presently 60,000 kg/day CNG is dispensed for vehicular purposes in Agra.
- By Ministry of Road Transport and Highways order No. S.O.2812(E), dated 30.08.2016 E-rickshaw has become conditionally free the boundation of permit as per Motor Vehicle Act 1988, Section-66, sub-Section (1).
- CNG A/R above 8 years is being scraped in office premised to ensure pollution control & three Registration No. being cancelled.

- Playing of EURO-II loader vehicles (Diesel) from registration date 01.04.2005 to 31.03.2006 & 01.04.2006 to 31.03.2007 & 01.04.2007 to 31.03.2010 prohibited to ply in Agra Municipal Area w.e.f. 01.11.2016.
- Private vehicle above 15 years old are not Re-registering w.e.f. 01.01.2016.
- As confirmed in the minutes of 42nd meeting of TTZ Authority dated 06.06.2018, 44 Jugad Vehicles have been closed by Transport Department. All the OLA Taxies have been converted on CNG.

DG Sets

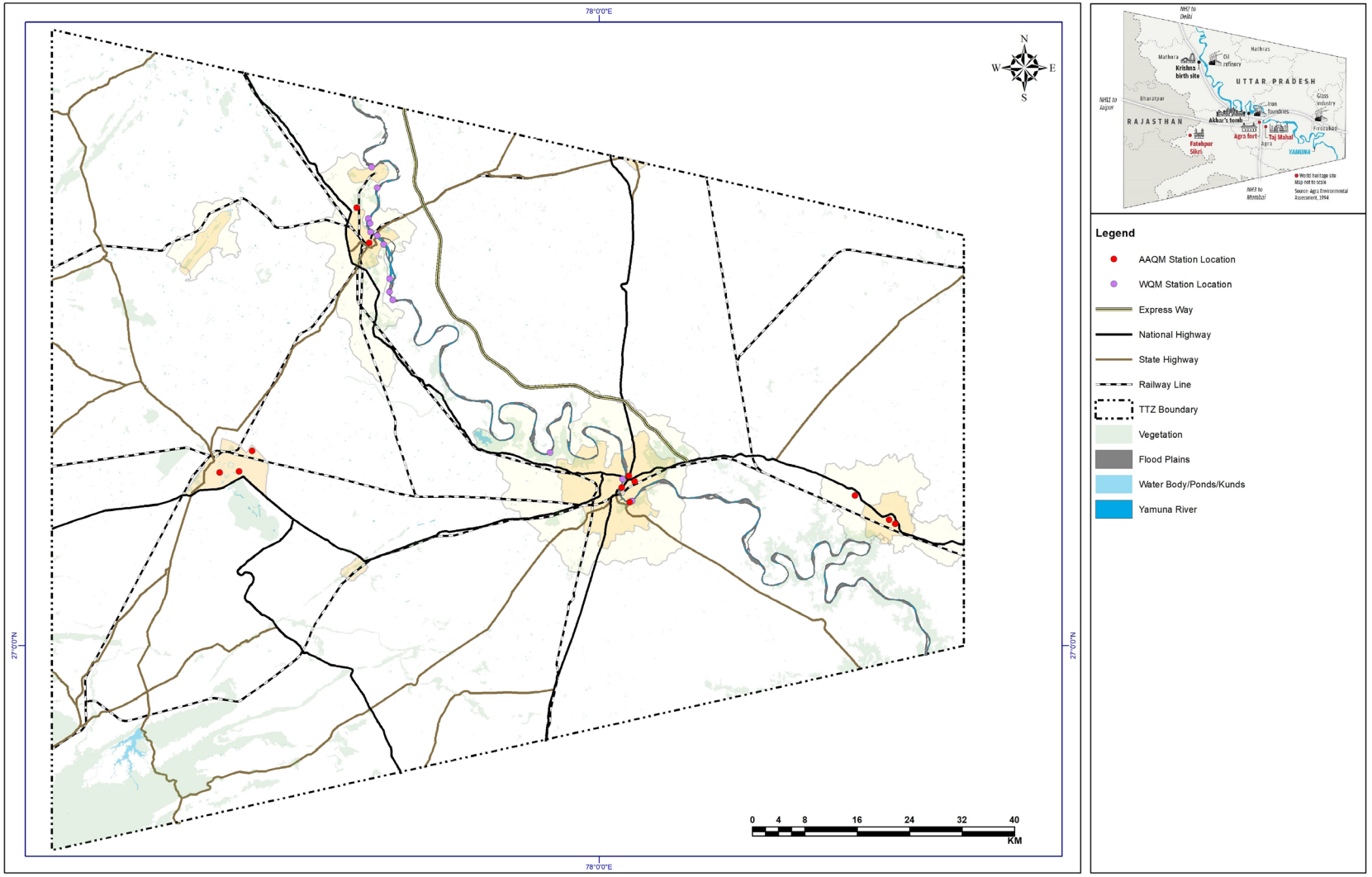
- Use of DG Sets, in whole TTZ area, especially in Agra is considered as a major source of air pollution. Irregular supply of electricity in the region forces the consumers to use DG sets for commercial as well as domestic purposes.
- As per the Environmental Management Plan of CPCB (2002) of Agra, it was estimated that about 32000 DG sets are operated in the city.
- DG sets are installed in almost all the glass based industries in district Firozabad. DG set installed in all glass industries are based on natural gas.
- DG sets are also deployed as alternative electricity source in many Health Care Facilities (HCFs), which include all types of hospitals, nursing homes, clinics, pathological labs etc. DG Sets are also installed in some commercial places such as banks and hotels. All these DG sets deployed in HCF and commercial sectors are used as standby, to be used in case of power break down/ power failure. All these DG Sets are operated on diesel, commercially available in the open market. Obviously given statement is true but not given any sensation in to about diesel operated in DG sets. .DG should be operated by Gas or electricity should be supplied 24 hours in TTZ of Firozabad.
- In Mathura, it is estimated that nearly 1000 DG Sets are installed/are being installed in Industries and commercial/residential premises like schools, hospitals, complexes and hotels etc. Further, details relating to the capacity of DG Sets and exact number are not available at present.
- The concentration levels of PM are much higher at all the sampling locations throughout the TTZ area. High levels of PM may be attributed to various other unaccounted sources of air pollution than the identified sources like industries, vehicles and road dust re-suspension. Therefore, efforts are required mainly to control the pollution due to particulate matter throughout the TTZ area.
- The DG Sets are an essential component of industrial/commercial setups. DG sets are used as a source of standby power supply. CPCB as declared the

Firozabad city as non-attainment city due to higher concentration of ambient air pollutant in environment like PM 10 and gaseous pollutant Nox. To radius environmnetalpollutants n the environmental action plan be being conducted to take action against the polluters in TTZ area in district Firozabad. Ambient air monitoring is being conducted by CDGI, Firozabad at three location in TTZ area of the Firozabad city. Which are Raja ka tall (residential area), Tilak Nagar (Mixed used), CDGI industrial area. Where at these points PM and gaseous pollutant Nox are found generally exceeding prescribed norms accept rainy and monsoon season.

- Uninterrupted power supply is being monitored by TTZ Authority in compliance of orders passed by Hon'ble Supreme Court.
- The Environment (Protection) Rules lays down the norms for emission limits of gen sets run on natural gas/ liquid petroleum gas/ diesel/ petrol.
- In Agra, Mathura and Firozabad the DG Sets installed in industries are gas based, meeting the norms, prescribed E(P) Rules.
- The DG Sets in above districts installed in commercial and other places use diesel as fuel, but are as per the norms, prescribed in E(P) Rules.
- Regular drives are carried to take onsite action against DG Sets which are not as per the provision of E(P) Rules.

Though several measures have been taken in the past to control air pollution in the TTZ area, however with the growth in residential as well as floating population in the region shall continue to result in enhanced activities, thus putting pressure on the environment of the TTZ area.

Map 2.9 Location of AAQM Stations and WQM Stations



Source: http://cpcb.nic.in

2.11.2 Water Pollution

Water Quality of Yamuna in TTZ

In the first phase during the Ninth Five Year Plan, 10 projects were approved and are being implemented. Four of these pertain to water and sewerage sector. These are:

- Water supply (Agra)
- Water Supply (Mathura-Vrindavan)
- Gokul Barrage
- Storm Water Drainage System (Agra)
- Improvement in Electric Supply at Agra
- Improvement in Electric Supply in and around the rural areas of Agra and Fatehpur Sikri
- Solid Waste Management
- Construction of one part of Agra bye-pass
- Widening of Agra Bye-pass
- Improvement of Master Plan of Roads of Agra City

The quality of water in the River Yamuna deteriorates in the upstream, before the river enters the State of U.P., which is reflected from the report of the Central Pollution Control Board, New Delhi with regard to “Water Quality of River Yamuna 2017”. The aforementioned report shows that the levels of Dissolved Oxygen in the River Yamuna devoid of Dissolved Oxygen by various points where samples had been taken in the State of Delhi, just before the river enters the State of U.P. For ready reference, a true photocopy of the report sent by the Central Pollution Control Board, New Delhi on the subject “Data of River Yamuna” and giving particulars of “Water Quality of River Yamuna 2017”.

As evident from the data of Water Quality of River Yamuna, the Dissolved Oxygen levels, which clearly indicate that at the point of entry of the River Yamuna from upstream States into the State of U.P., at Shahpur, the levels of Dissolved Oxygen are the lowest, and further downstream at Vrindavan (Kesi Ghat and Gokul Barrage), the Dissolved Oxygen show an increasing trend. The River Yamuna enters the State of U.P., namely Shahpur Kosi Kala and the sampling point was also very close to the “Gucchi Drain” and upon said sample being tested, the level of the Dissolved Oxygen. The report of the U.P. Pollution Control Board, Lucknow, referring to a report of the Central Pollution Control Board, New Delhi, states that the Dissolved Oxygen levels range between 0.5-1.4 at Okhla after meeting Shahdara Drain in the State of Delhi as per the reports of the year 2017, which clearly indicates the carryover of pollution

load into Mathura from the upstream States.

The water quality of River Yamuna improves after entering the State of Uttar Pradesh. The regular monitoring carried out by UPPCB shows that the water quality improves mainly because of addition of 150 cusec Ganga water from Palada through Harnaul Scape Canal in the upstream of Gokul barrage and Sikandra Water Works, Agra. The water quality of River Yamuna further improves in the down streams particularly after confluence of River Chambal.

For improving the water quality of river Yamuna and formulating an action plan to this effect it should be appreciated that the water quality of river Yamuna in the state of Uttar Pradesh depends upon the quality and flow of water received from upstream. Therefore, it seems appropriate to adopt a holistic and integrated approach for abatement of pollution and restoration of water quality of River Yamuna by the concern States. Regarding study of E-flow of Yamuna and its maintenance, intervention of Ministry of Water Resources, Government of India is required.

In Agra, all the water polluting units have adequate effluent treatment plant.

In Mathura, the Indian Oil Corporation Refinery has installed adequate effluent treatment plant and sewage treatment plant and the most of treated effluent is used for irrigation purpose.

In Agra, 09 STPs of cumulative capacity of 220 MLD are setup and functional now.

- In Mathura there are 06 STPs of 59 MLD cumulative capacity are setup. Out of these 04 STPs are oxidation pond and 02 are UASB (Up flow Anaerobic Sludge Blanket). The average capacity utilization of STP infrastructure is approximately 50% and it requires to be utilized properly to cover all the drains.
- In Firozabad 01 STP of 67 MLD capacity is under construction.
- The major challenge related to sewage pollution is proper tapping of sewage drains so that discharge of untreated sewage may not result into increase of sewage pollution.

2010 (Observation)

- The storm water drains were half a century old.
- The existing structural conditions of the drains are not good. These drains are not functioning properly due to silting and accumulation of solid waste, which are not cleaned regularly by the authorities.
- There is no arrangement at outfall location drains/nallas for holding the solid waste, which finds its way finally into the river Yamuna. Also the outfalls of the drains are not provided with control structure to avoid back flow from the river.

- Total length of drains in Agra Municipal area is 818.99 km, of which 396.23 km length is already in RCC structured. Required more finance for completing the work. Cleaning of drains in regular basis and 21 drains are already covered by net. (Total length of drains in Mathura Municipal area is 26 km. 20 km length already in RCC structured. Nullahs are cleaned according to the schedule. Garbage bins are kept in places to stop the litter from going to the drains. Door to Door Collection work in on proposals.)
- In the absence of comprehensive sewerage management system, the storm water drains carry raw sewage laden with solid wastes.
- The flow in the river downstream has been impacted as a result of the impoundment, and the characteristics of the river Yamuna has changed due to reduced flow conditions downstream.
- However, based on the UPJN report on ground water availability at site, the data indicates that depth of groundwater availability is increasing since the project completion. This may be due to increased abstraction of ground water in the area.

The existing drainage system, as per the data available with UPJN, indicated that the drainage system in the city has been classified into 11 major catchments/zones and a number of kacha open drains. Around 21 major open drains spread across the entire Agra city, collect and convey the storm water finally into river Yamuna. However, no data is available on the details of the catchment area served by the drains. The table below presents the 21 major drains in the city and the coverage areas (names) of the respective drains with discharge points. Mantola and Bhairon drains are the largest drains. In addition, there are several medium and small drains which discharge into the major drains.

2013 (Observation)

- The sources available for supply of water to Agra city are surface water (Yamuna River, Gokul Barrage, Kitham Lake) and groundwater.
- The groundwater quality is fit for drinking purpose as indicated by the water quality reports from UPJN.
- Moreover, the groundwater table is receding at high rate. The dependability on groundwater for water supply is thus jeopardized and alternate sources have to be found.
- There is extreme shortage of raw water in the river Yamuna during summers, the lowest discharge has been observed as 101.7 mld. Out of this discharge the average summer drawl of raw water is of the order of 99 mld.

- Due to high pollution level in Yamuna water the demand of drinking water of Agra, which is presently 142 cusecs and projected to be 276 cusecs in the year 2036 could not be met from this source. Foreseeing the shortfall in River Yamuna, the Central Govt. has earmarked 140 cusecs raw water for Agra and 10 cusecs from Tehri reservoir. This 150-cusec raw water will be conveyed up to Palra fall of Upper Ganga canal through its system and then it has to be brought to Agra.
- A rubber Barrage has been proposed downstream of Taj Mahal by Irrigation Department, GoUP. Appropriate Feasibility Study to be carried out.

2.12 Health

Water brone and air brone diseases in the area show increasing trends due to insanitary conditions and high levels of particulate matter in the air.

- All the operational electroplating units have installed effluent treatment plants.
- 30 Dhol and vibratos units (silver polishing and washing units) operational in residential area have been closed and being directed to shift to industrial area with proper pollution control system.
- In Agra, 09 STPs of cumulative capacity of 220 MLD are setup and commissioned.
- In Mathura there are 06 STPs of 59 MLD cumulative capacity are setup. Out of these 04 STPs are oxidation pond and 02 are UASB (Up flow Anaerobic Sludge Blanket). The average capacity utilization of STP infrastructure is approximately 50%. The major issue is under utilization of STP capacity because all the drains are not diverted to the STPs.
- In Firozabad 01 STP of 67 MLD capacity is under construction.
- The major issue related to sewage pollution is improper tapping of sewage drains which results in discharge of untreated sewage.
- The STP under construction in Firozabad is based on the aerobic technology and one STP of Agra of 36 MLD capacity to be commissioned is also based upon latest Sequential Batch Reactor (SBR) technology.
- All the 09 operational STPs in Agra are achieving the standards. In Mathura & Vrindavan out of existing 06 STPs, 02 STPs (01 in Vrindavan and 01 in Govardhan) are achieving the prescribed norms. The remaining 04 STPs (02 in Mathura, 01 in Vrindavan and 01 in Govardhan) are based on oxidation pond technology and they need to be upgraded.

2.12.1 Industrial Effluent Discharges

Based on the information collected regarding the pollution from industrial effluents in

the TTZ, it is understood that majority of the industries are dry in nature or discharge less effluents. Also, the effluent management systems have to be commissioned for dairy, peta and tanneries. Since these units have higher organic concentration, efforts should be directed for energy recovery through methane generation and subsequent utilization for power generation. Plans are afoot to change effluent management in electroplating industries in Agra from conventional treatment to ion-exchange based technologies. Advanced treatment for water recovery through membrane filtration systems may be adopted to reduce freshwater consumption and reuse treated water in electroplating units. The major industry in the TTZ is Indian Oil Corporation's Mathura Refinery. The effluents are treated in ETP and part of the treated wastewater is recycled into the industry for power generation. The refinery may reduce wastewater generation through reuse of treated domestic sewage from Mathura & Vrindavan thus reducing freshwater consumption from Yamuna River.

2.12.2 Wastewater Management in TTZ Area

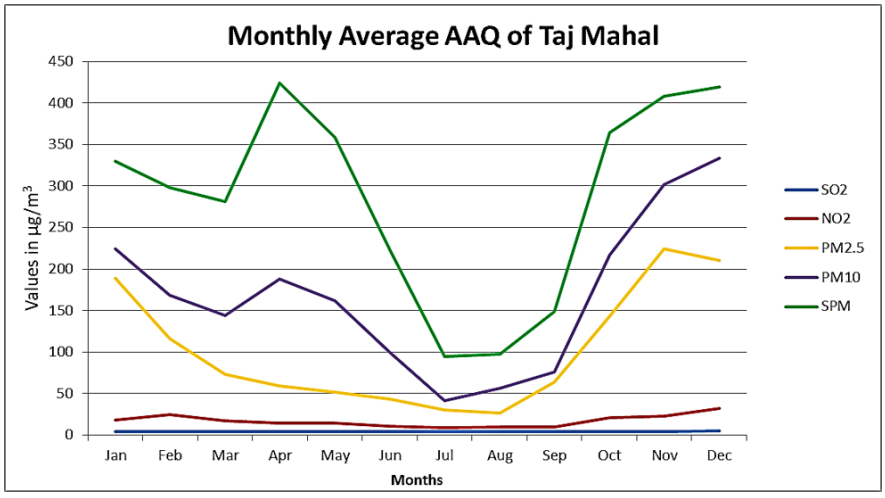
Comprehensive wastewater management plan (CWMP) formulation is necessary for environmental improvement in the TTZ and it should include initiating activities on storm water management, domestic and industrial wastewater management through construction of drainage/sewer network systems, sewage and effluent treatment plants. The following section provides the status on sewerage, storm water and industrial effluent discharges in the TTZ area.

2.12.3 Status of Sewerage and Sewage Management in the TTZ

The existing status of wastewater management in the TTZ comprising Agra, Mathura, Vrindavan and Firozabad is discussed in this section. The percentage of population covered by sewerage system in the TTZ varies from 25% to 90%. Large number of activities have to be undertaken to improve the overall situation in the TTZ with respect to the water environment. Several areas in the TTZ are not covered by the sewerage network for collection of domestic, commercial and industrial effluents. The latest census data (2011) was not available in the public domain for assessment. Hence Information based on the available data was used. The status of TTZ wrt wastewater would improve significantly if it meets the current or 2010 waste water generation of 260, 50, 8, 67 MLD in TTZ. The information on all aspects of wastewaters have increased in the last few years due to improved reporting and recent information which was available in public domain. Many low lying areas are severely affected during monsoon due to overflow of sewage on the roads and open plots adjoining the building blocks due to the presence of solid waste choking the sewer lines. In the absence

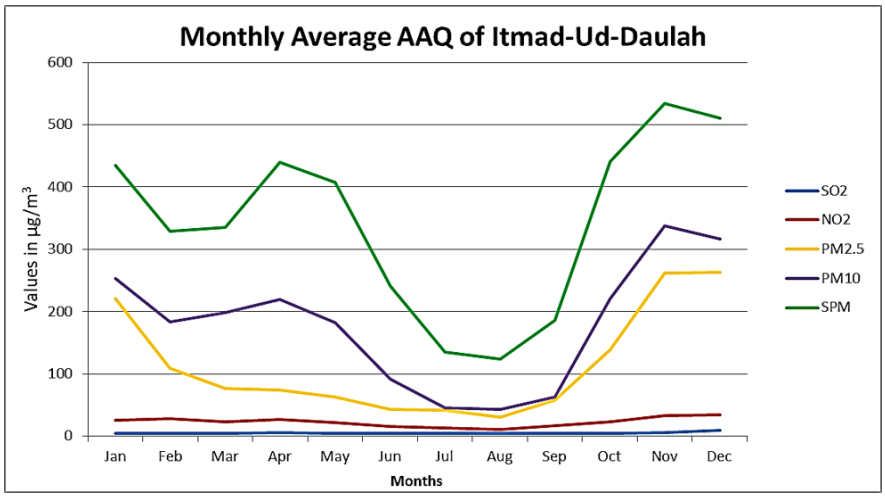
of sewerage system, majority of the houses have septic tanks and those that do not have, discharge into nearest drains posing a threat to the public health and causing bad odor. The untreated effluents reach Yamuna River through the various storm water drains. The Yamuna River also receives industrial and domestic discharges from Faridabad, Paliwal, Kosi, Vrindavan and Mathura before reaching Agra. The flow in the river is mainly sewage except during monsoon. All the above towns discharge domestic wastewaters into Yamuna River of varying quantities. Yamuna, in its course of 10 km in Agra, receives wastewater of 105 MLD at 28 points where 57.5 MLD is from domestic sources, 5.3 MLD from industrial areas and 42.4 MLD from mixed sources (CPCB-2002). The total pollutant load in terms of BOD and SS discharged through these drains is 32 t/d and 40 t/d respectively as per the CPCB report10. The major drains in Agra discharging into Yamuna is Mantola (BOD - 27 t/d) Bhairon (BOD - 1.4 t/d) and Etamudulla (BOD- 1t/d), respectively. The STPs design and operated in the TTZ are based on anaerobic and natural oxidation treatment route. The treated effluent quality from few of the STP at Agra, Vrindavan and Mathura does not meet the inland surface water discharge standards, Additional treatment sequence is required to reduce the organic pollutants before discharging into river. The treated effluents from the STPs are partially used for farm irrigation near the river bed in Agra. The quantum of E-Coli discharged through treated effluent from STPs into the Yamuna River ranged between 2 x 103 to 6.54 x 106 MPN /100 ml. About 300 out of 800 hectares is used for irrigation. The details of greenbelt development in Mathura, Vrindavan, Firozabad, Fatehpur Sikri and Bharatpur using treated effluent are not available.

Figure 2.8 Monthly Average AAQ Profile Recorded at Taj Complex



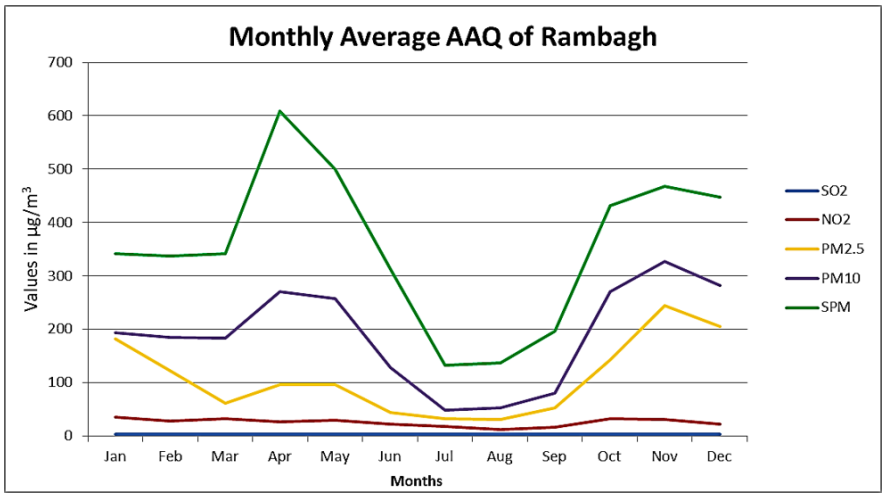
Source: http://cpcb.nic.in

Figure 2.9 Monthly Average AAQ Profile Recorded at Itmad-Ud-Daulah



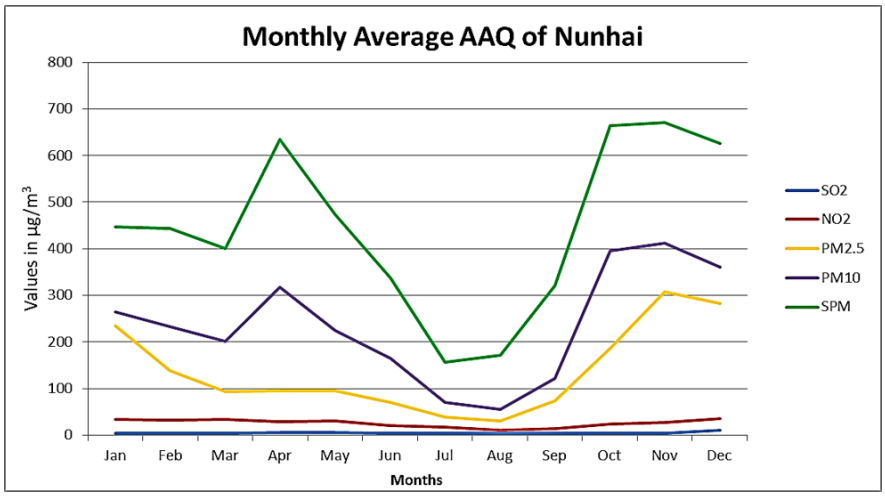
Source: http://cpcb.nic.in

Figure 2.10 Monthly Average AAQ Profile Recorded at Rambagh



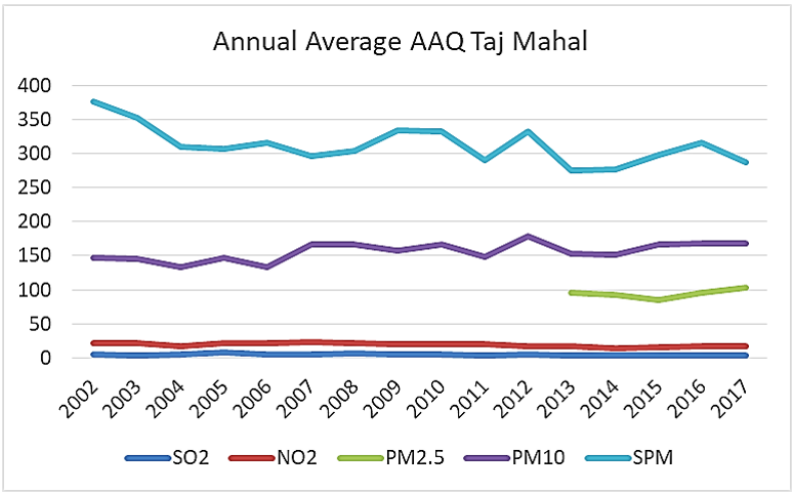
Source: http://cpcb.nic.in

Figure 2.11 Monthly Average AAQ Profile Recorded at Nunhai



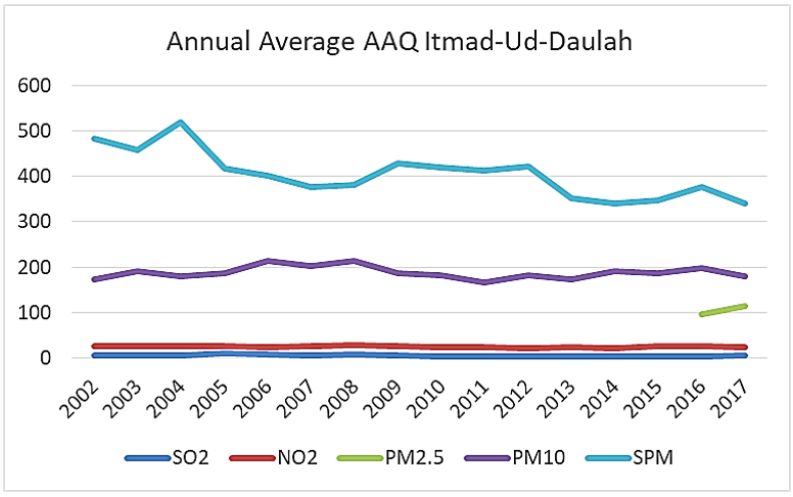
Source: http://cpcb.nic.in

Figure 2.12 Annual Average AAQ Profile Recorded at Taj Complex



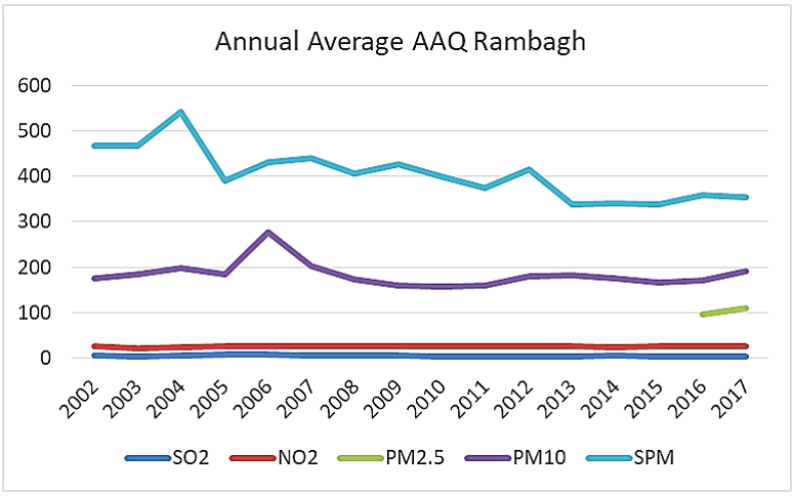
Source: http://cpcb.nic.in

Figure 2.13 Annual Average AAQ Profile Recorded at Itmad-Ud-Daulah



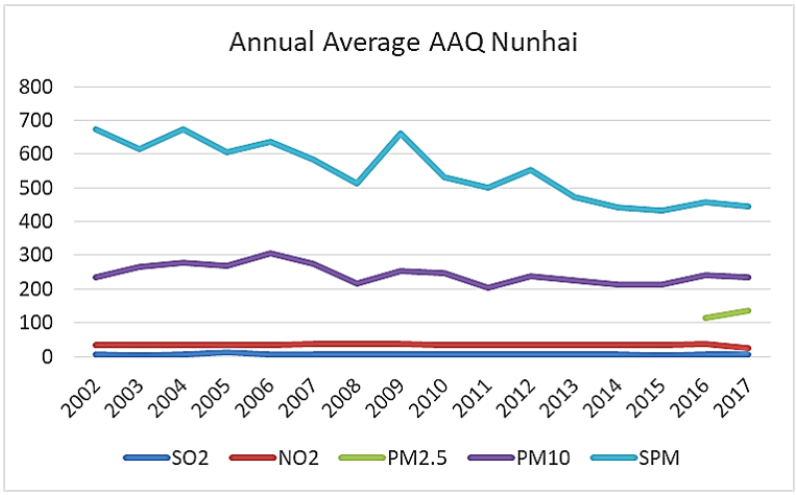
Source: http://cpcb.nic.in

Figure 2.14 Annual Average AAQ Profile Recorded at Rambagh



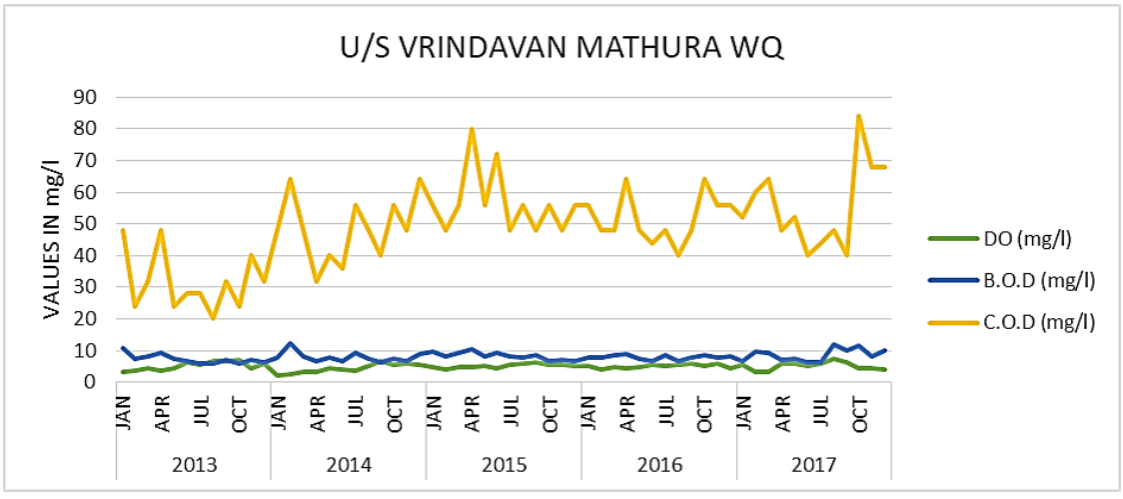
Source: http://cpcb.nic.in

Figure 2.15 Annual Average AAQ Profile Recorded at Nunhai



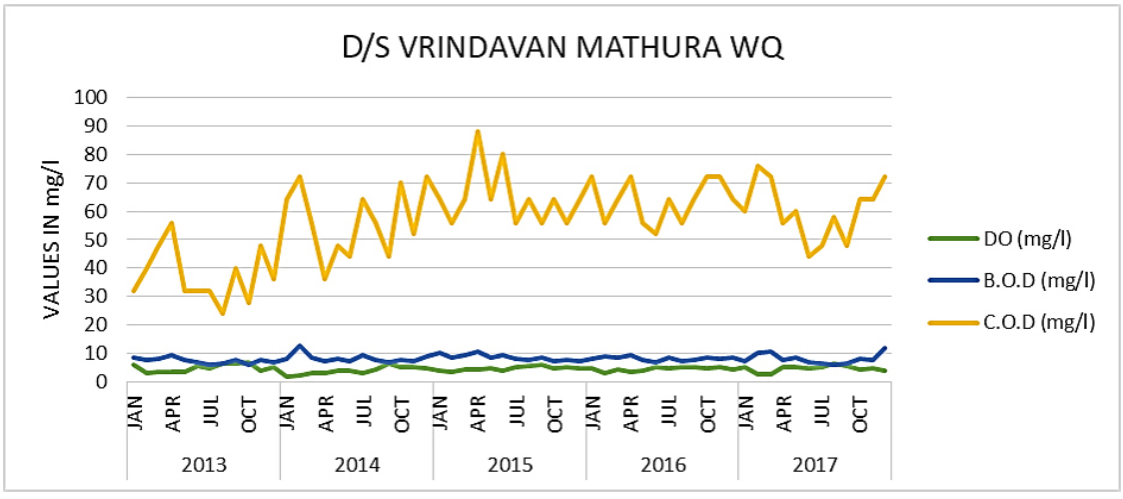
Source: http://cpcb.nic.in

Figure 2.16 Upstream WQ Profile Recorded at Vrindavan



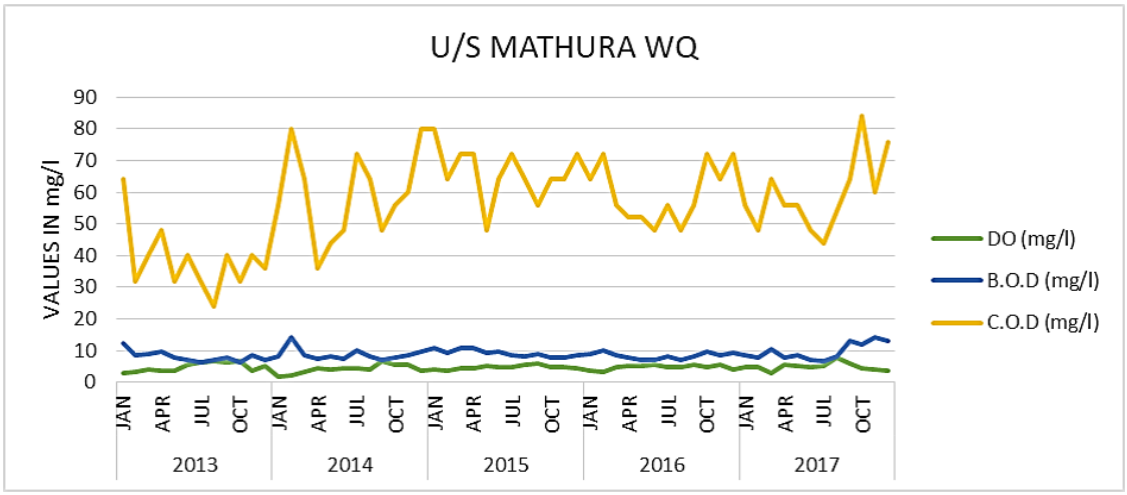
Source: http://cpcb.nic.in

Figure 2.17 Downstream WQ Profile Recorded at Vrindavan



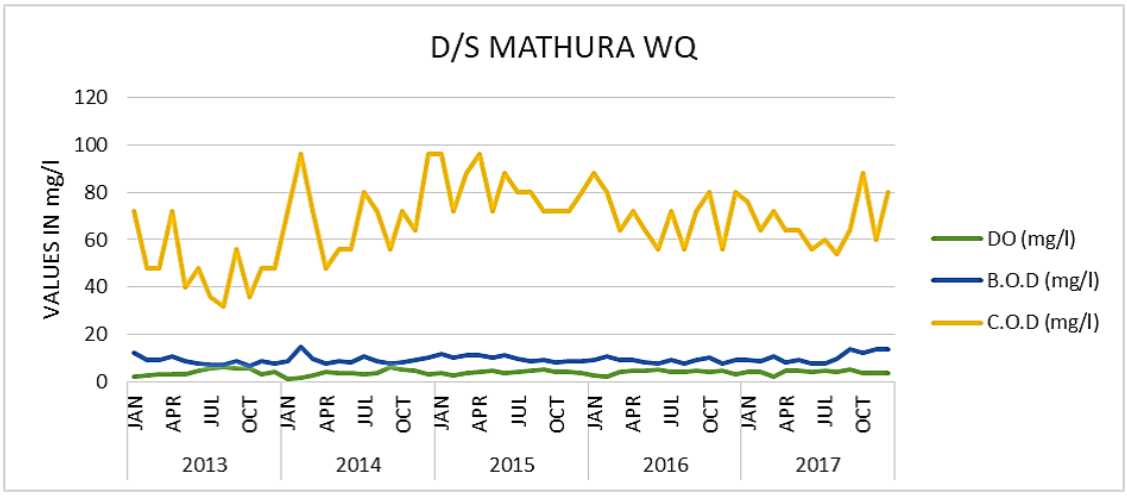
Source: UPPCB

Figure 2.18 Upstream WQ Profile Recorded at Mathura



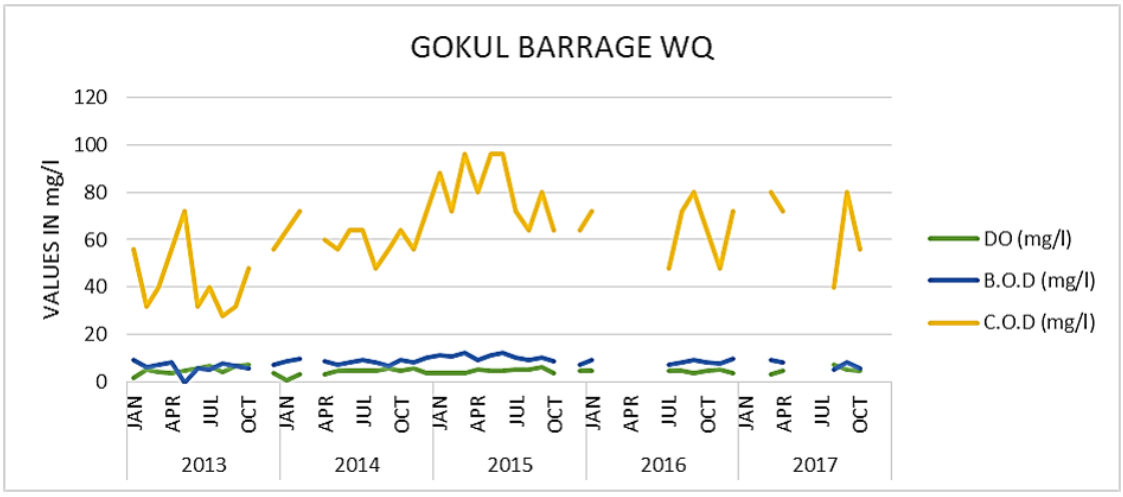
Source: UPPCB

Figure 2.19 Downstream WQ Profile Recorded at Mathura



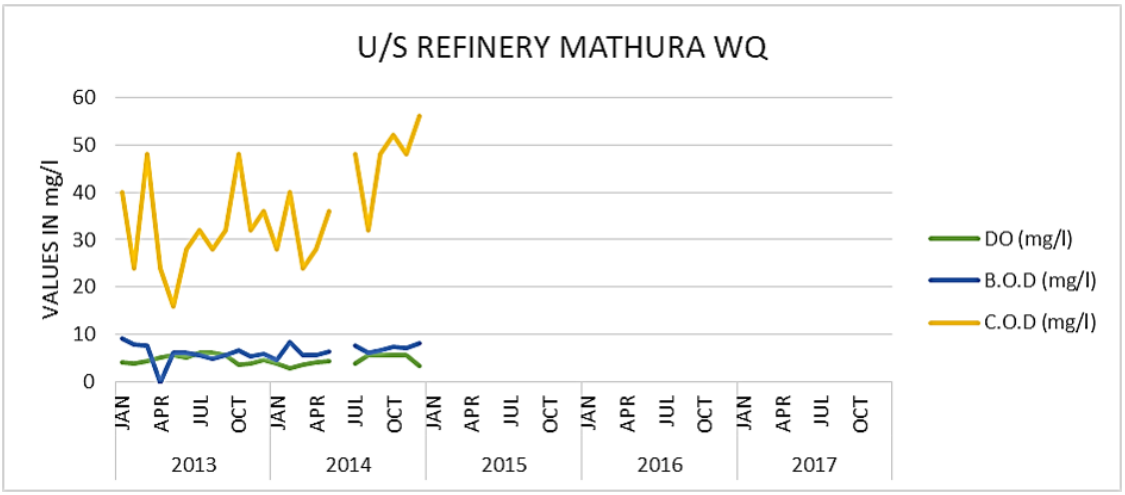
Source: UPPCB

Figure 2.20 Upstream WQ Profile Recorded at Gokul Barrage



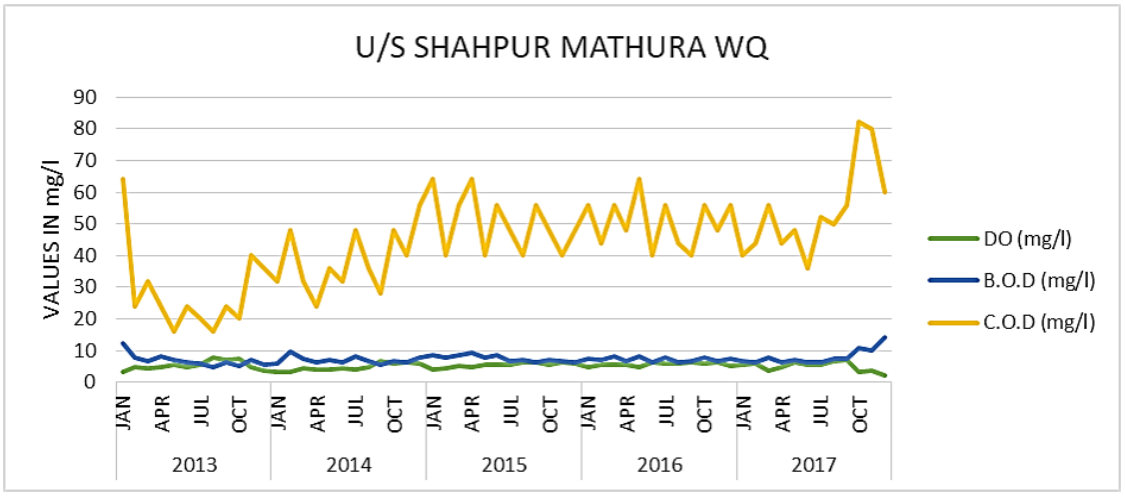
Source: UPPCB

Figure 2.21 Upstream WQ Profile Recorded at Mathura Refinery



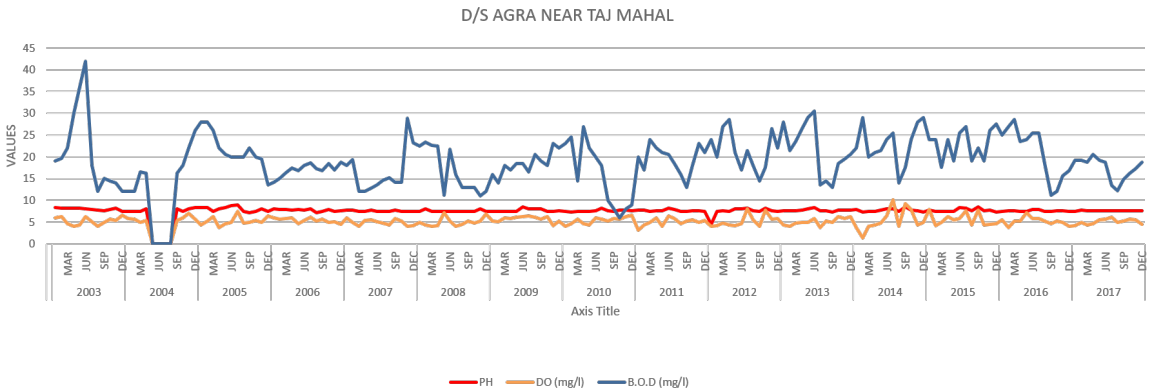
Source: UPPCB

Figure 2.22 Upstream WQ Profile Recorded at Shahpur



Source: UPPCB

Figure 2.23 Downstream WQ Profile Recorded at Agra



Source: UPPCB

Table 2.4 Status of Sewerage Network in the TTZ

Area	Pop. in Lakhs (2001)	Waste water generation, 2010 (MLD)	Sewerage Coverage	Sewered Districts	No. of STP Quantity, MLD					
					Total	O (Operational)	NOP (Non Operational)	UC (Under Construction)	NRCP (Sanctioned under NRCP for GAP and YAPs)	TF (Treatment Route)
Agra	12.42	260*	17	8	5(144) 3 under YAP I & 2 under YAP II	3 (90.25)		1(40)	1(14)	UASB, OP
Mathura	2.99	50		25	7	2(28) 2 under YAP I	2(28)			WSP
Vrindavan	1	8	na	na	2(9.5) 2 under NRCP	2(4.5)	1(0.5)		2(4.5)	OP
Firozabad	3.97	67 (2001)	na	na	nil	nil				nil
Fatehpur Sikri	0.288	3.2	na	na	nil	nil				nil
Bharatpur	2.05	23	na	na	nil	nil				nil

Source: UPPCB; CPCB Report 2013 (NOTE: Assumed @140 litres per capita day as water consumption and 80% as waste water generation. + Wastewater generation in 2010. *Estimated value is 240 MLD calculated at above assumption. However recent data indicates 260 MLD based on CPCB report, 2013,

UASB- Upflow Anaerobic Sludge Blanket; OP – Oxidation Pond; WSP – Waste Stabilization Pond.)

UPJN has reported that at present the percentage of sewerage connection has increased in recent years with Agra (30%), Mathuhra (40%), Vrindavan (90%), Firozabad (25%) and also the nunmber of STPs have increased since 2013.

2.12.4 Proposed Projects on Sewerage System

Agra

A project is proposed for interceptions and diversion of drains falling in river Yamuna (3 STPS of total capcity of 166 MLD costing Rs. 856.00 Crore is undedr Namami Gange Project. Another project for laying of sewerage network (Rs. 394.00 Crore) has been proposed under AMRUT programme.

Mathura and Vrindavan

In Mathura, under Namami Gange Programme, a project is sanctioned (for network., I&D Works and STP) costing Rs. 460.45 Crore. In Vrndavan, a project for rising main, upgradation and renovation of old SPS, STP costing Rs. 30.00 Crore has been

sanctioned under Namami Gange.

Firozabad

In Firozabad, sewer system of 160 km has been laid with STP (under constrtuction) under the JNNURM programme at a cost of Rs. 8692.00 lakhs.

Under UIDSSMT (already spent 167.74 crore) STP work is already in progress by UP Jal Nigam, Firozabad.

Bharatpur

Proposals for laying of sewer lines and construction of STP in Gopal Nagla Village were submitted and District Office has issued "No Objection Certificate" for the STP construction last year. There are no protected areas, wetlands, mangroves or estuaries at the project sites.

Fatehpur Sikri

There are no proposals for laying the sewerage system in Fatehpur Sikri.

2.12.5 Storm water Management in the TTZ

The storm water network designed in the TTZ is inadequate and most of the drains are natural drains which usually collect domestic and industrial effluents and run off during precipitation. However, during the last 2 decades, increase in population has resulted in increased discharge into these drains. The number of natural drains in the respective urban agglomeration.

Table 2.5 Status of Sewage Management Systems and Treated Effluent Quality in TTZ

Area	STPs Name	Capacity, MLD	Treatment Type	Existing FLow, MLD	pH	BOD (mg/l)	COD (mg/l)
Agra	Burhi Ka Nagla	2.25	OP	2.25	6.8-7.85	27-29	232-240
	Peela Khar	10	OP	8	6.9-7.89	25-29	232-256
	Dhandupura	78	UASB, FP	50	7-7.69	27-29	218-248
240 (Total) - 90.25 (Treated) = 150.75 MLD (Untreated)							
Mathura	Masani	13.59	OP	13.5	7.4-7.6	54-64	296-328
	Bangali Ghat	14.5	WSP	13.5	7.2-7.6	56-68	312-328
50 (Total) - 28.09 (Treated) = 21.98 MLD (Untreated)							
Vrindavan	Kali Deh	0.5	OP	NOP	6.3-7.3	60-180	432-752
	Pagal Baba Mandir	4	OP	8	6.3-7.2	52-175	352-752
8 (Total) - 4.5 (Treated) = 3.5MLD (Untreated)							

Source: R.O., Pollution Control Board, UPPCB; CPCB Report 2013 (Effluent Management System: ANP –Anaerobic ponds; FP – Facultative ponds; UASB – Up-flow Anaerobic Sludge Blanket; PP - Polishing ponds; NOP- Non Operationall)

All the storm water drains in the TTZ finally discharge into Yamuna River. Large parts of the urban agglomeration comprising residential and commercial areas are bereft of sewer network, particularly in Agra, Mathura and Vrindavan leading to discharge into the storm water drains. Discharge of solid waste into the storm water drains results in choking of the storm water drains leading to water logging, stench and groundwater pollution. The situation also aggravates growth of aquatic weeds and disease causing vectors (mosquito). The storm water drainage system in TTZ area is in a very bad condition. The system comprises of natural and man-made drains that the ultimately discharge surface run off and waste water generated in the TTZ. The quality of water flowing in the drains located in Mathura. The water quality status of Agra, Vrindavan, Firozabad, Fatehpur Sikri and Bharatpur are not available.

Table 2.6 Status of Storm Water Network in the TTZ

Area	No. of Natural Drains	Storm Water Coverage in the UA, Hectares
Agra	20	17730.68
Mathura	19	2707.12
Vrindavan	18	na
Firozabad	2	na

Source: SWDP, Agra City, UPJN, 2011; CDP of Mathura-Vrindavan, JNNURM-NPP, 2006

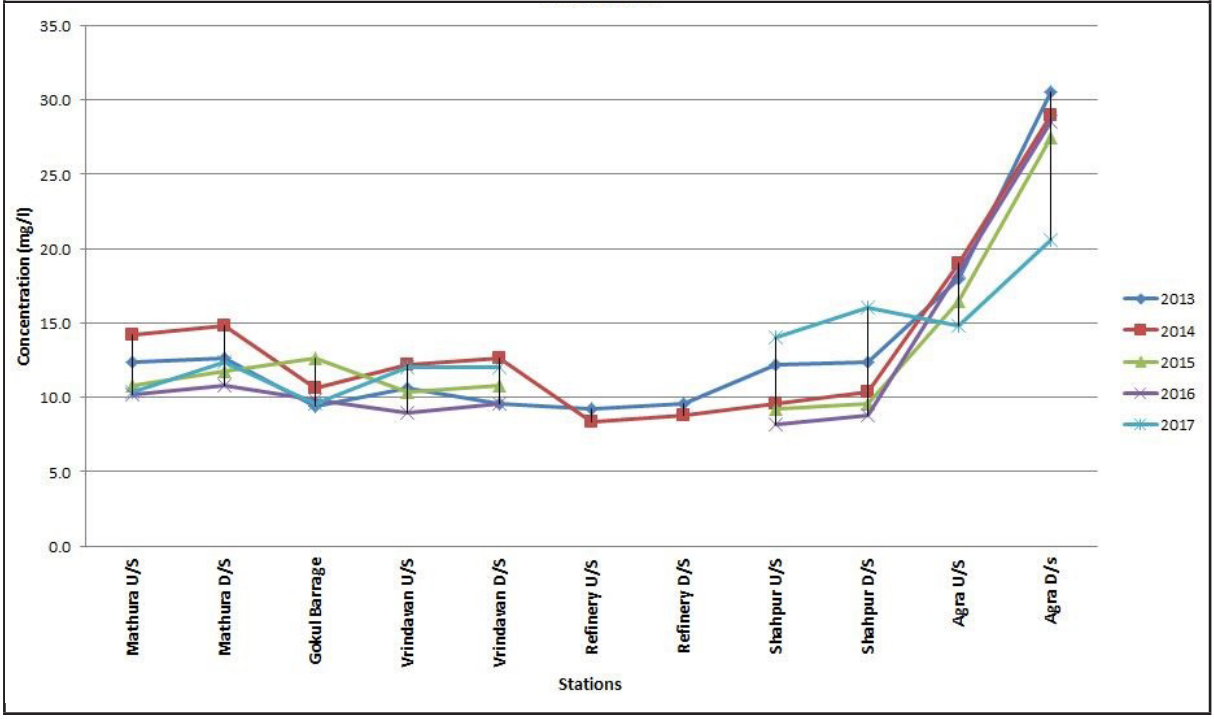
As per the status of the sewage management system reported by UPJN, 286 MLD of waste water is generated in the city of Agra. 29 Nallas are tapped, 25 SPS has been constructed, 582 km of sewerage line has been constructed and 9 STPs with capacity of 220.75 MLD has been commissioned. At present 143 MLD of waste water is treated. Work for coverage of household sewerage connection is under progress and we can see that nearly 50% of waste water is untreated which ultimately gets drained into Yamuna River. The functional capacity of the STPs should be maximized or new STPs should be identified. Techniques such as constructed wetlands can be brought up since a large portion of area within TTZ falls under agricultural land and such initiatives can help in water demand for irrigation purposes and also for ground water recharge.

Table 2.7 Water Quality Status of Drains in Mathura in TTZ

Drains in Mathura	Parameters, mg/l					
	pH	DO	BOD	COD	TDS	CL
Goochi Drain	6.3-8.1	4.6-6.8	13-36	40-288		
Goverdhan Drain	6.3-7.3		24-40	96-492		
Mansi Ganga Goverdhan	6.2-9.1	1.7-7.8	16-6	12 -80		148-240
Refinery Drains	6.1-7.5	7.4	18-42	72-288	1840	

Source: UPPCB

Figure 2.24 Longitudinal profile of B.O.D. Concentration from 2012-2017



Source: UPPCB

Important Observations:

- B.O.D values are exceeding the desired quality from 2013-2017 as they show an increasing trend.
- B.O.D value varies between 4.8 to 36 mg/l from 2013 to 2017. B.O.D level exceeded the desirable criteria from Mathura U/S to Agra D/S.
- B.O.D level remains constant from the stretch Mathura up to Agra U/S. However, downstream of Agra the water quality is degraded to a very high extent due to the discharge of untreated waste water inflow from Agra City and non-availability of considerable dilution effect.
- The longitudinal profile of B.O.D reflects that the water quality of river is in deteriorated condition between Mathura to Agra.

The stretch of river from Delhi is excessively polluted with the discharges of waste water from domestic and industrial sources through 14 major drains from urban areas of Delhi. Another reason of pollution in the river is the over-exploitation of fresh water from the river which is essentially required to maintain self-purification capacity of the river.

Non-conforming data regarding Air Quality among the administration can lead to mis-leading outcomes.

2.13 Waste

2.13.1 Solid Waste Management in TTZ Area

Type of Waste:

Solid waste generated in TTZ zone can be broadly classified into three categories:

- Municipal solid waste
- Industrial solid waste
- Biomedical waste

There are also miscellaneous wastes like food processing waste and construction and demolition waste.

Solid Waste

- 1316 workers in 70 wards in Mathura.
- 170 MT waste is collected /day and disposed to Nangla Kolu.

Solid Waste Management Processing Plant

- Due to some reason company has stopped working since 11.09.2014 and arbitration case is pending, with advance date 04.08.2018. The Municipal Corporation has made plans for door to door collection and disposal of Solid Waste as per SWM rules, 2016.
- In order of proposal and Uttar Pradesh Government Town Development Section-7 Number 1056/9-7-18-28(Lucknow) / 18 in the order of date 15th July, 2018, the proceedings of restricted polythene seizure / penalty etc. are being continued.

Plastic waste to fuel plant

- The corporation has contracted with the firm Patterson Energy India Limited, Chennai, to enable the plastic waste to be disposed of in a scientific manner.
- The work of the above plant will be completed by October 2018.
- After that plastic processing will be started.
- Nagar Nigam has passed proposal of making Mathura-Vrindavan area a plastic free zone.
- A total of 4240 cleaning workers are being provided with cleaning facility in 100 wards by the municipal corporation in Agra city and Decantation of municipal solid waste through 293 vehicles. Apart from this, the work of Door-to-Door Garbage collection by Agra Municipal Corporation is being done through 5 Agencies.

Table 2.8 Solid Waste Management in Agra

Sl. No.	Zone/ Area Name	Agency Name	Household Coverage	Current Status	Percentage
1	Hari Parbat Zone	Om Motor Construction	60058	43489	72.41
2	Taj Ganj Zone	Arava Associate	40530	32120	79.24
3	Lohamandi Shetra	S.R.Map Technology	43331	9219	21.28
4	Shahganj Shetra	Society For Education & Welfare For All	44007	10354	23.53
5	Chatta Zone	Spaak Brasan	78970	40876	51.76

Source: Agra Nagar Nigam

The collection of Door-to-Dry waste collection in 100 words will be completed by 31.12 18.

For the disposal 500 TPD Solid Waste from Agra city with the approval of the government for the generation of electricity, contract with SPARC Brihan Pvt. Ltd. was expired on date 06.10.2017. Proposal for the operation of the plant is already presented on 12.02.2018. The TTJ committee has forwarded with its recommendation for non-objection to the Ministry of Environment, Forest Climate Change Government of India. In relation to the above, Director, Niti Ayog was also directed to set up the plant during Agra excursion on 12.13.18.

Waste to energy plant.

A project is also under implementation for making compost from the flowers used in various temples and wedding spots in the city.

2.13.2 Existing Status of Municipal Solid Waste Management in TTZ Area

Previous dump site in Shahdara, Agra is being capped. The plantation and greening activity of this site is proposed with the help of CSR funds.

Agra

Agra has an area of 141 sq.m. which falls under the jurisdiction of Agra Nagar Nigam. At present, as reported about 708 tpd of MSW is generated in Agra. Agra Nagar Nigam (ANN) is the nodal agency which looks after overall MSW management.

Main Observation in Agra:

- For solid waste management purpose, the city is divided into 19 sanitary wards.
- Each ward is headed by a sanitary inspector
- The waste is temporarily dumped at a specified area. The previous dumpsite at Shahdara is no longer in use.
- A sanitary landfill site along with composting facility has been developed at Kuberpur. The site is located at approximately 16 km from Nagar Nigam

Table 2.9 Quantity and Characteristics of MSW in Agra

Waste Characteristics	Quantity Generated (tpd)	Percent of Total Waste
Recyclable	150	21
Organic matter including Petha waste	311	44
Construction debris	114	16
Mixed waste drain slit and street sweepings	133	19
Total	708	100

Source: Adapted from DPR (Revised) prepared by Regional Centre for Urban Development, Government of India, University of Lucknow, Lucknow

MSW Management at Mathura

Urban population of Mathura (as per 2011 census) is 349336. Assuming a per capita waste generation of 0.4 kg/day (average value estimated for Indian cities), the estimated quantity of MSW is 140 tpd. At present, at Mathura disposal of MSW is practised in Laxminagar area of Nimgaon in a non-scientific manner. The practice is not in compliance with the guidelines of MSW Rules. As reported, Mathura Nagar Waste Processing Co. (P) Ltd. has been entrusted with the task of establishing and operating treatment and disposal facility for MSW. Total area of land proposed is 27 acres. The capacity of proposed facility is 177 tons of MSW per day.

MSW Management at Firozabad

At Firozabad, as reported, about 130 tons of municipal solid waste is generated per day. MSW is dumped at specified low-lying areas. The disposal of waste is practiced in non-scientific manner. The practice is not in compliance with the guidelines of MSW Rules. The construction of sanitary landfill and compost facility has been proposed under JNNURM and UIDSSMT programme in Kutubpur-Chanera area to be developed by U.P. Jal Nigam

MSW Management at Bharatpur

The population of Bharatpur as per 2011 census is 252109. Assuming a per capita MSW generation of 0.4 kg/day (average value estimated for Indian cities), the waste quantity estimated is 100 tpd. Disposal of MSW is practised in non-scientific manner. The practice is not in compliance with the guidelines of MSW Rules. It has been proposed to construct a sanitary landfill and compost facility in a plot of land of area 11.92 ha on the West of Nohagaon near Achnera road.

Observation

- Most of the Municipal Solid Waste manage in a non-Scientific manner
- The practice is not in compliance with the guidelines of MSW Rules
- No one has any kind of Sanitary Landfill

- There is a lack of awareness among public

Industrial Waste Management Plan for TTZ

Industries in Agra are located in scattered areas. In some locations, clusters of industries are available. The industries are generating a considerable amount of solid waste. Uncontrolled disposal of waste poses problems like drain blockage, flies and mosquitoes breeding, bad vision and odour problem. Following measures are proposed for controlling the present situation.

- There should be a common site exclusively for Petha industries. All the dairies should also be located at one or two sites, exclusively selected for dairies. Tanneries, electroplating and shoe making industries should be accommodated at another common site if these are not household industries.
- Possibility of recycling of other industrial wastes, leather, shoe making and electroplating industries can be explored in consultation with regulatory bodies. This will reduce the load on disposal facility for the industrial wastes.
- Possibility of composting Petha and dairy waste can be explored. The product can be utilized by applying in local gardens or used for agriculture purpose.
- Hazardous waste management rules should be strictly followed during storage, transportation, treatment and disposal of hazardous waste generated from the industries. The authorized TSDF nearby should be availed by all the industries.
- All the glass industries of Firozabad should be located at one common site exclusively identified for glass industries. The waste generated from glass industries at Firozabad should be collected properly. (The decision should be taken by UP govt. Problems will arrive in locating 200 glass industries at one common sites, they are: 1. 500 acres land which is required for all glass industries is not available in one place. 2. Requirement of financial support for Land acquisition from UP govt.)
- For the shifting of Petha industry, an area has already been identified in Kalindi Vihar Yojna. As regard shifting of tanneries, electroplating units etc., there is no such need keeping in view the facts that at present there is only 01 tannery unit in Mathura which is operational at proper site. The electroplating units in Agra are proposed to be shifted to newly developed Lakhanpur industrial area.
- Regarding the recycling of industrial waste, the hazardous waste from industrial is sent to TSDF (Treatment Storage Disposal Facility) at Kanpur Dehat as per the provisions of Hazardous Waste Rule, 2016.
- Regarding composting of waste from Petha industries, it is proposed to dispose

the waste to composting process after complete shifting of petha industries to Kalindi Vihar Yojna.

- In Agra, Mathura and Firozabad there are 159 number of units identified as hazardous waste generating units under the provisions of Hazardous Waste Rule, 2016. The hazardous waste from these units is disposed of authorized TSDF facility at Kanpur Dehat.
- In Firozabad, all the glass industries are located in industrial land use. Therefore, cause of relocating these industries does not arise because shifting of industries to a different location in the same district would not bring any change. Moreover, relocation of the industries has to be voluntary as per the Relocation Policy. The relocation of industrial cluster is a long drawn process and has not proved successful in India on the basis of past experiences.

Biomedical Waste Management Plan for TTZ

Biomedical waste management is an area which needs special attention in Agra and other towns under TTZ. The following measures are proposed for improvement of the situation.

Biomedical Waste Management for Agra

- Many hospitals, nursing homes have not developed proper biomedical management facilities. The tasks of collection, segregation and storing of waste, which are the duties and responsibilities of the hospitals, are not executed properly. It is necessary to develop appropriate facilities in all the hospitals and operate properly as per the guidelines of Biomedical Waste Management Rules, 2016.
- In Agra total bio medical waste generation is assessed at approximately 2142 kg/day. There is one Common Bio Medical Waste Treatment Facility operated by M/s JRR Waste Management Pvt. Ltd. At Edmatpur, Agra. The facility equipped with Incinerator, Hydro Clave and Shredder. The common facility has proper affluent treatment plant (ETP) and Air Pollution Control System (APCS). At present, 916 health care facilities are the members providing their waste for disposal. The CBWTF at Agra has been found to be compliant in the Joint Inspection of UPPCB and CPCB on 13th July 2018.
- All the health care facilities should comply with the provisions of biomedical waste rules 2016 and should provide segregated waste to the biomedical waste treatment facility.
- In Mathura, total Bio-medical Waste generation is assessed at approximately 954 kg/day. There is 01 Common Bio-medical Waste Treatment Facility (CBWTF)

operated by M/s. Common Bio-medical Waste Agency, Neemgaon, Maath, district Mathura. The facility is equipped with Incinerator, Hydro-clave and shredder. The common facility has proper effluent treatment plant and air pollution control systems. At present 475 HCFs are the members providing their waste for treatment and disposal.

- In Firozabad, total Bio-medical Waste generation is assessed at approximately 422 kg/day as per latest inventory. Bio-medical waste generated in Firozabad is being treated and disposed by CBWTF situated in Agra.
- Bio-Medical waste Agency, Mathura is collecting and transporting the bio-waste generating in Hathras.
- JRR company, Agra is also collecting bio-waste from some private clinics.
- Under Hospital Waste Management, health department is disposing solid hospital waste through common waste treatment facility in each district. For liquid biomedical waste at present one STP is functional in Combined Hospital, Vrindavan. For district male and female hospital Agra, district hospital Firozabad and District hospital Mainpuri STPs are proposed through UP Health System Strengthening Project (UPHSSP).
- Under quality assurance programme UPHSSP, five hospital have been awarded entry level NABH Certification under NHM programme. All district level hospitals working for having NQAS Certification.
- At Bharatpur, Mathura and Firozabad, quality of biomedical waste management services is yet to be improved. The common treatment facility of Agra is not availed by some hospitals. The management status of the some individual hospitals is also far from satisfactory. It is required to develop proper management systems in all the hospitals. Moreover, all hospitals should avail the common biomedical waste management facility. More authorized treatment and disposal facilities can be established to cater to the needs of all hospitals, if required.

2.14 Climate Change

As per the projections, mentioned in Uttar Pradesh State Action Plan for Climate Change, 2014; annual rainfall is predicted to increase by 15% to 20% in the 2050's as compared to the baseline and the increase is higher towards 2080's (25% to 35%). Inter annual variability is higher towards 2080's. There is also predicted increase in maximum temperature 1.8^0 C to 2.1^0 C during that period. The state has formulated action plan for seven missions

(1) Sustainable agriculture mission

(2) Solar Mission

(3) Energy Efficiency Mission

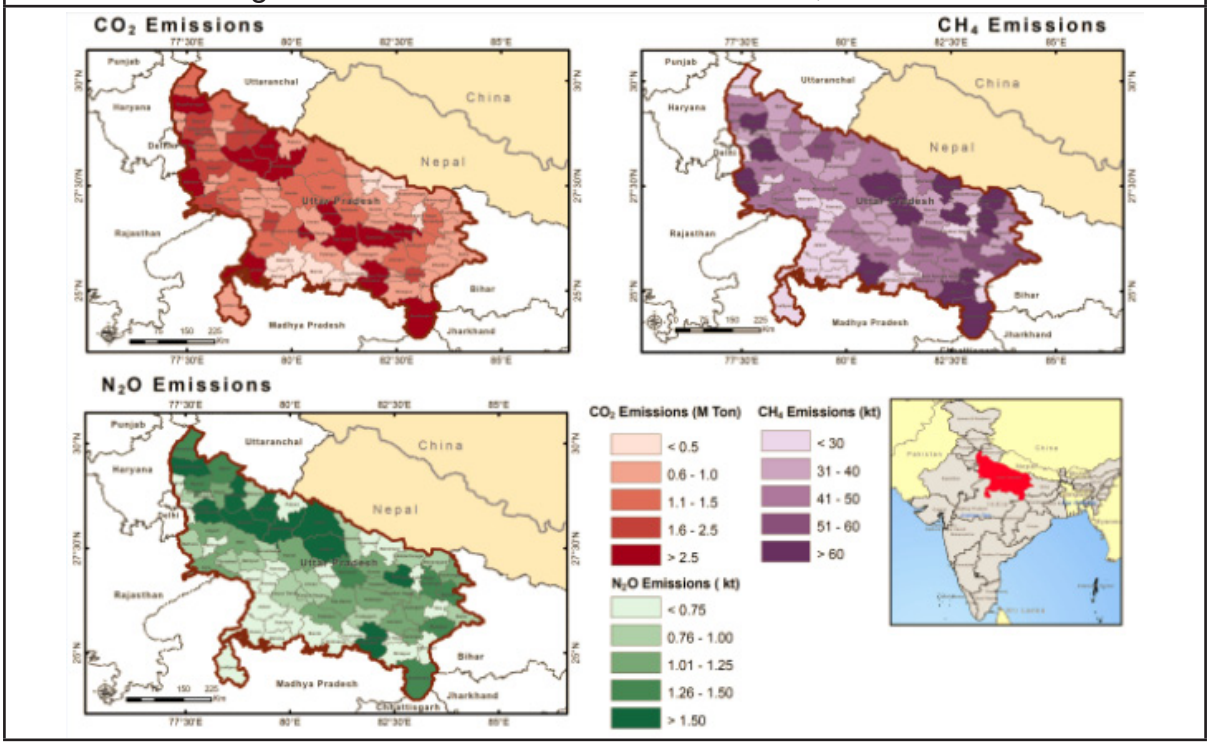
(4) Green UP Forestry Mission

(5) Jal Mission

(6) Strategic Knowledge Mission

(7) Sustainable Habitat Mission.

Figure 2.25 District Level GHG Emissions, 2005-2006

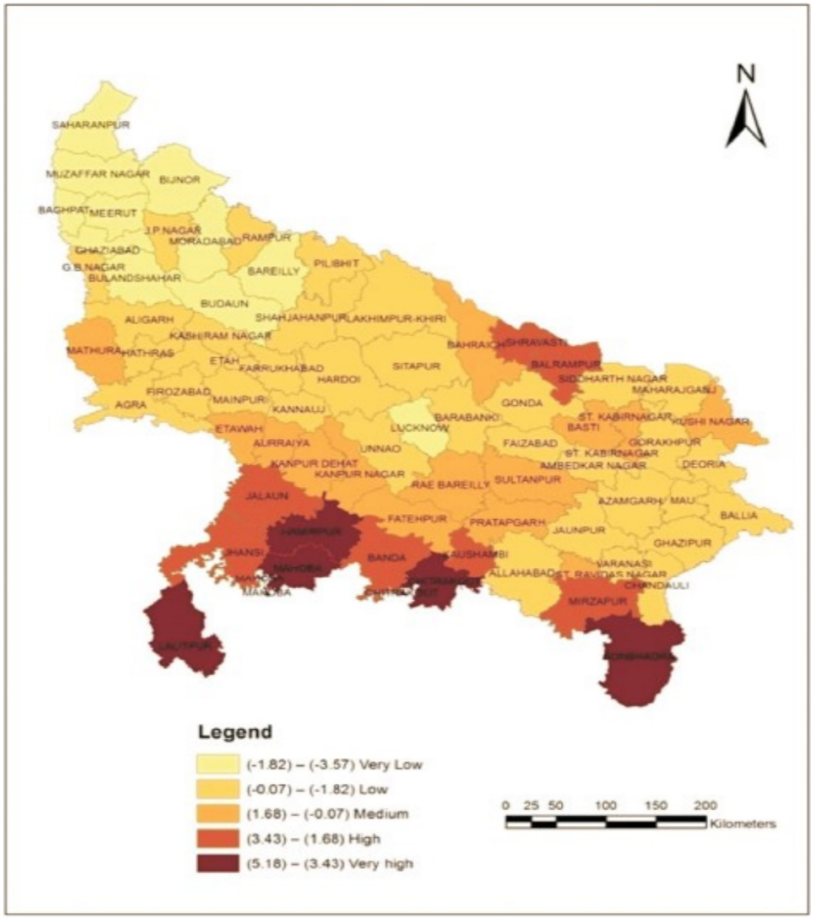


Source: Uttar Pradesh State Action Plan for Climate Change, 2014, pg. 51

About 68% of GHG emissions from Uttar Pradesh come from energy category. This category includes emissions due to fossil fuel and biomass burning within power plants, manufacturing industries, transport sector and residential sector. Ammonia and aluminium production as well as limestone consumption are the major source of industrial process and product use emissions. Agriculture sector contributes about 77% and 88% of CH_4 and N_2O emissions of the state. Majority of CH_4 emissions occur from enteric fermentation of livestock (50%) followed by rice cultivation (19%) and biomass burning (10%). While majority of N_2O emissions occur from application of synthetic nitrogenous fertilizer (56%) followed by decaying of crop residues left on field (13%) and indirect emissions from soil (13%). Municipal solid waste and domestic waste water treatment contribute about 3% and 2% to CH_4 and N_2O emissions of the state respectively.[14]

14 Uttar Pradesh State Action Plan for Climate Change, 2014, pg 50

Figure 2.26 District Wise combined Climate Vulnerability Index, 2005-2006



Source: Uttar Pradesh State Action Plan for Climate Change, 2014, pg. 46

The state has covered 93 priorities under seven missions detailed in its Action Plan. Mainstreaming climate change agenda in the policy and planning at the state level is still in a formative stage which requires to be mainstreamed. Mainstreaming requires not only cross-cutting policy approach but also both horizontal and vertical integration and systemic scrutiny to avoid duplication of effort.

2.15 Disaster Management

Floods, Droughts, Fires and Earthquakes are the major disasters faced by the State Loss of life and property from these disasters, especially the former three, are in terms of hundreds of crores of rupees annually.[15] The Disaster Management Plan of Agra District address the disaster preparedness parameters. Disasters faced by this region have been mainly floods and drought which have not been severe. However as per predictions related with the climate change induced disasters the intensity of these are to rise. Coupled with this the rising levels of pollution in water bodies, ground water

15 http://upsdma.up.nic.in/stateprofile.htm; accessed on 1st November, 2018

and heat spells spread of diseases could take a disastrous scale.

Agra District

The district faces a number of hazards, like Earthquake, Hailstorm, Flood, Fire, Accidents, LPG cylinder blast, Chemical and Industrial Accidents, Terrorism and Epidemics, which pose the threat of disaster.)

Earthquake

Agra falls in high risk seismic zone III and corresponds to MSK intensity VII, making it prone to Earthquakes. The existence of the Great Boundary Fault near Jalesar, dense urban population and weak structures in old Agra city make it highly vulnerable to seismic hazards. Although no major earthquake has occurred in Agra in recent years, yet tremors have been felt whenever there is an earthquake in the NCR. The NCR has fairly seismicity with general occurrence of earthquakes of 5-6 magnitude, a few of magnitude 6-7 and occasional incident of 7.5-8.0 magnitude shocks.

North part of Bharatpur belongs to High damage risk zone IV and southern part of the district belongs to Moderate damage risk zone III, with VII-VII(6.0 - 6.9)and VI-VII (5.0 - 5.9) Intensity.

Hailstorm

Hailstorm affects the UP state as most of its economy is based on agriculture. In the year 2015-16, 73 districts of the state faced severe crop loss due to hailstorm. All the five districts are affected by the hailstorm.

Drought

Entire Vindhya & Bundelkhand region in UP is traditionally prone to drought. The factors that are responsible are exogenous in character and dependency on agriculture and allied livelihood is so high that even a small and seasonal change in weather component can create adverse impact on rural populace and force them to borrowing from moneylenders or banks.

In Uttar Pradesh usually from 1st June to 30 September normal monsoon rainfall occurs. Normal average rainfall of the whole state from 1st June to 30th Sep should be 829.8 M.M. but this year it is only 443.7 M.M which is only 53.5% of the expected average rainfall of this duration. In 16 districts rainfall has been recorded at less than 40% i.e. Scanty category, whereas in 33 districts it is in between 40% to 60% i.e. highly Deficient category. There are 20 Districts in the category of deficient rainfall. Only 6 districts of Uttar Pradesh have rainfall in category of excess or normal. The situation got worsen due to long dry spells.

Table 2.10 District wise detail of rainfall in the State from 1st June to 30 September 2015

Status	District	Normal Rainfall (mm)	Total Rainfall (mm)	%age to its Normal
60-80% i.e., Deficient	Firozabad	584.3	435.1	74.5
	Mathura	518.7	371.3	71.6
40-60% i.e., Highly Deficient	Hathras	579.5	275.3	47.5
	Etah	612.1	285.3	46.6
Below 40% i.e., Scanty	Agra	584.3	208	35.6

Source: State Disaster Plan UP, 2017

Adverse topography, Insufficient and highly erratic rainfall, Rapid industrialization, urbanization and withdrawal of huge ground water are leading factors for the occurrence of Drought in Agra district. The monsoon months from July to September see about 67 cm (27 inches) of rainfall annually. Adjoining Rajasthan, the Tehsils of Kiravali and Kheragarh are the worst affected from drought. The water level in wells of these Tehsils recedes down beyond 80-90 feet which results in scarcity of drinking water. Kiravali experiences warm and dry westerly winds from Rajasthan in the summers. Jagner is a hilly part of Kheragadh which experiences chronic droughts. Tehsils Bah and Fatehabad are affected by irregular terrain and ravines. Tehsil Sadar and Etmadpur are also badly affected by receding groundwater in summers.

Floods

Floods are main natural disaster the State experiences every year. South west Monsoon rainfall during the months of June to September is the main cause for triggering floods when rainfall happens to be in excess than the normal.

There are 8 village in Mathura Tehsil,15 in Matt tehsil and 5 village in Mahavan tehsil which are belongs to high flood zone effected area.

The Yamuna - The Yamuna flows perennially and drains all the tehsils except Kheragadh .The number of villages affected by floods of the Yamuna are-

Table 2.11 Villages affected by floods of the River Yamuna

Sl. No.	Name of Tehsil	No. of Villages
1	Sadar	37
2	Bah	33
3	Etmadpur	18
4	Fatehabad	26
5	Kiravali	04
Total		118

Source: State Disaster Plan UP, 2017

Utangatan River - Floods are caused - a) due to Torrential rains, or b) because there is heavy discharge of water or a breach of Bandhs – Ajaan, Khanua and Chiksana

in Rajasthan that wreak havoc and aggravate the situation in U.P. The number of villages affected by floods in the Utangatan are-

Table 2.12 Villages affected by floods of the River Utangatan

Sl. No.	Name of Tehsil	No. of Villages
1	Bah	12
2	Kheragarh	22
3	Fatehabad	30
4	Kiravali	02
Total		66

Source: State Disaster Plan UP, 2017

Kiwad River- This River affects 22 villages of Jagner area of Kheragadh.

Khari River - After originating from Terah Mori Dam in Fatehpur Sikari, this River ultimately joins the Utangatan River near borders of Kheragadh and Fatehabad.

Because of a breach in Chiksana Bandh in Bharatpur, the years 1978 and 1996 witnessed heavy floods in Kiravali that inundated a number of villages. The number of villages affected by floods in the Khari are-

Table 2.13 Villages affected by floods of the River Khari

Sl. No.	Name of Tehsil	No. of Villages
1	Sadar	106
2	Kheragarh	49
3	Etmadpur	17
4	Fatehabad	13
5	Kiravali	81
Total		266

Source: State Disaster Plan UP, 2017

Bharatpur

Major portions of Bharatpur districts falling under the basin of River Banganga, and the basins of River Ghaggar in Sriganganagar are prone to floods. The reasons for flooding in these regions include: Excess rain in the catchment, sudden release of large quantities of water from Dams/ water reservoirs, breach/ damage in major reservoirs/ dams and limited holding capacity and above normal annual rainfall causes floods in different parts of the district.

3. PROFILE OF TTZ

3.1 Regional Level

3.1.1 Introduction

The Taj Trapezium Zone (TTZ) is a 10,400 sq. km area around the Taj Mahal, comprising of five districts of Uttar Pradesh and parts of two districts of Rajasthan. The TTZ has been declared as an “Air Pollution Protected Area” (MoEF, GoI in 1983), as a strategy to protect and conserve the Taj Mahal, a UNESCO world heritage site, from potential damage due to air pollution.

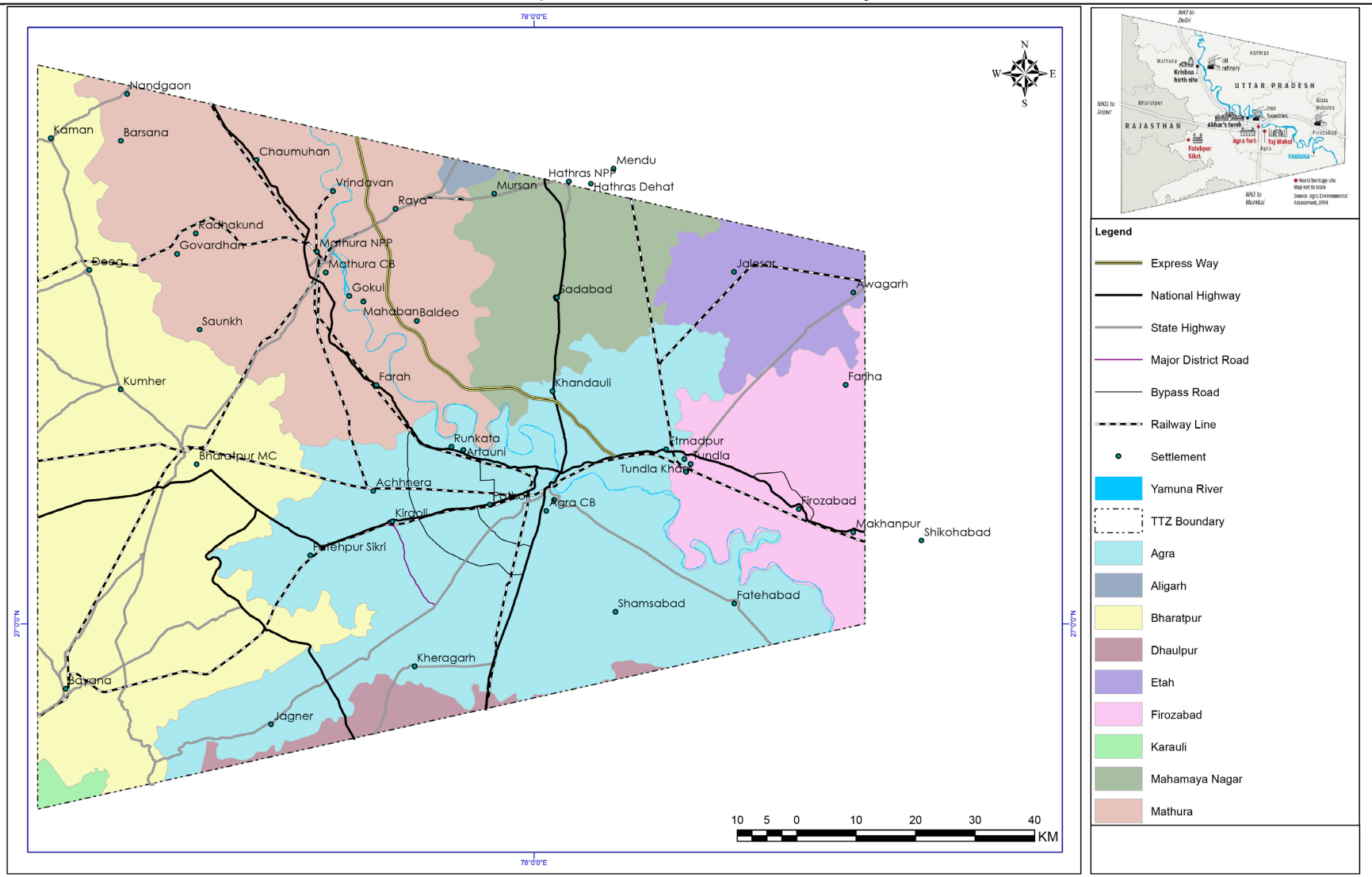
The TTZ comprises of about 40 protected monuments including three World Heritage Sites - the Taj Mahal, Agra Fort and Fatehpur Sikri. The zone is dotted with numerous unprotected and unidentified heritage sites which link India to its glorious past. It is a popular tourism destination and offers huge development potentials with respect to tourism, heritage and tourism-centric economy. TTZ is so named since it is Taj Mahal specific as per location and intent and is shaped like a trapezoid.[16]

3.1.2 Location and area

The urban areas of TTZ constitute 5 Class I cities (i. Agra ii. Mathura iii. Hathras iv. Firozabad and v. Bharatpur), two Class II cities (i. Vrindavan and ii. Tundla) and two Class III Cities (i. Govardhan and ii Fatehpur Sikri) have experienced rising growth trends in the period between 2001 to 2011 (Census 2001 and 2011). These cities are expected to expand substantially by 2050. Therefore, eight cities namely, Agra, Mathura-Vrindavan, Firozabad, Hathras, Bharatpur, Tundla, Fatehpur-Sikri and Govardhan have been considered for detailed planning intervention in the TTZ region to assess urban growth and development potentials. The physical, social and infrastructural details of all chosen cities have been provided.

16 Parliament of India Rajya Sabha, Department-Related Parliamentary Standing Committee On Science & Technology, Environment & Forests, Two Hundred Sixty Second Report On Effects of Pollution on Taj, July 2015

Map 3.1 Administrative Boundary

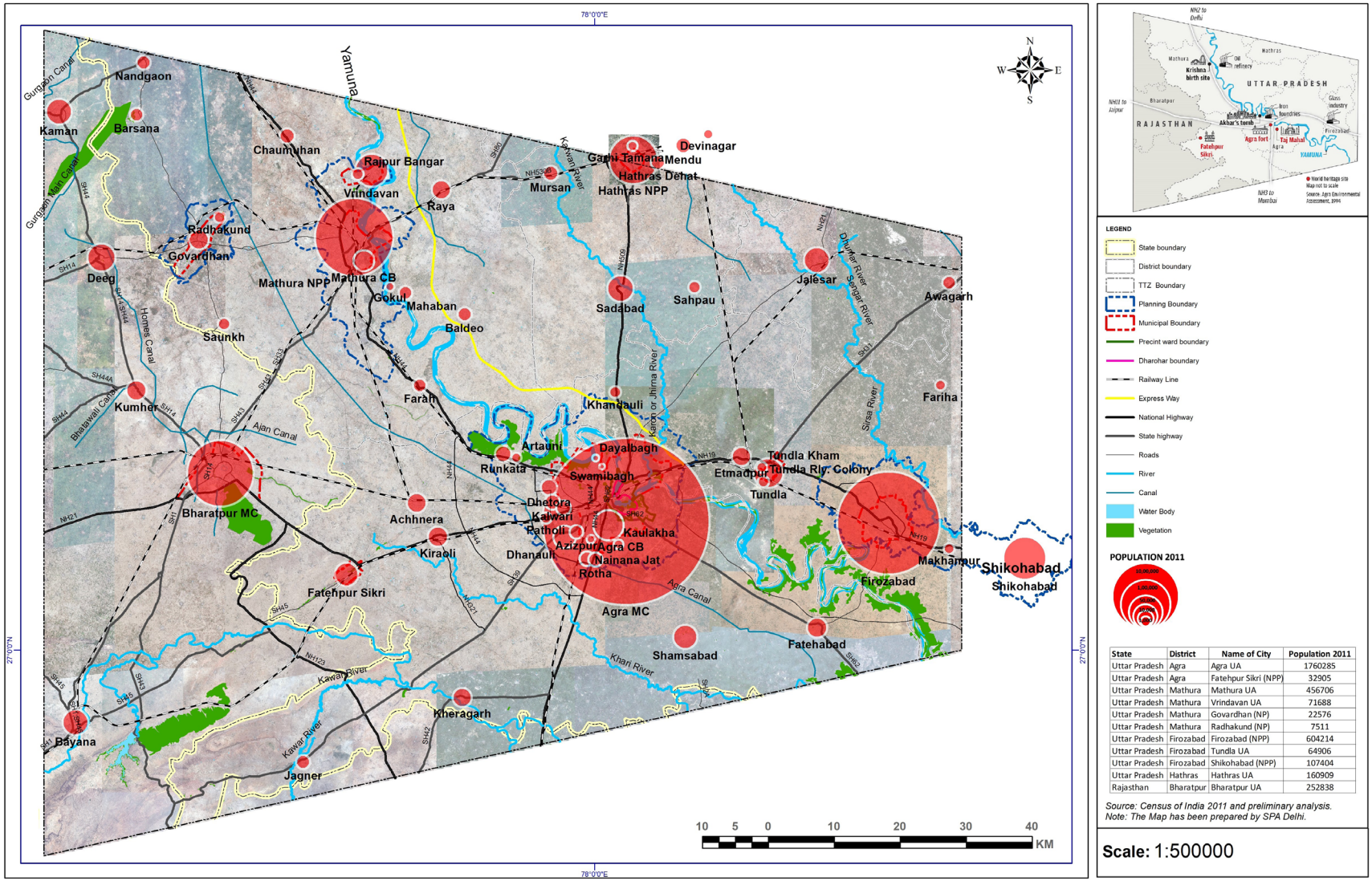


Legend

- Express Way
- National Highway
- State Highway
- Major District Road
- Bypass Road
- Railway Line
- Settlement
- Yamuna River
- TTZ Boundary
- Agra
- Aligarh
- Bharatpur
- Dhaulpur
- Etah
- Firozabad
- Karauli
- Mahamaya Nagar
- Mathura

Source: SOI Toposheet

Map 3.2 Population of TTZ, 2011



LEGEND

- State boundary
- District boundary
- TTZ Boundary
- Planning Boundary
- Municipal Boundary
- Precint ward boundary
- Dharohar boundary
- Railway Line
- Express Way
- National Highway
- State highway
- Roads
- River
- Canal
- Water Body
- Vegetation

POPULATION 2011

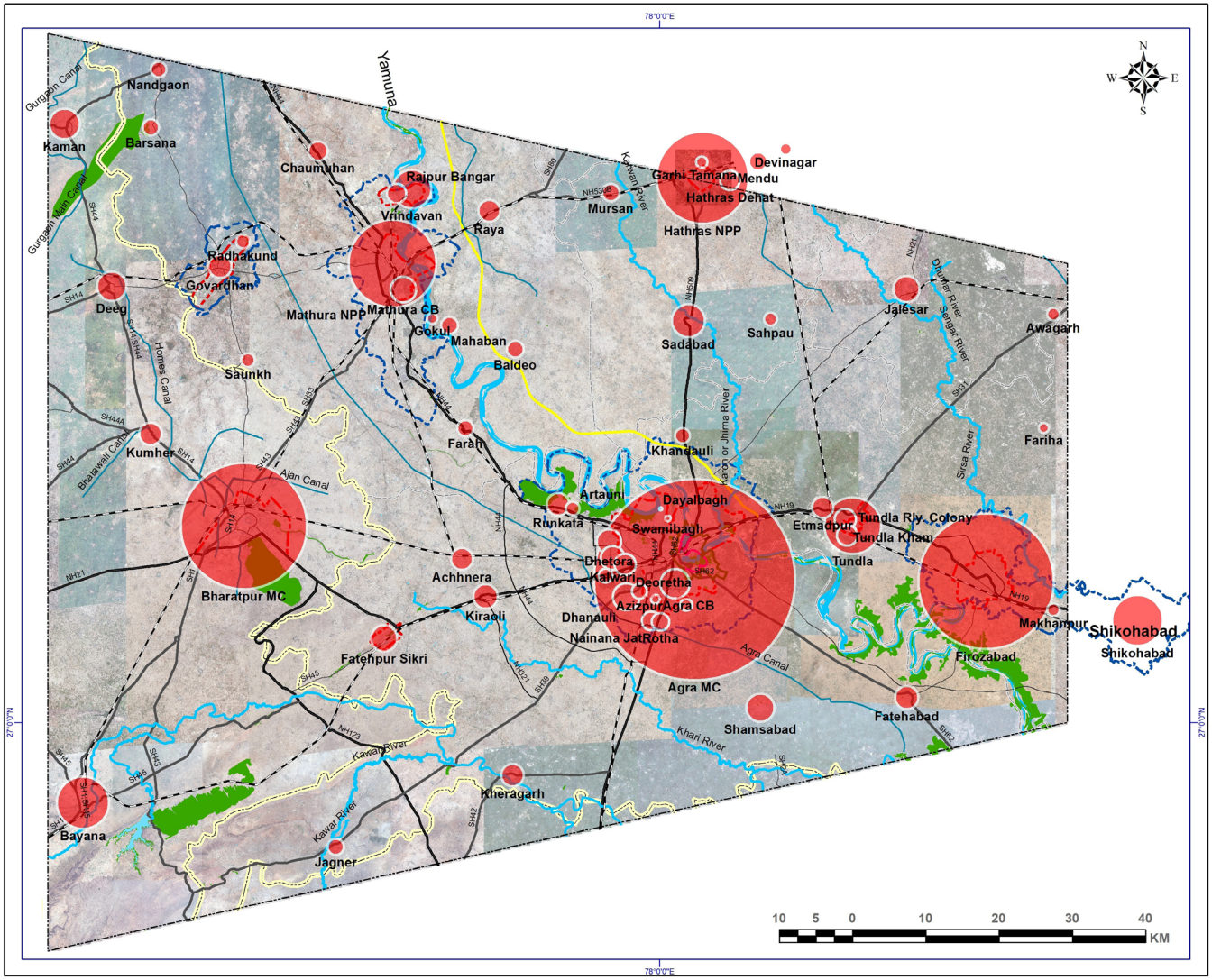
State	District	Name of City	Population 2011
Uttar Pradesh	Agra	Agra UA	1760285
Uttar Pradesh	Agra	Fatehpur Sikri (NPP)	32905
Uttar Pradesh	Mathura	Mathura UA	456706
Uttar Pradesh	Mathura	Vrindavan UA	71688
Uttar Pradesh	Mathura	Govardhan (NP)	22576
Uttar Pradesh	Mathura	Radhakund (NP)	7511
Uttar Pradesh	Firozabad	Firozabad (NPP)	604214
Uttar Pradesh	Firozabad	Tundla UA	64906
Uttar Pradesh	Firozabad	Shikohabad (NPP)	107404
Uttar Pradesh	Hathras	Hathras UA	160909
Rajasthan	Bharatpur	Bharatpur UA	252838

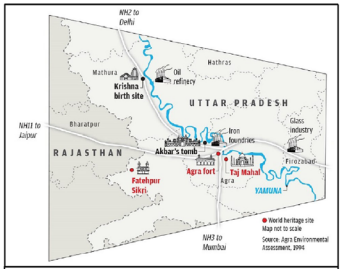
Source: Census of India 2011 and preliminary analysis.
Note: The Map has been prepared by SPA Delhi.

Scale: 1:500000

Source: Adpated from Census 2011

Map 3.3 Projected Population of TTZ, 2050





LEGEND

- State boundary
- District boundary
- TTZ Boundary
- Planning Boundary
- Municipal Boundary
- Precint ward boundary
- Dharohar boundary
- Railway Line
- Express Way
- National Highway
- State highway
- Roads
- River
- Canal
- Water Body
- Vegetation

POPULATION 2050



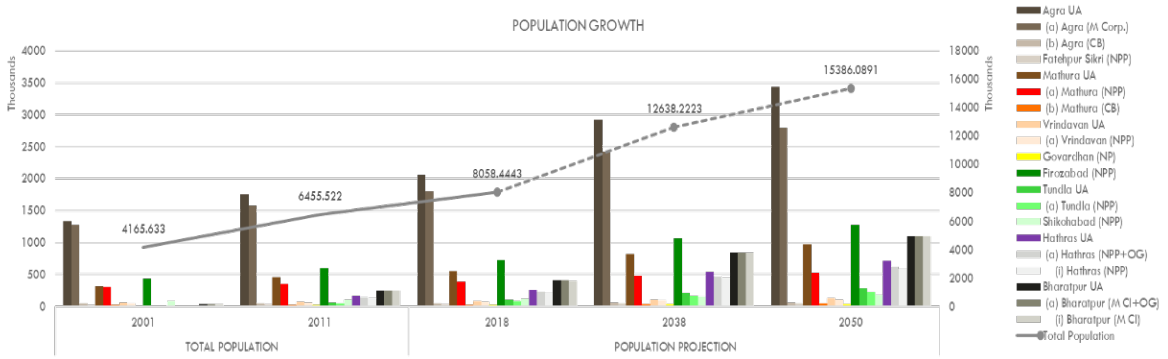
State	District	Name of City	Population 2011	Population 2050
Uttar Pradesh	Agra	Agra UA	1760285	3433174
Uttar Pradesh	Agra	Fatehpur Sikri (NPP)	32905	48899
Uttar Pradesh	Mathura	Mathura UA	456706	976931
Uttar Pradesh	Mathura	Vrindavan UA	71688	130172
Uttar Pradesh	Mathura	Govardhan (NP)	22576	38496
Uttar Pradesh	Mathura	Radhakund (NP)	7511	13669
Uttar Pradesh	Firozabad	Firozabad (NPP)	604214	1272471
Uttar Pradesh	Firozabad	Tundla UA	64906	285705
Uttar Pradesh	Firozabad	Shikohabad (NPP)	107404	182452
Uttar Pradesh	Hathras	Hathras UA	160909	711277
Rajasthan	Bharatpur	Bharatpur UA	252838	1105125

Source: Census of India 2011 and preliminary analysis.
Trend based population projection for 2050.
Note: The map has been prepared by SPA Delhi.

Scale: 1:500000

Source: Projected by SPA, Delhi

Figure 3.1 Population Growth and Projected Population based on Trend of the Selected Cities in TTZ



Source: Census 2011 and Trend based Projected Population till 2050

3.1.2.1 Mathura-Vrindavan

The twin cities of Mathura-Vrindavan is a popular pilgrimage destination, located approximately 50 kilometres north of Agra; 145 kilometres south-east of Delhi; and 22 kilometres from Govardhan at 27°29′33″N 77°40′25″E. Mathura-Vrindavan cover a geographic expanse of 7,796 ha.

3.1.2.2 Firozabad

City of Firozabad is a fast growing industrial and commercial city and is the headquarter of the western districts of Uttar Pradesh. Firozabad is located 40 km from Agra and around 240 km away from Delhi, at the northern edge of the Deccan plateau, at 27°09′N 78°24′E. Total area of Firozabad is 2,135 ha.

3.1.2.3 Hathras

City of Hathras is an ancient city associated with the epic Mahabharata. It is a Municipal Board in the newly named Hathras District (previously Hathras district), in Uttar Pradesh. It also forms a part of Aligarh Division.[17] Hathras lies within the Braj region in central or middle doab at 27.6°N 78.05°E. It is approximately 50 kms from Agra and 200 kms from Delhi. The total area of Hathras is 767 ha.

3.1.2.4 Bharatpur

City of Bharatpur is a Municipal Corporation in the Braj region of Rajasthan, famous for the Keoladeo Ghana National Park, a UNESCO world heritage site and Kaldeo Lake, a Ramsar Site. The city is located 58 km west of Agra, 38 km from Mathura and approximately 200 kms from Delhi. It is also the administrative headquarters of

17 District Census Handbook, Hathras, 2011

Bharatpur District and the headquarters of Bharatpur Division of Rajasthan. Total area of Bharatpur is 3,295 ha.

3.1.2.5 Tundla

City of Tundla is a British Heritage City and a Municipal Board in Firozabad District in Uttar Pradesh. It is located 24 km away from Agra city and 240 kms from Delhi. It is a major railway junction in the eastern railways system of India. It is a prime link between Firozabad on eastern side (17 kms) and Agra on the western side. The total area of Tundla is 350 ha.

3.1.2.6 Fatehpur Sikri

The medieval city of Fatehpur Sikri houses the Fatehpur Sikri Palace City, a widely visited UNESCO world heritage site. The city is located 240 kms south of New Delhi and 36 kms from Agra. The total area of Fatehpur Sikri is 245 ha.

3.1.2.7 Govardhan-Radhakund

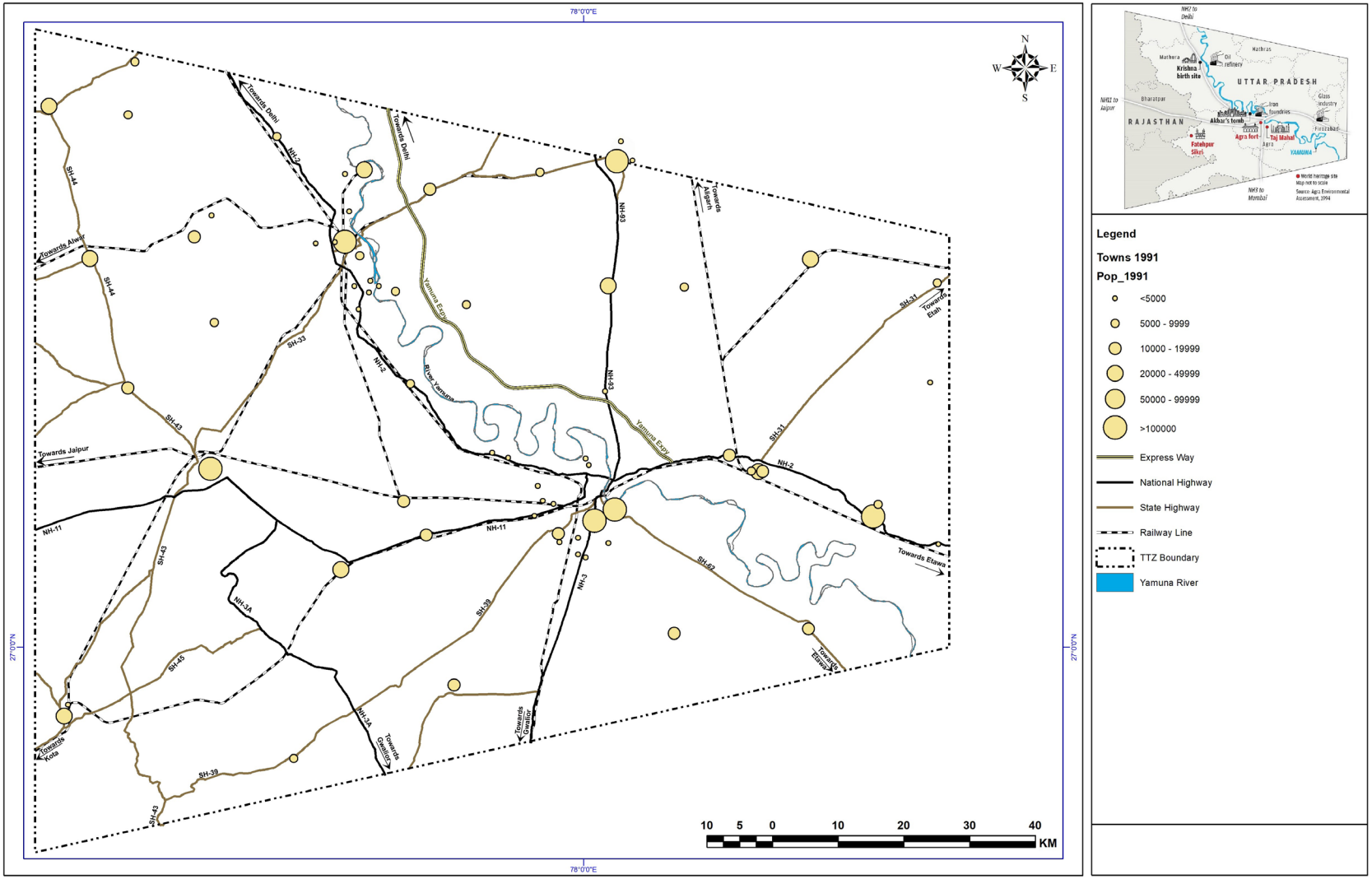
The City of Govardhan and the City of Radhakund have rich cultural and religious significance in India and famous for the Lord Krishna fame Govardhan Hill. Both cities are Nagar Panchayats in Mathura District and a part of Mathura-Vrindavan Part G zone. The cities are key pilgrimage centres located 23 Km west of Mathura, 20 Km west of Vrindavan, 200 kms away from Delhi and 90 kms away from Agra. The total area of Govardhan-Radhakund is 678 ha.

Figure 3.2 Location Map of Important Cities in TTZ with respect to Agra



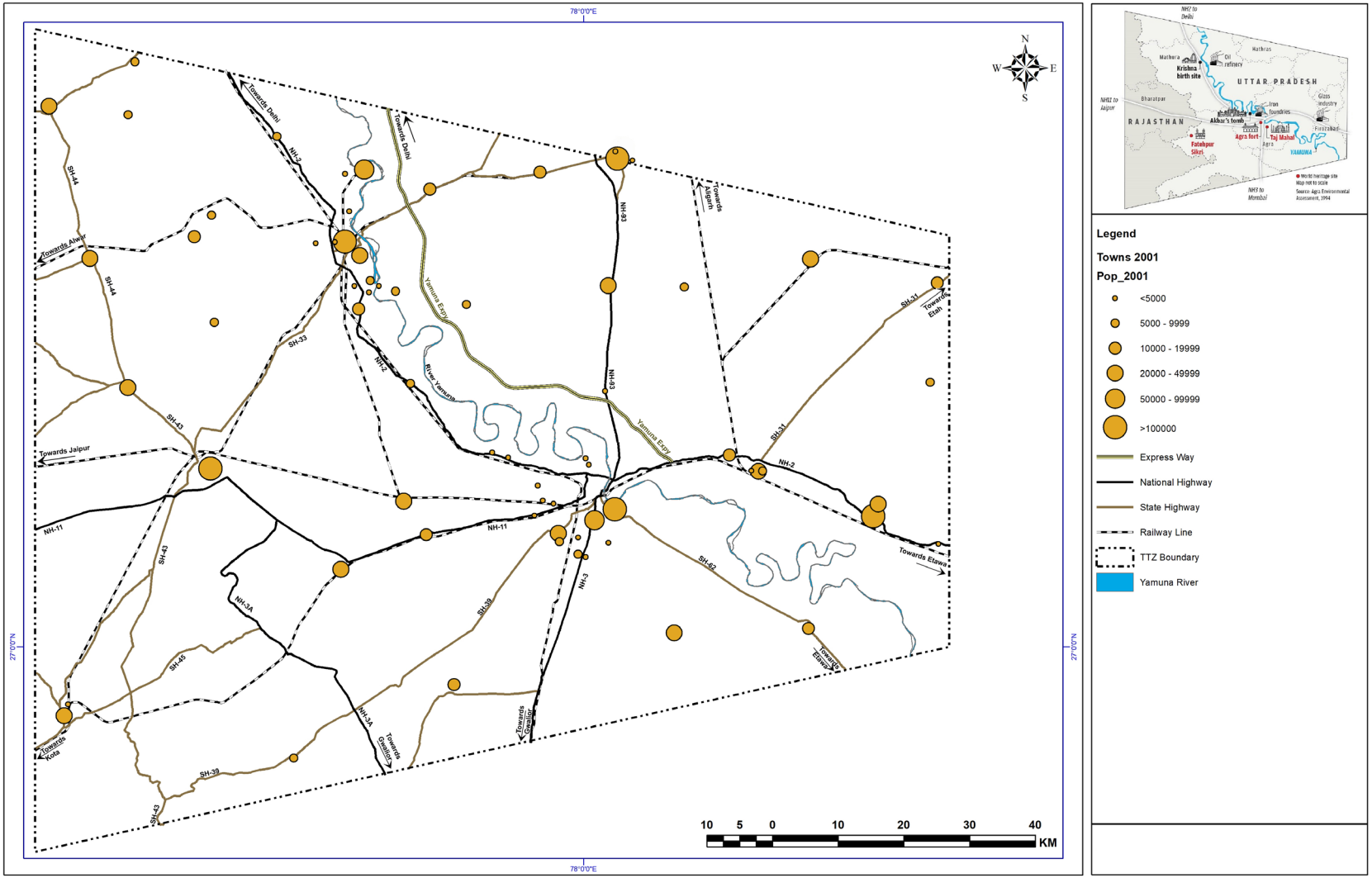
Source: Google Earth, 2018

Map 3.4 Size of Towns in 1991



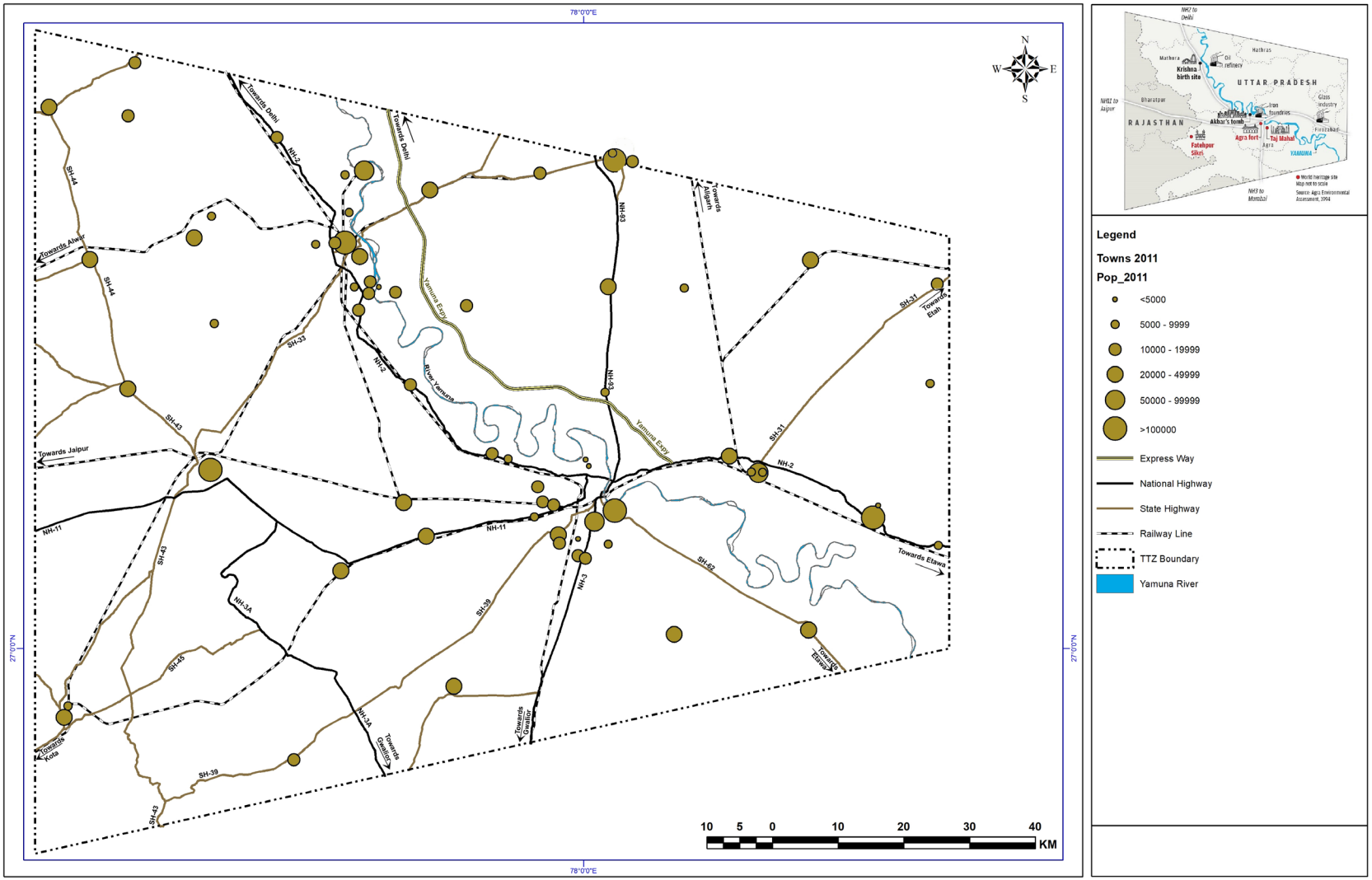
Source: Census, 1991

Map 3.5 Size of Towns in 2001



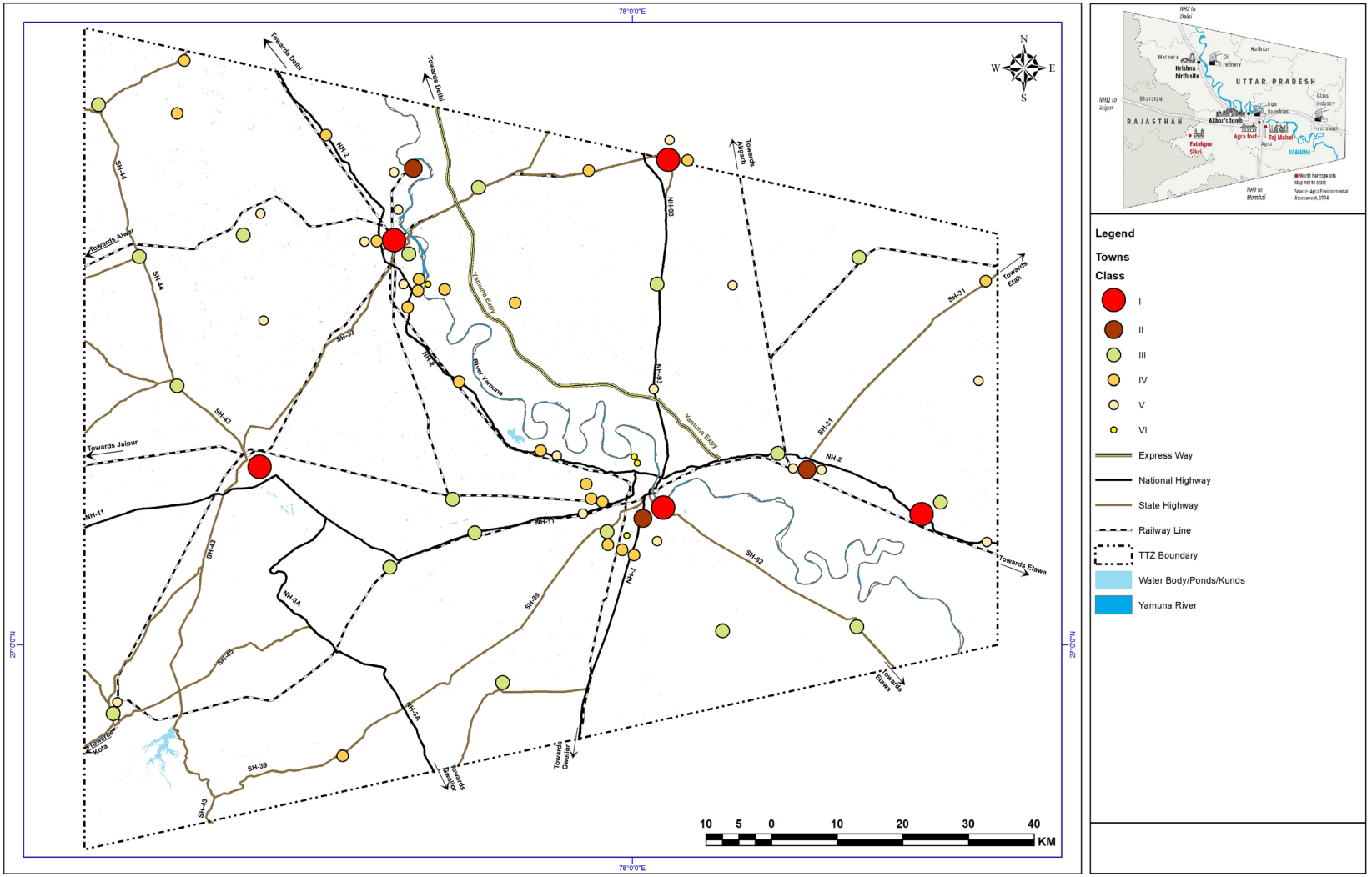
Source: Census, 2001

Map 3.6 Size of Towns in 2011



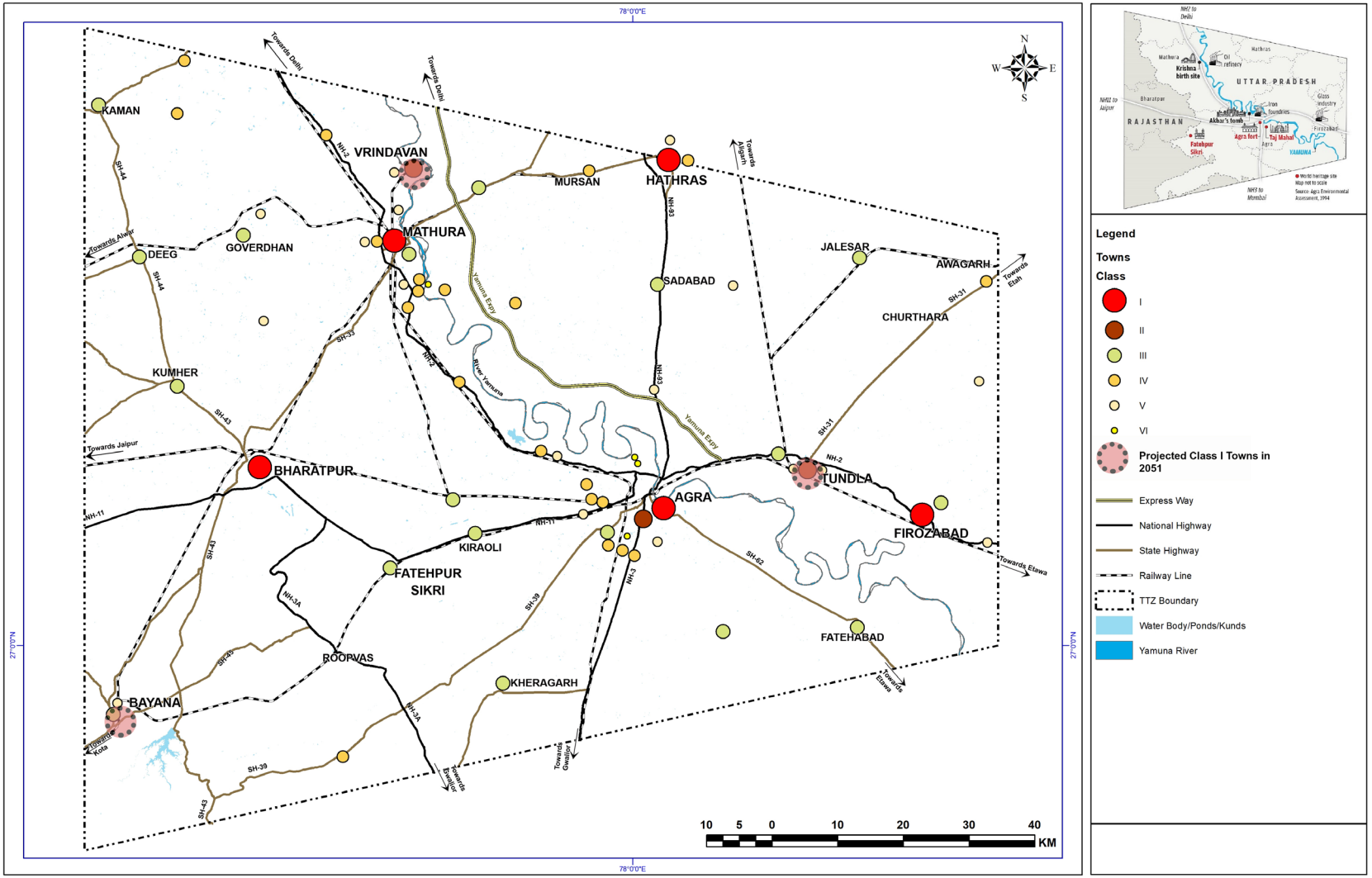
Source: Census, 2011

Map 3.7 Classes of Towns, 2011



Source: Census, 2011

Map 3.8 Projected Class I Towns in 2051

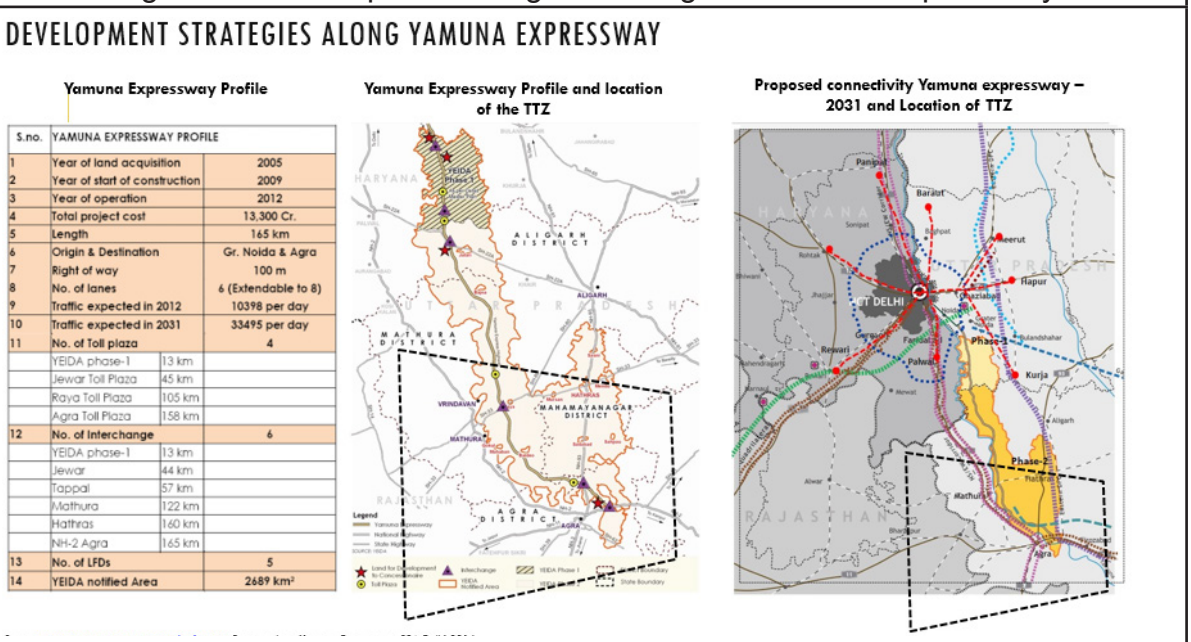


Source: Projected by SPA, Delhi

3.1.3 Development along Yamuna Expressway

One of the significant development strategies in the TTZ, is exploring the potential of the Yamuna Expressway which connects international tourist destinations of Delhi and Agra with a 165 km long, 6-8 lane, access controlled super highway corridor. The Expressway has 5 LFDs (Land of concessionaire) with facilities of 4 Toll Plazas, and 6 Interchanges along its entire length. The Yamuna Expressway Industrial Development Authority (YEIDA) notified area spans approximately 2,689 sq. km and constitutes of six districts that are planned to be developed in two phases.[18] The southern part of the expressway lies within the TTZ identified boundary

Figure 3.3 Development along TTZ along the Yamuna Expressway



S.no.	YAMUNA EXPRESSWAY PROFILE		
1	Year of land acquisition		2005
2	Year of start of construction		2009
3	Year of operation		2012
4	Total project cost		13,300 Cr.
5	Length		165 km
6	Origin & Destination		Gr. Noida & Agra
7	Right of way		100 m
8	No. of lanes		6 (Extendable to 8)
9	Traffic expected in 2012		10398 per day
10	Traffic expected in 2031		33495 per day
11	No. of Toll plaza		4
	YEIDA phase-1	13 km	
	Jewar Toll Plaza	45 km	
	Raya Toll Plaza	105 km	
	Agra Toll Plaza	158 km	
12	No. of Interchange		6
	YEIDA phase-1	13 km	
	Jewar	44 km	
	Tappal	57 km	
	Mathura	122 km	
	Hathras	160 km	
	NH-2 Agra	165 km	
13	No. of LFDs		5
14	YEIDA notified Area		2689 km²

Source: Yamuna Expressway Industrial Development Authority

3.1.4 Land-Use and Urban Sprawl

Most of the cities in the region are a result of unregulated urban growth. The growth of these cities have taken course along the expressways and the river. Residential, industrial and commercial uses are the key uses in the cities with residential and commercial taking a bigger share followed by industrial use. It has been a general observation that open spaces, parks and recreation and semi-public and public uses form a very small part of the existing land use statistics indicating inadequate social infrastructure essential for a good quality of life standards.

A common pattern observed in most of the cities selected for the Vision document analysis is that, areas in the core cities, adjacent to market centres and old settlements

18 Yamuna Expressway Industrial Development Authority Website [www. http://yamunaexpresswayauthority.com]

exhibit extreme dense residential and commercial development.

Table 3.1 Land Use Distribution of Cities in TTZ, 2018

Sl. No.	Land Use	Mathura		Vrindavan		Govardhan Radhakund		Hathras		Fatehpur Sikri		Tundla		Firozabad		Bharatpur	
		Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%
1	Residential	3499	53.68	815	63.80	318	46.87	559	72.97	121	49.58	243	69.41	1214	61.36	1885	57.21
2	Commercial	468	7.18	45	3.50	55	8.17	89	11.57	17	6.99	21	6.13	129	6.53	173	5.24
3	Industrial	1078	16.54	0	0	0	0	26	3.34	1	0.38	0	0	485	24.50	377	11.44
4	Public/ Semi-Public	159	2.44	11	0.85	59	8.76	55	7.19	2	0.96	16	4.46	26	1.31	204	6.20
5	Transport	154	2.36	5	0.38	2	0.25	10	1.34	2	1.02	0	0	1	0.05	314	9.53
6	Heritage	5	0.08	391	30.63	69	10.10	0	0	56	22.92	0	0	0	0	0	0
7	Recreational	113	1.74	0	0	14	2.10	27	3.58	3	1.40	70	20	9	0.43	189	5.72
8	Public Utilities	0	0	11	0.85	8	1.14	0	0	0	0	0	0	0	0	0	0
9	Other	1042	15.98	0	0	153	22.61	0	0	41	16.75	0	0	115	5.83	153	4.65
Total Developed		6519	100	1277	100	678	100	767	100	245	100	350	100	1979	100	3295	100

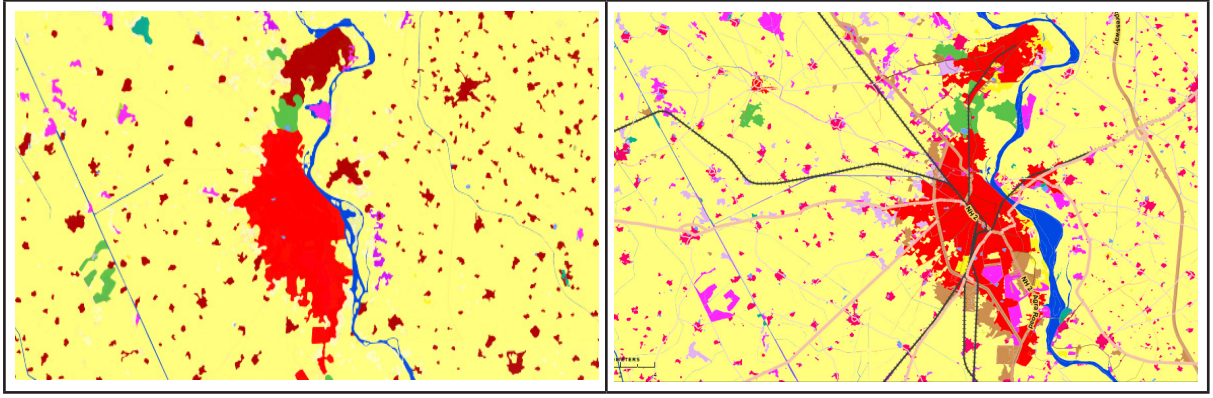
Source: Primary Survey and preliminary Analysis by SPA Delhi 2018.

Note: The land use map has been prepared by SPA Delhi to understand the growth pattern of development. Note: As per Agra Forest Department, the area of Taj Forest Block is 183.10 Ha, Acquired/ Ceiling Land is 32.936 ha and total area is 216.036 ha. Internal Road layer has been integrated with the adjacent/corresponding land use. Hence, the transportation percentage may vary on ground.

3.1.4.1 Mathura-Vrindavan

Land cover map of 2001 and 2011 from ISRO's Bhuvan Portal indicates that the City of Mathura and Vrindavan have grown along the western bank of River Yamuna. The lateral expansion is prominent towards the west and the South. A greater part of the City's growth has been concentrated in the city centre and old city areas where most of the religious heritage sites are located. In recent times the expansion has been noted across the river, along Hathras-Mathura road to the east towards the Yamuna expressway and this trend is expected to continue.

Figure 3.4 Land Use and Land Cover Change 2005 (left) and 2011 (right)



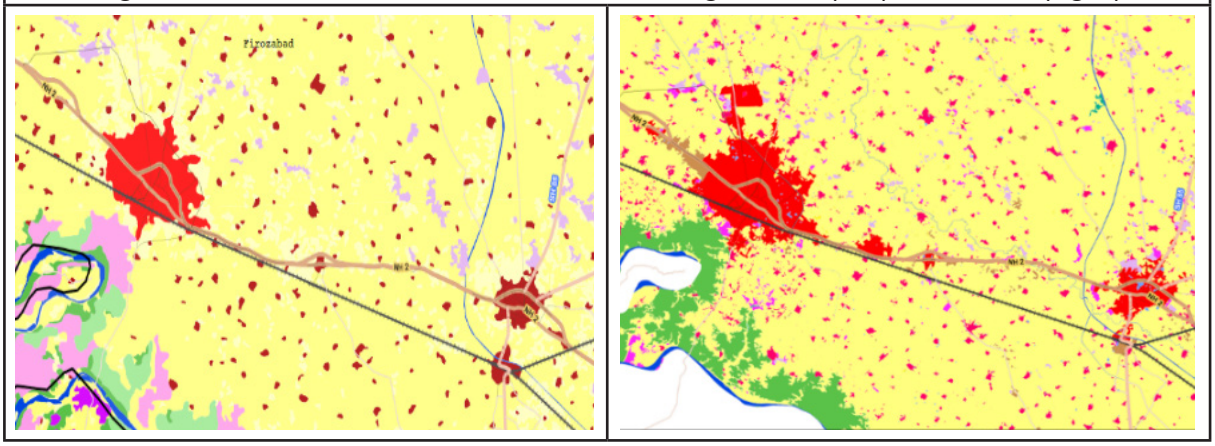
Source: Bhuvan Portal - Land cover of year 2005, 2011

3.1.4.2 Firozabad

Land cover map of 2001 and 2011 from ISRO's Bhuvan Portal indicates, major growth in the City of Firozabad has been moved towards the North along Jalesar Road, Kotla

Road and Saanti Road and towards the east along the Agra-Lucknow expressway connecting Shikohabad. Scattered growth has been rapid down south across the railway towards the river. By 2050, it is expected that Shikohabad and Firozabad will merge.

Figure 3.5 Land Use and Land Cover Change 2005 (left) and 2011 (right)

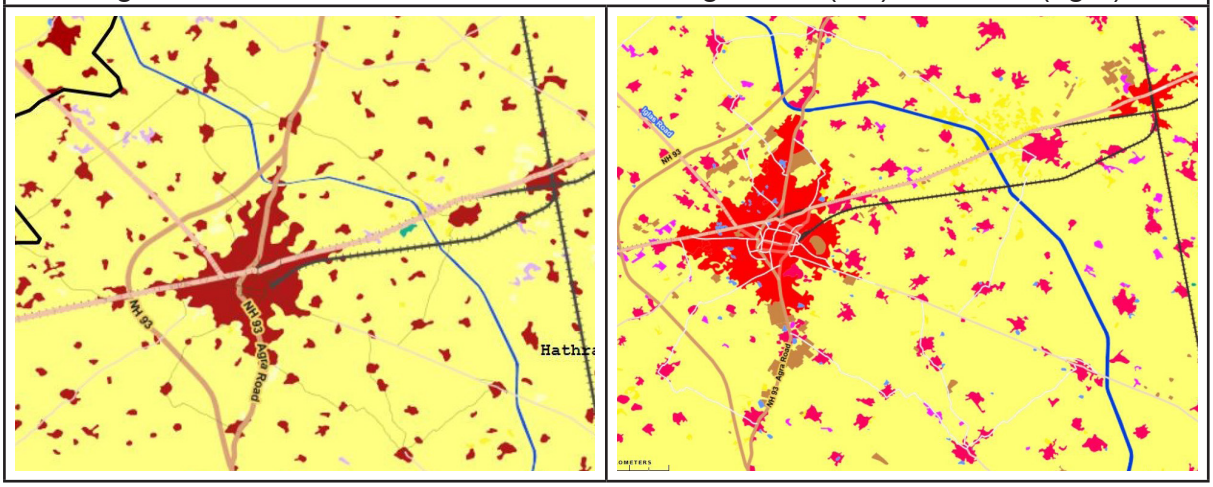


Source: Bhuvan Portal - Land cover of year 2005, 2011

3.1.4.3 Hathras

Land cover map of 2001 and 2011 from ISRO's Bhuvan Portal indicates scattered growth in the City of Hatras in all directions due to major linkages running north-south and East-West. North-South links, Agra Road and NH509 connects Agra, Aligarh and Moradabad and East-west link, Hatras-Mathura Road connects Bareilly and Mathura-Vrindavan.

Figure 3.6 Land Use and Land Cover Change 2005 (left) and 2011 (right)



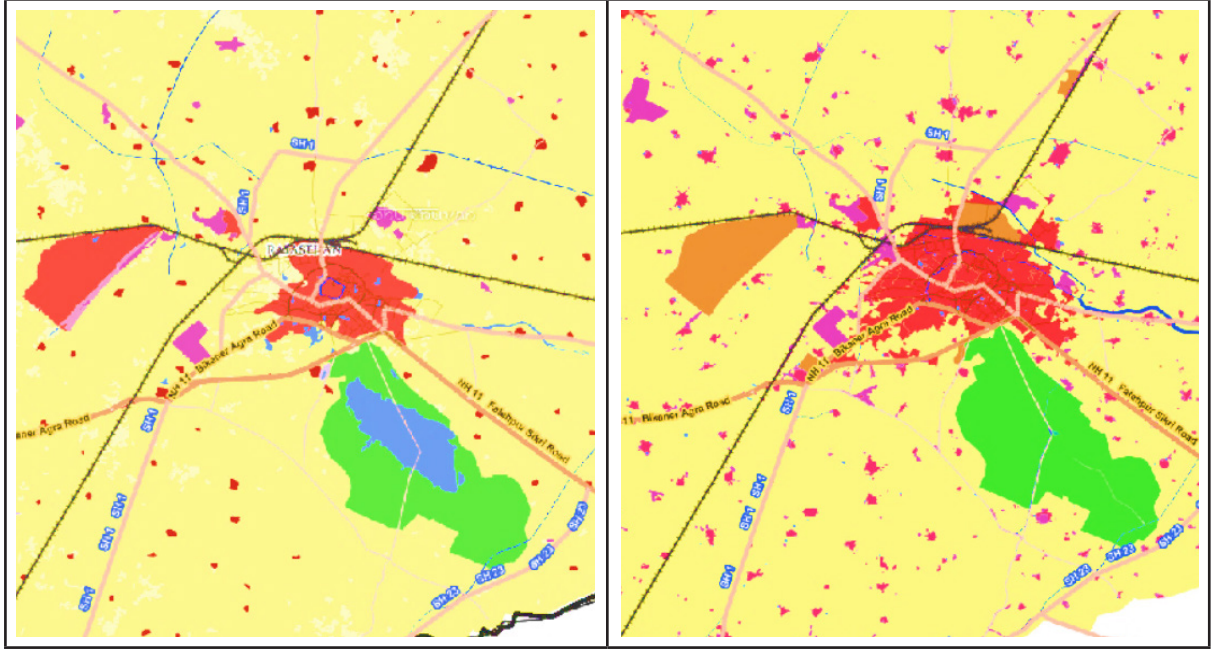
Source: Bhuvan Portal - Land cover of year 2005, 2011

3.1.4.4 Bharatpur

Land cover map of 2001 and 2011 from ISRO's Bhuvan Portal indicates that the City of Bharatpur has sprawled in all directions particularly towards southwest, south and north direction along the Bikaner- Agra road and Fatehpur Sikri Road. As per Master

Plan 2023, the city is expected to continue this trend. Growth is not expected down south towards the Kaldeo Ghana National Park due to reserved land for conservation.

Figure 3.7 Land Use and Land Cover Change 2005 (left) and 2011 (right)

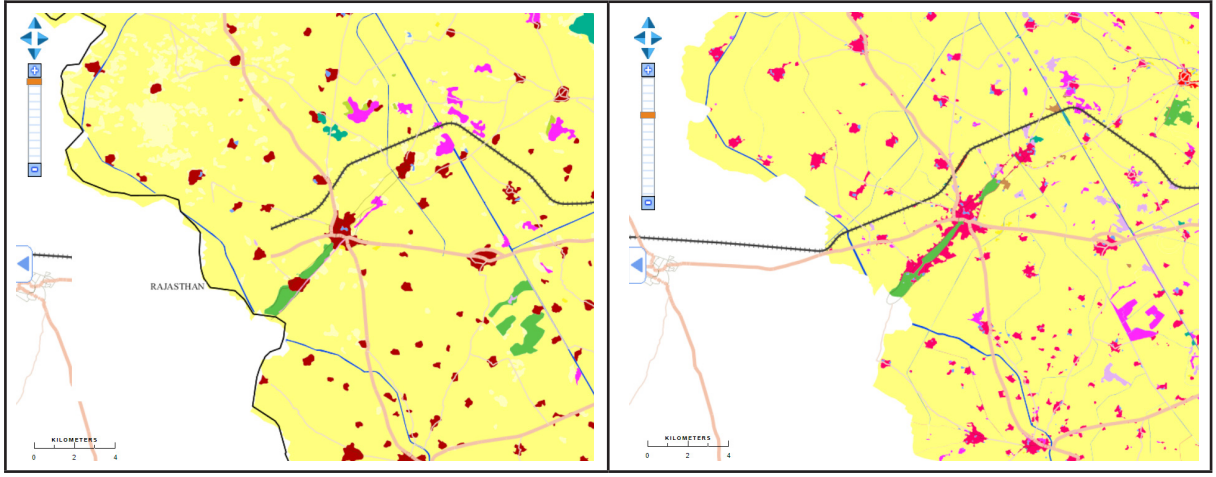


Source: Bhuvan Portal - Land cover of year 2005, 2011

3.1.4.5 Tundla

Land cover map of 2001 and 2011 from ISRO's Bhuvan Portal indicates that the City of Tundla has had a concentric growth in all directions with a leaning towards the North due to National Highway 19 and the Agra Road. A new Mandi on the Agra Road north of Tundla has been attributed to the escalated growth in that direction.

Figure 3.8 Land Use and Land Cover Change 2005 (left) and 2011 (right)



Source: Bhuvan Portal - Land cover of year 2005, 2011

3.1.4.6 Fatehpur Sikri

Land cover map of 2001 and 2011 from ISRO's Bhuvan Portal indicates that the City of Fatehpur Sikri has grown in a linear east west direction along highway connecting

Agra and National Highway 23.

Figure 3.9 Land Use and Land Cover Change 2005 (left) and 2011 (right)

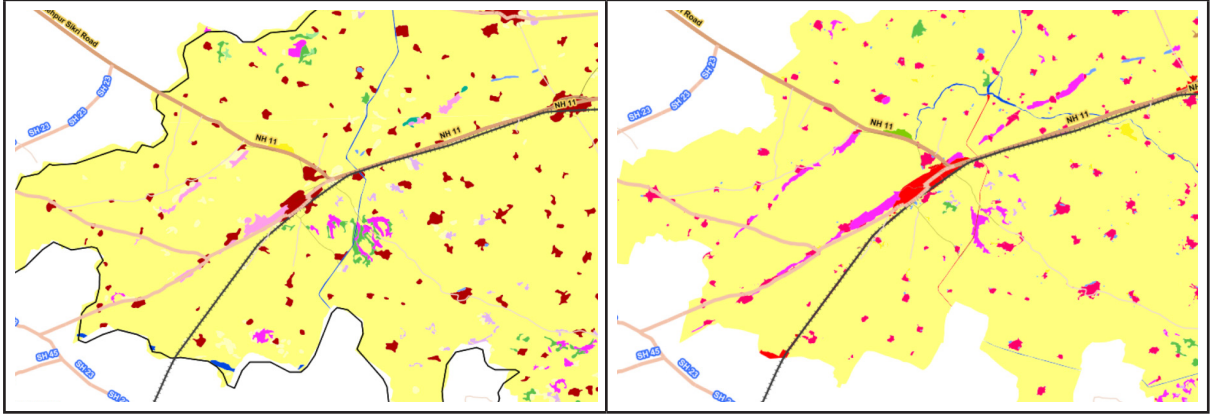


Source: Bhuvan Portal - Land cover of year 2005, 2011

3.1.4.7 Govardhan-Radhakund

Land cover map of 2001 and 2011 from ISRO's Bhuvan Portal indicates that the City of Govardhan and Radhakund have grown in a linear pattern along the Govardhan Hill circumambulatory pathway. Though the land along the pathway has been reserved as a green cover, there has been unauthorized residential and commercial encroachment all along the Parikrama path.

Figure 3.10 Land Use and Land Cover Change 2005 (left) and 2011 (right)



Source: Bhuvan Portal - Land cover of year 2005, 2011

3.1.5 Demographic Profile

Table 3.2 Demographic Profile of Cities in TTZ

Sl. No.	Name of Cities	Class	Area (Ha)	Total	Population				Density (pph)
					Male		Female		
					Pop.	%age	Pop.	%age	
1	Agra (M. Corp.)	I	12057	1585704	845902	53.35	739802	46.65	132
2	Mathura (NPP)	I	2805	349909	185983	53.15	163926	46.85	125
3	Hathras (NPP+OG)	I	676	143020	76054	53.18	66966	46.82	212
4	Firozabad (NPP)	I	2135	604214	319415	52.86	284799	47.14	283
5	Bharatpur (M. CL)	I	2144	252342	133780	53.02	118562	46.98	118
6	Vrindavan (NPP)	II	1350	63005	34769	55.18	28236	44.82	47

Sl. No.	Name of Cities	Class	Area (Ha)	Total	Population				Density (pph)
					Male		Female		
					Pop.	%age	Pop.	%age	
7	Tundla (NPP)	II	825	50423	26510	52.58	23913	47.42	61
8	Govardhan (NP)	III	800	22576	12114	53.66	10462	46.34	28
9	Fatehpur Skiri (NPP)	III	800	32905	17392	52.86	15513	47.14	41

Table 3.3 Literacy Rate in TTZ

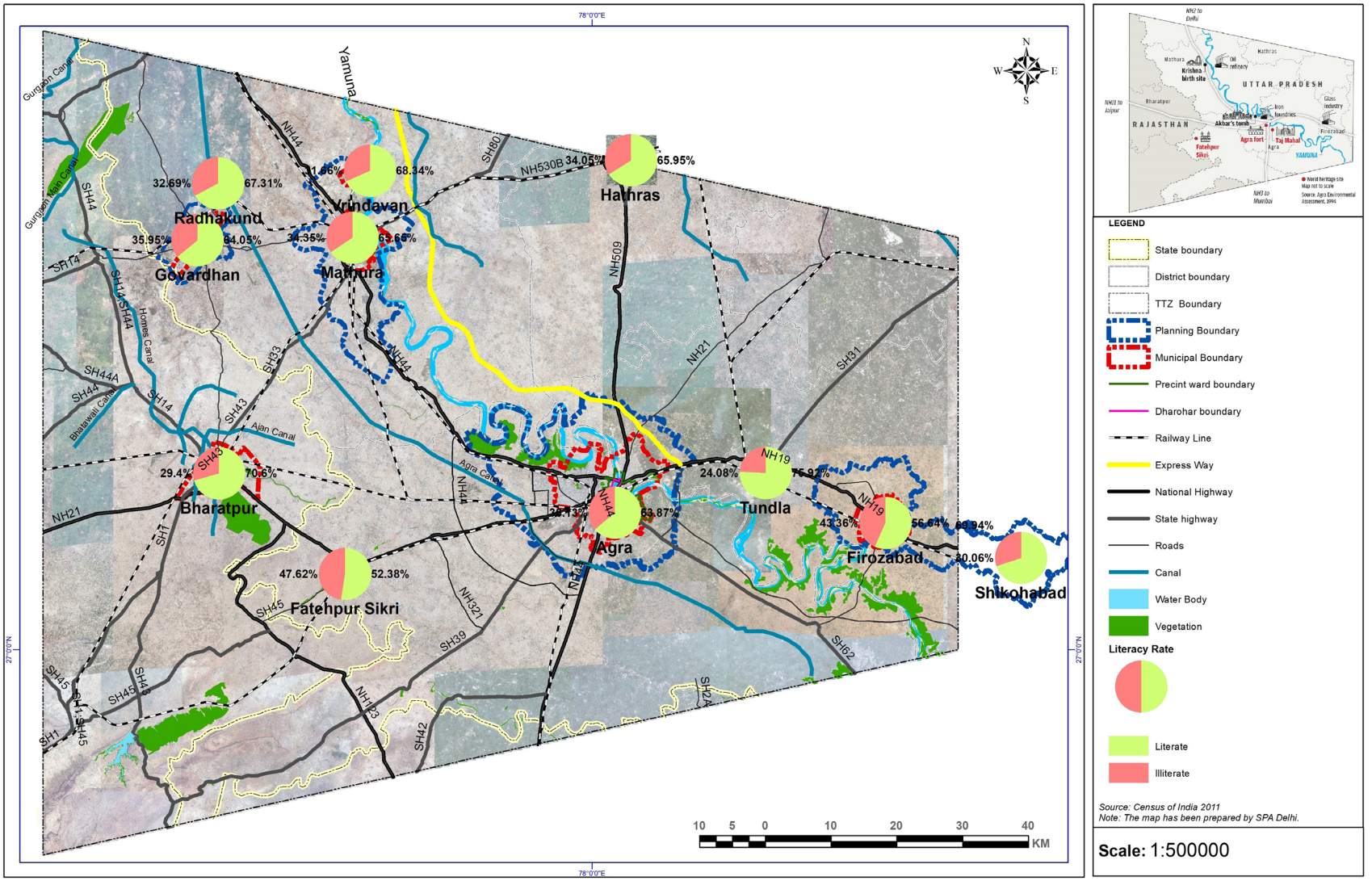
Sl. No.	Name of Cities	Total Popula-tion	Literate						Illiterate					
			Total		Male		Female		Total		Male		Female	
			Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
1	Agra (M. Corp.)	1585704	1014872	64.00	575475	56.70	439397	43.30	570832	36.00	270427	47.37	300405	52.63
2	Mathura (NPP)	349909	229061	65.46	130336	56.90	98725	43.10	120848	34.54	55647	46.05	65201	53.95
3	Hathras (NPP+OG)	143020	94909	66.36	53542	56.41	41367	43.59	48111	33.64	22512	46.79	25599	53.21
4	Firozabad (NPP)	604214	342252	56.64	197978	57.85	144274	42.15	261962	43.36	121437	46.36	140525	53.64
5	Bharatpur (M Cl)	252342	178252	70.64	103343	57.98	74909	42.02	74090	29.36	30437	41.08	43653	58.92
6	Vrindavan (NPP)	63005	42917	68.12	25641	59.75	17276	40.25	20088	31.88	9128	45.44	10960	54.56
7	Tundla (NPP)	50423	38263	75.88	21295	55.65	16968	44.35	12160	24.12	5215	42.89	6945	57.11
8	Govardhan (NP)	22576	14459	64.05	8546	59.11	5913	40.89	8117	35.95	3568	43.96	4549	56.04
9	Fatehpur Sikri (NPP)	32905	17236	52.38	10505	60.95	6731	39.05	15669	47.62	6887	43.95	8782	56.05

Source: Census of India 2011. (Note: M. Corp = Municipal Corporation, NPP = Nagar Palika Parishad, NP = Nagar Panchayat, M. Cl = Municipal Council, OG = Out Growth)

The total population for selected cities in the TTZ is around 31 lakhs as per 2011 census data. Apart from Agra that has a population of around 15 lakhs in 2011, Mathura with a population of 4,56,706 lakhs and Vrindavan city with a population of 71,688 thousand as per 2011 Census are the next big cities in the region. Firozabad City (6,04,214 lakhs), Hathras (1,61,289 lakhs), Bharatpur (2,52,342 lakhs) are the other class I cities in the region. Tundla Urban Agglomeration (64,906), Fatehpur Sikri (32,905), and Govardhan-Radhakund (30,087) as per Census 2011, are other important cities in the region. On an average there has been a decadal growth of around 1.5 to 3.5 lakhs of population in between 2001 and 2011. Few cities like Firozabad and Hathras exhibits a high density of population of around 283 pph within the cities (as per Census 2011).

The literacy rate for the TTZ region on an average is around 65% and the illiteracy rate is around 35%

Map 3.9 Literacy Rate, 2011



Source: Census 2011

3.1.6 Socio-Economic Profile

As per the 2011 census data, the average percentage of the working population in the 10 selected cities is 30% and the non-working population is 70%. The non-working population is more than double the working population which is an alarming difference and needs detailed examination since the economic stability of a city and a region depends majorly on its workforce and a huge gap between non-working and working population is a huge negative indicator (Refer Table 4).

An average growth rate of state gross domestic product (GDP) in Uttar Pradesh (UP) shows that contributions from the tertiary sector to the GDP is the highest followed by secondary and primary sectors (NITI Ayog 2017). TTZ is centrally located and has close economic links with the northern and central part of India. The region is well connected with roads and railways. City of Agra, is also strategically located and well-connected by transportation linkages as a regional gateway for tourism, trade and services for India and rest of the world.

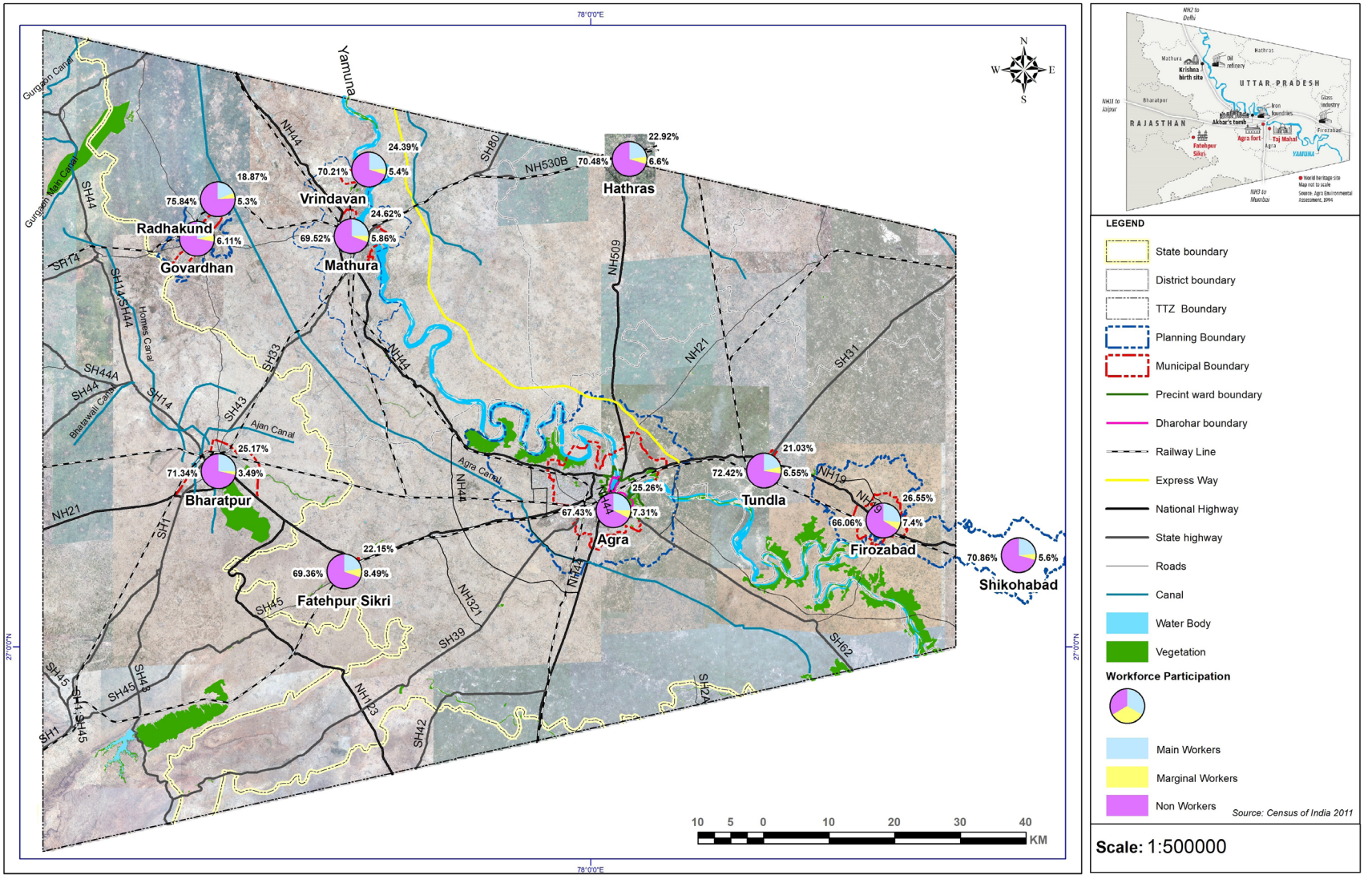
Table 3.4 Workforce Participation Rate in TTZ

Sl. No.	Name of Cities	Total Population	Total Workers	%	Main Workers	%	Marginal Workers	%	Non - Workers	%
1	Agra (M. Corp.)	1585704	516859	32.59	400613	77.51	116246	22.49	1068845	67.41
2	Mathura (NPP)	349909	106587	30.46	85408	80.13	21179	19.87	243322	69.54
3	Hathras (NPP+OG)	143020	42716	29.87	33118	77.53	9598	22.47	100304	70.13
4	Firozabad (NPP)	604214	205092	33.94	160398	78.21	44694	21.79	399122	66.06
5	Bharatpur (M. Cl)	252342	72286	28.65	63567	87.94	8719	12.06	180056	71.35
6	Vrindavan (NPP)	63005	19136	30.37	15590	81.47	3546	18.53	43869	69.63
7	Tundla (NPP)	50423	13719	27.21	10375	75.63	3344	24.37	36704	72.79
8	Govardhan (NP)	22576	6291	27.87	4912	78.08	1379	21.92	16285	72.13
9	Fatehpur Sikri (NPP)	32905	10082	30.64	7289	72.30	2793	27.70	22823	69.36

Source: Census of India 2011

The Agra expressway has further strengthened these connectivity linkages and is expected to foster greater social and economic interactions and economies of scale to the TTZ region.

Map 3.10 TTZ Workforce Participation



LEGEND

- State boundary
- District boundary
- TTZ Boundary
- Planning Boundary
- Municipal Boundary
- Precint ward boundary
- Dharohar boundary
- Railway Line
- Express Way
- National Highway
- State highway
- Roads
- Canal
- Water Body
- Vegetation

Workforce Participation

- Main Workers
- Marginal Workers
- Non Workers

Source: Census of India 2011

Scale: 1:500000

Source: Census 2011

3.1.7 Settlement Pattern

The settlement pattern in TTZ, exhibits that the core areas adjacent to the central market and old settlements has developmental pressure due to lack of organized growth.

Table 3.5 Occupational Structure in TTZ

SN	Name of Cities	Total Population	Total Workers	Primary		Secondary		Tertiary	
				Workers Pop. (Main+Mar-ginal)	%	Workers Pop. (Main+Mar-ginal)	%	Workers Pop. (Main+Mar-ginal)	%
1	Agra (M Corp.)	1585704	516859	27887	5.40	42951	8.31	446021	86.29
2	Mathura (NPP)	349909	106587	5357	5.03	6738	6.32	94492	88.65
3	Hathras (NPP+OG)	143020	42716	2113	4.95	4516	10.57	36087	84.48
4	Firozabad (NPP)	604214	205092	14672	7.15	30333	14.79	160087	78.06
5	Shikohab-ad (NPP)	107404	31295	2240	7.16	2633	8.41	25400	81.16
6	Bharatpur (M Cl)	252342	72286	4030	5.58	2744	3.80	65694	90.88
7	Vrindavan (NPP)	63005	19136	479	2.50	1102	5.76	17555	91.74
8	Tundla (NPP)	50423	13719	917	6.68	774	5.64	12028	87.67
9	Govardhan (NP)	22576	6291	1061	16.87	361	5.74	4869	77.40
10	Fatehpur Sikri (NPP)	32905	10082	1687	16.73	1009	10.01	7386	73.26
Total		3211502	1024063	60443	7.80	93161	7.94	869619	83.96

Source: Census of India 2011.

As per the 2011 census data. 31% of the population in selected cities live in slums which is an indicator for lack of employment opportunities, affordable housing, and adequate social and physical infrastructure.

Table 3.6 Slum profile in TTZ

Sl. No.	Name of Cities	Total Population	Total No. of Households	HH Size (Persons Per HH)	Slum Households	Percentage of Slum House-holds
1	Agra (M. Corp.)	1585704	267945	5.9	89600	33.44
2	Mathura (NPP)	349909	59781	5.9	27597	46.16
3	Hathras (NPP+OG)	143020	25402	5.6	18844	74.18
4	Firozazbad (NPP)	604214	99833	6.1	13892	13.92
5	Bharatpur (M. Cl.)	252342	45818	5.5	6805	14.85
6	Vrindavan (NPP)	63005	11637	5.4	1762	15.14
7	Tundla (NPP)	50423	8744	5.8	451	5.16
8	Govardhan (NP)	22576	3910	5.8		

Sl. No.	Name of Cities	Total Population	Total No. of Households	HH Size (Persons Per HH)	Slum Households	Percentage of Slum House-holds
9	Fatehpur Sikri (NPP)	32905	4936	6.7		
Total/Average		3104098	528006	5.9	158951	30.10

Source: Census of India 2011

3.1.8 Social and Physical Infrastructure

The TTZ is well connected by road and rail to the rest of India. Developmental programs like the Jawaharlal Nehru National Urban Renewal Program (JNNURM), AMRUT, RAY, Affordable Housing scheme, Swatch Barat Mission and now the Smart Cities projects, urban areas in the state of Uttar Pradesh have been beneficial and infrastructural developments are in progress in most of the primary cities of the state and TTZ. However, inconsistencies in the distribution pattern of services can still be felt throughout the TTZ.

The cities are consistently making efforts for improving the sewage and sanitary infrastructure. Census 2011 data has indicated that 90% of the households in the TTZ region have toilets within premises while 10% of the households defecate in open areas with Dhanauli, Dhaulpur and Bharatpur having highest open defecation rates in the region4. However, since the advent of the Swacch Bharat Mission, there have been positive changes in this situation. Works are in progress as per the Municipal Corporation of Agra and the current status shows the construction of 10563 individual household toilets, 910 Community Toilets and 447 Public Toilets. Similar works are in progress in other major cities of TTZ.

About 92% of the households are provided with electricity connections though there are frequent power cuts and dependence on alternative fuel sources which may contribute to pollution and risk of fire hazards.[19]

3.1.9 Trade and Commerce

Most of the cities in the region have the main commercial hub grown along with residential use within the city core but in an unplanned manner. Mixed use development has resulted in many parts of the cities. The average growth rates of commercial establishments are high compared to hotels & restaurants. The cities are mainly dependent on handlooms and garment products, tourism products, snacks and sweet shops, etc. dominating their commercial hubs. Many cities like Tundla and Hathras also have agricultural mandis that are important for the district.

19 Census of India 2011

3.1.10 Industry

The state of Uttar Pradesh has an access to a robust industrial infrastructure, with fifteen industrial areas, twelve specialized parks, four growth centers and Industrial Infrastructure Development Centers (IIDC). Under the central government scheme, various integrated industrial development centers have been established to boost the growth of micro, small and medium size industries at Etah, Banthar (Unnao), Kosi Kotwan (Mathura), Kursi Road (Barabanki) to name a few.

Table 3.7 District Industrial Profile in TTZ

Sl. No.	Name of District	Number of Registers Units	Employment	Source
1	Agra	6787	636	Brief Industrial Profile of District Agra, 2012
2	Mathura	1096	4803	Brief Industrial Profile of District Mathura, 2012
3	Hathras	2832	12407	Brief Industrial Profile of District Hathras, 2012
4	Firozabad	4829	32000	Brief Industrial Profile of District Firozabad, 2012
5	Etah	6672	22973	Brief Industrial Profile of District Etah, 2012
6	Bharatpur	10322	33461	Brief Industrial Profile of District Bharatpur, 2012
Total		32538	106280	

Source: Brief Industrial Profile of District Agra 2012, Brief Industrial Profile of District Mathura, 2014, Brief Industrial Profile of District Hathras, 2015, Brief Industrial Profile of District Firozabad, 2014, Brief Industrial Profile of District Etah, 2015-16, Brief Industrial Profile of District Bharatpur, 2012.

There are about 27 types of household creative industries in the TTZ particularly in Agra, Mathura and Vrindavan which, have the potential for growing into export houses and can contribute to improved livelihood and economy generation . A list of these creative household industries is given below:

Table 3.8 Creative Household Industries in TTZ

Name of Cities	Agra	Mathura	Vrindavan	Firozabad
Type of Creative Household Industries	Leather Craft Marble Work Carpet Work Brassware Zari Work Dari Work Bone Articles Dyeing and Cloth Printing Wooden Ornamental Work Jewellery Craft Cane and Bamboo Craft Chikan Work Textiles China Clay Items Items of Ivory (now under prohibition)	Poshak Making Mukut Making Kanthi Malas Sanjhi Art Brass Murtis (fingu-rines)	Flower Garlands Zardozi Tulsi Mala Kullhar Silver Anklets Brass Polishing Marble and Alabas-ter Figure s (idols or figurines)	Bangle Decoration Glass Handicraft Glass Decoration Choodi Judai Choodi Mudai Choodi Katai

Source: Mapping of Heritage Assets & Tourist Attractions Braj Corridor, Vol I & II, INTACH, June 2014

3.1.11 Tourism

The UP Government envisioned "Uttar Pradesh Pro Poor Tourism Development Project" with the financial support of World Bank as a stepping stone in restructuring its tourism sector in a pro-poor manner. The Project Development Objective is to increase tourism-related benefits for local communities in targeted destinations and has been initiated in the destinations of Agra, the Braj region and the Buddhist circuit. Project is being carried out in accordance with the provisions of the Environmental and Social Management Framework, the Resettlement Policy Framework and the relevant Safeguard Assessments and Plans. The project supports the priorities of the Government of Uttar Pradesh and its Department of Tourism by contributing to refocusing tourism in a way that optimizes the state's assets in a sustainable manner while directly benefiting residents in both economic and non-economic terms.

As per the census 2011, the tourist inflow in this region has been increasing considerably in few cities like Agra, Mathura-Vrindavan followed by Bharatpur, Fatehpur Sikri and Govardhan. There are also various other locations like Gokul, Deeg, Nandgaon, Chhata, etc. However, a projection of the current tourist inflow in few selected cities shows that in another three decades Agra, Vrindavan and Govardhan will see a considerable increase in the tourist influx over the years. (Source: U.P. Tourism Department and World Bank).

Table 3.9 Tourist Inflow in TTZ

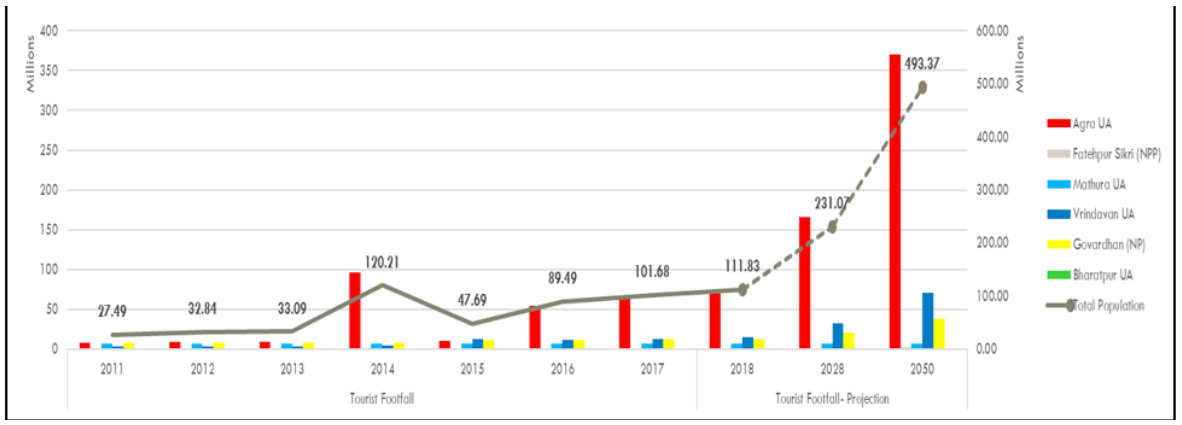
Name of City	Tourists Footfall							Tourists Footfall Projection		
	2011	2012	2013	2014	2015	2016	2017	2018	2028	2050
Agra	7815960	9158976	9114221	96101728	10812435	56097408	65929656	74992364	171390995	383467982
Fatehpur Sikri	669985	720984	744538	756766	814781	745906	747405	793245	919083	1195927
Mathura	6598290	6614600	6624700	6645450	6651000	6635103	6637867	6656150	6722592	6868764
Vrindavan	3859700	3883600	3943800	4034050	12647890	6614321	6927825	9325871	17672266	36034337
Govardhan	8133400	8324400	8374450	8454850	12058500	9472571	9607055	10689512	14404282	22576776
Bharatpur			123048	25045	148093	118359	126772	138492	239253	460927
Total Population	27077335	28702560	28924757	116017889	43132699	80009294	90282331	103003046	212693013	454010938

Source: Uttar Pradesh Tourism, Department of Tourism Bharatpur and Preliminary Analysis

Projections as per UP tourism study suggests that in the coming three decades Agra, Vrindavan and Govardhan will see a considerable increase in the tourist influx.[20]

20 Source: U.P. Tourism Department and World Bank

Figure 3.11 Tourist Inflow and Projections



Source: Uttar Pradesh Tourism, Department of Tourism Bharatpur and Preliminary Analysis

District: Agra

Settlement: Agra

Sultan Sikandar Lodhi (1488–1517) moved his capital from Delhi to Agra in 1506 CE before it became the capital of the Mughal Empire from 1556 to 1658 CE. The colonial imprint of the city was established with the setting up of the cantonment in the early nineteenth century. The settlement was a major centre during Lodhi, Mughal and Colonial period. It has Architectural, Archaeological, Ecological, Socio-cultural, and Economic significance.

The main heritage resources identified in the settlement are Fort, Memorials such as Tombs, Chattris, Mosques, River Front Gardens, Havelis, Gateways, Churches, and Institutions etc. and intangible resources are Marble inlay Pietra Dura, Leather Craft (Selling and packaging) , Carpet Work, Zari work and Petha Making.

Settlement: Sikandra

Sikandra is named after Sikandar Lodi, who was in power from 1488 to 1517 CE. Sikandra Fort is located in the western periphery of the city at a distance of about 10 kms from the city center. Sikandra also has the mausoleum of the Mughal emperor Akbar. The settlement was a major centre during Lodhi, Mughal and Colonial period. It has Architectural and Archaeological significance.

The main heritage resources identified in the settlement are Fort, Tombs, Tank, Archaeological remains.

Settlement: Etmadpur

A Mughal period settlement, the town is believed to be named after Mirza Ghiyas Beg or Itimad-ud-Daulah, a Mughal official, father of Nur Jahan and grandfather of Mumtaz Mahal. It has architectural and ecological significance.

The main heritage resources identified in the settlement are Memorial, Water tank and Pavilion.

Settlement: Fatehpur Sikri

The city was founded as the capital of Mughal Empire in 1571 CE by Emperor Akbar. After settling in Agra in 1803 CE, the British established an administrative center here and it remained so until 1850. It has Architectural, Archaeological and Ecological significance.

The main heritage resources identified in the settlement are Walled city, Mosque, Havelis, Gateways, Kos minars.

Settlement: Fatehabad

Fatehabad was founded by the Mughal ruler Aurangzeb after his victory over his brother Dara Shikoh in 1658 CE. Fatehabad was later associated with Maratha king Daulat Rao Scindia (1794–1827) who ruled from Gwalior. It is an important settlement of Mughal period which has Architectural and Ecological significance.

The main heritage resources identified in the settlement are Sarai, Mosque and Baghs and main intangible resources are Bangle making, Bangle coloring and Glassware

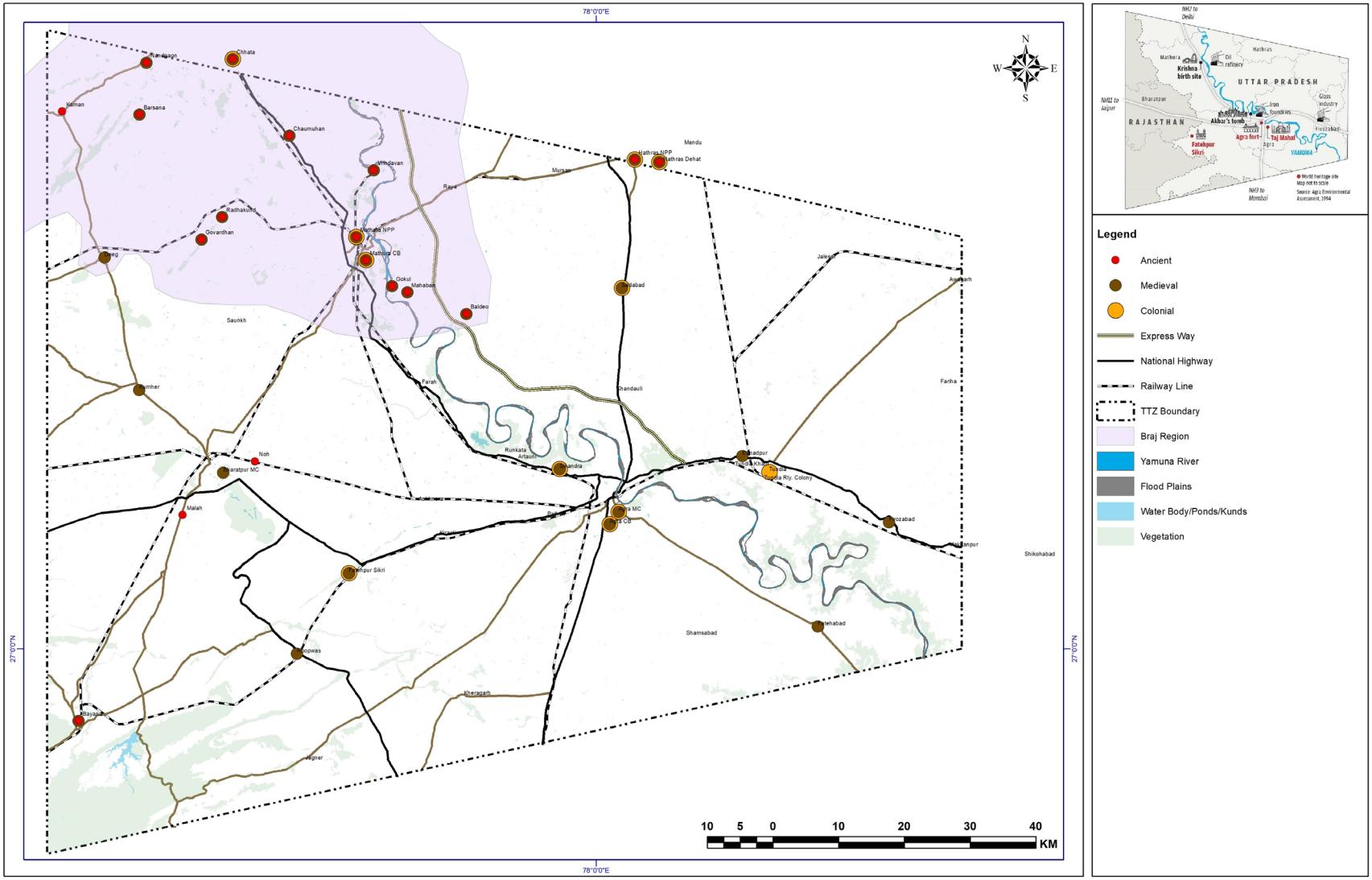
District: Mathura

Settlement: Mathura

Mathura is principally associated with the birthplace of Krishna. In times 5th century BCE, it was a major metropolis and the capital of the Surasena kingdom. Mathura saw its `golden age' during the rule of the Kushanas. It remained a center of power during the Mauryan period, through the rule of Emperor Ashoka to the Gupta era (4th century CE). During Akbar's reign, the city again became the center of religious, artistic, and literary activities. Jats ruled it till 1770 CE after which it came under the Marathas and then to the British when the Cantonment was established in 1804 CE. Mathura district was formed in 1832 CE. It was a main centre of activities during Ancient, Medieval and Colonial period. It has Architectural, Ecological, Religious, Socio –Cultural and Archaeological significance.

The main heritage resources identified in the settlement are Ghats, temples, Kunds, dharamshala, archaeological mounds and remains, mosques, Fort, havelis, bazaars, Baoli, Matha, Institutional and Residential buildings in Cantonment area. The intabgibvle resources are Sanjhi Art, Poshak making, Mukut Making, Kanthi Mala, Marble and alabaster figures , Brass Murti and Peda Making

Map 3.11 Historical Significance



Legend

- Ancient
- Medieval
- Colonial
- Express Way
- National Highway
- Railway Line
- TTZ Boundary
- Braj Region
- Yamuna River
- Flood Plains
- Water Body/Ponds/Kunds
- Vegetation

Source:http://www.mvda.in/braj-84-kos.php

Settlement: Vrindavan

Vrindavan was not a very significant settlement until 1515, when Chaitanya Mahaprabhu interpreted Vrindavan and its surrounding landscape as the homeland of Lord Krishna. It received patronage during the Mughal and Jat period. It was a major centre of activity during Ancient and Medieval period. It has Architectural, Ecological, Religious, Socio – Cultural and Archaeological significance.

The main heritage resources identified in the settlement are Ghats, Temples, Kunds, Baithak, Havelis, Vans and Dharamshalas. Intangible resources are Tulsi Mala, Zardosi, Silver Anklets, Poshak Making , Mukut Making, Kulhar, Misri and Chinori, Brass Polishing and Peda making.

Settlement: Govardhan

Govardhan hill has great religious significance in view of its association with Lord Krishna. It has architectural ensembles attributed to Bundela and Jat rulers, Veer Singh Deo, ruler of Orchha 1675 CE and Jat rulers Suraj Mal, and Jawahar Singh, the king of Bharatpur (1707–1763). It was a major centre of activity during Ancient and Medieval period. It has Architectural, Ecological, Socio-cultural, Archaeological and Religious significance.

The main heritage resources identified in the settlement are Hill, Archaeological Mound, Temple, cenotaph, Chattri and Kunds.

Settlement: Gokul

Gokul is believed to be the settlement where Lord Krishna was brought up by his foster mother Yasodha. It was a major centre of activity during Ancient and Medieval period. It has Architectural, Religious, Ecological, and Social significance.

The main heritage resources identified in the settlement are Residences, Ghats, and Temple. Main intangible resources identified are Tulsi Mala, Mukut Making, Poshak making , Govardhan, Poshak making, Mukut Making, Tulsi Mala , Flower Garland, Misri and Chinori

Settlement: Barsana

The settlement is associated with Radha, the favourite gopi of Krishna, who was born in Barsana and spent her childhood here. Barsana is surrounded by hills, which is why it has high ecological value because of the presence of numerous kunds. It also has Jat period havelis and monuments and a red sandstone temple of Hari Deva built by Raja Man Singh during the reign of Akbar. It was a major centre of activity during Ancient and Medieval period. It has Architectural, Religious, Ecological, and Social

significance.

The main heritage resources identified in the settlement are Temples, Palaces, Havelis, Bagh and Baghichis, Kunds and Van and and intangible resource is peda making

Settlement: Nandgaon

Nandgaon is believed to be the home of Lord Krishna, where he spent his childhood along with his foster father Nanda Baba and mother Yashoda. It was a major centre of activity during Ancient and Medieval period. It has Architectural, Religious, Ecological, and Social significance.

The main heritage resources identified in the settlement are Kunds, Temples and Havelis and intangible resource is peda making

Settlement: Baldeo

According to Hindu mythology, it is believed that Baldeo is the place where Lord Krishna's elder brother named 'Baldeo' use to reside. It was a major centre of activity during Ancient and Medieval period. It has Architectural, Religious, Ecological, and Social significance.

The main heritage resources identified in the settlement are Kunds, Temples, and Havelis.

Settlement: Mahavan

Mahavan is also called Brihadvan, because it was the largest of all the forests. It is believed that Krishna and his friends used to come for Ras to the Mahavan forests. It was a major centre of activity during Ancient and Medieval period. It has Religious and Ecological significance.

The main heritage resources identified in the settlement are Vans and Kunds. Flower garland making is one of the important intangible resource identified.

Settlement: RadhaKund

It is believed that Krishna and Radha spent time together at this site and has many myths about their pastimes. It was a major centre of activity during Ancient and Medieval period. It has Architectural, Religious and Ecological significance.

The main heritage resources identified in the settlement are Kunds and Temples

Settlement: Chaumuha

Chaumuha is a settlement where Brahma Vimohan Leela took place during Krishna's time. Because of this the village has been named Chaumuha, indicating four heads of Brahma. It was a major centre of activity during Ancient and Medieval period. It has Religious and Ecological significance.

The main heritage resources identified in the settlement are Temples and Kunds.

Settlement: Chatta

The place has derived its name from Chhatra Dharana in Krishna's life. It has a fort like serai with high walls and bastions built in the reign of Sher Shah Suri and later embellished by Emperor Akbar. It was a major centre of activity during Ancient and Mughal period. It has Architectural and Ecological significance.

The main heritage resources identified in the settlement are Kund, Serai and Kos minar.

Settlement: Kosi Kalan

The settlement was an important trade centre on the Mughal imperial highway and has a large serai known as Shahi Serai, ascribed to Khwaja Itibar Khan, governor of Delhi during Akbar's reign. It was briefly occupied by Ranjit Singh, the Jat king, when retreating to Barsana in 1774 CE. It was a major centre of activity during Mughal period. It has Architectural and Ecological significance.

The main heritage resources identified in the settlement are Kunds and Serai.

District: Hathras

Settlement: Hathras

Archaeological remains of Hindu, Buddhist, and Jain culture as well as items from the Shung and Kushan periods were found at many locations in Hathras. The fort dates from the Mauryan period. Many bagichis or the gardens of Jat period survive. A typical feature of almost every bagichi is the akhara or the wrestling ring where juveniles and adults practice various forms of wrestling. In 1716 CE, the Jat ruler Raja Nandram's son, Bhoj Singh, took over the rule of Hathras from the Rajput rulers, followed by the Scindia ruler Madhavrao I Scindia in 1784 CE. Hathras was an industrial hub during the British Raj with several cotton-presses and spinning mills. The main centre during Ancient, Jat Period and Colonial period, the town has Archaeological, Architectural, Ecological, Religious, Socio-cultural and Economic significance.

The main heritage resources identified in the settlement are Fort, Archaeological remains, Bagichis, Havelis, temples and Tanks and intangible resources are Hing Making, Brass works, Color Industry and Jute embroidery

Settlement: Sadabad

Sadabad was a zamindari of Lalkhani Muslim Rajput in the eighteenth and nineteenth century. The main centre during Late Mughal and Colonial period, the town has

Architectural significance.

The main heritage resources identified in the settlement are Haveli of Nawabs and Mosque.

District: Firozabad

Settlement: Firozabad

Firozabad was founded by Firoz Shah Tughlaq and flourished during the time of Akbar and Jehangir. Bajirao Peshwa looted Firozabad and Etmadpur in 1737 CE. The Jats of Mahawan also ruled Firozabad for 30 years. It was a major centre of activity during Mughal, Jat and Marathas period. It has Architectural and Economic significance.

The main heritage resources identified in the settlement are Mosques, Tombs, Havelis, Residences, Bazaars.

Settlement: Tundla

Tundla developed as a major junction on the East Indian Railway in the colonial period and a main center of British administration resulting in a typical railway colony settlement with a railway station, bungalows, churches, and barracks exemplifying industrial heritage. The main centre during Colonial period, the town has Architectural significance.

The main heritage resources identified in the settlement are Residential colony with Barracks and Church.

District: Bharatpur

Settlement: Bharatpur

Bharatpur is also known as Lohagarh. In 1733 AD, Maharaja Suraj Mal built the city of Bharatpur as a well-fortified settlement. It changed hands between the Jats and Marathas in the eighteenth and early nineteenth century till Lord Combermere laid siege in 1825 CE and Bharatpur became a part of the British empire. The main centre during Jat, Marathas and Colonial period, the town has Architectural and Economic significance.

The main heritage resources identified in the settlement are Fort, Moat, Temples, Palace, Gateways, Residences and havelis.

Settlement: Deeg

Deeg was a palace garden retreat town in north of Bharatpur, laid by the Jats of Bharatpur. The main centre during Jat period the town has Architectural, Socio-

Cultural and Ecological significance.

The main heritage resources identified in the settlement are Deeg Fort, Palaces, Gardens.

Settlement: Kumher

Kumher was founded by a Jat chieftain Kumbh. In 1754 CE, when Raja Surajmal of Bharatpur was the king, the fort at Kumher was under siege by the Marathas. The main centre during Jat and Maratha period, the town has Architectural and Ecological significance.

The main heritage resources identified in the settlement are Fort, Palaces, Kunds, Talaab, Pavilions.

Settlement: Bayana

Bayana is famous for Bijaigarh (Vijaygarh) fort which was built by Raja Bijai Pal in 1040 CE. It was an important settlement in the period of Sikandar Lodi, Humayun and Akbar and finds mention in Ain e Akbari by Abul Fazl as “this town is the burial place of many illustrious men”. The main centre during Ancient, Medieval and Jat period, the town has Archaeological and Architectural significance.

The main heritage resources identified in the settlement are Fort, Archaeological remains and inscriptions, Temples, Mosques, Tombs, Gateways and Chattri.

Settlement: Rupwas

The settlement was important in the period of Akbar, Shahjehan and Jat rulers. The main centre during Medieval period, the town has Architectural and Ecological significance.

The main heritage resources identified in the settlement are Chattri, Tank and Residences.

3.1.12. Rural Development

In 10 CD blocks of Mathura in TTZ through PMGAY 156 houses were constructed- construction material is being brought from outside TTZ. Hence EI is negligible – noise, air and water.

3.2 City Level

3.2.1 Introduction

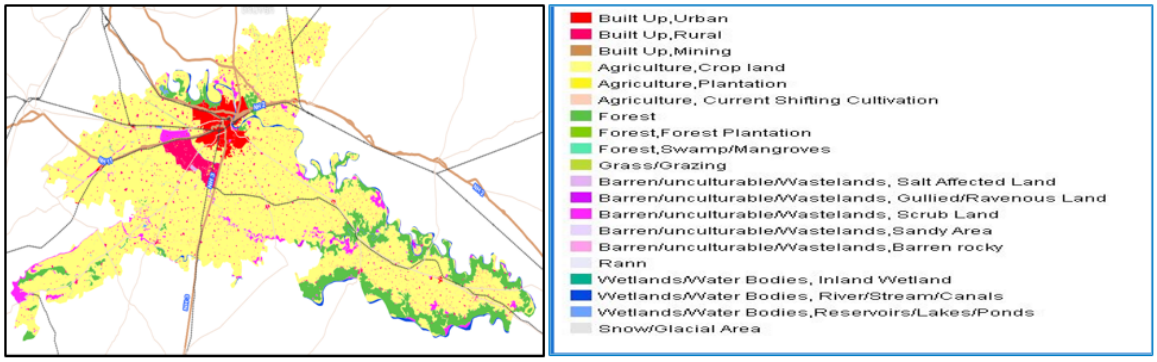
Agra tehsil in Agra district spans over an area of 528.64 kms. Population of Agra Tehsil is around 34 Lakhs. The region has semi-arid continental type of climate with low

monsoonal rains. The area inhabits the doab of Yamuna and Utangan rivers where ravine land, unsuitable for agriculture, is a common feature.

Table 3.10 Agra Tehsil Land Use Land Cover in 2002 and 2015

Sl. No.	Land Use/ Land Cover Classes	Area in Km² (2002)	Area in % (2002)	Area in Km² (2015)	Area in % (2015)	Variation from 2002 to 2015 (Km²)
1	Moderate Forests	8.28	1.56	4.35	0.82	3.93
2	Open Forests	8.71	1.64	2.24	0.42	6.47
3	Open Scrub	105.4	19.93	8.95	1.69	96.45
4	Built-Up Land	230.69	43.69	305.44	57.80	74.75
5	Agricultural Land	126.26	23.88	104.91	19.84	21.35
6	Water Body	15.23	2.88	12.06	2.28	3.17
7	Barren Land	34.07	6.44	90.69	17.15	-56.62
Total		528.64	100	528.64	100	

Figure 3.12 Land use Map Agra District and Tehsil LU/LC – 2002 – 2015



Source: Bhuvan Website and Land use land cover of Agra tehsil: A comparative study from 2002 to 2015; Bob Stanley Gardner*, Brototi Biswas, Praveen Andrew Majeed Department of Geography, St Johns College, Agra, India

3.2.2 Location And Area

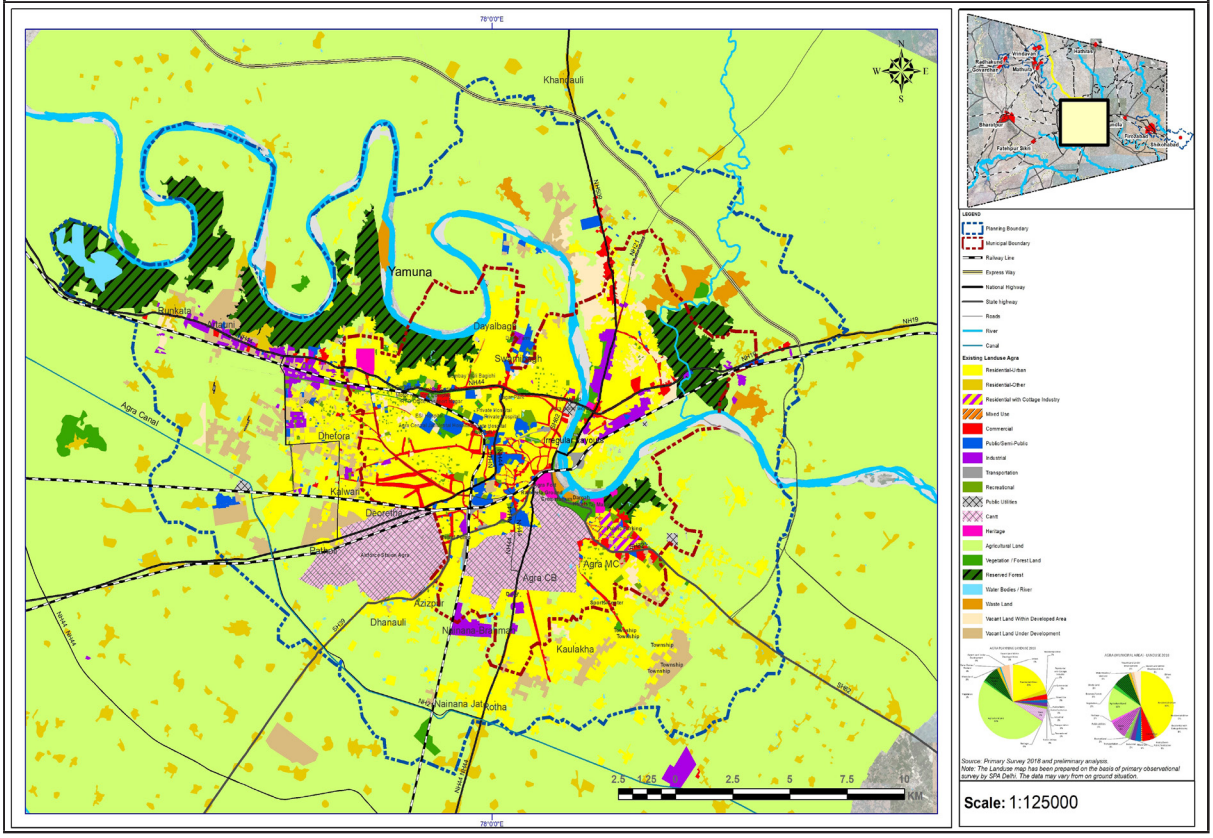
The city level delineation refers to the existing limit of Agra Municipal Corporation as per UP Municipal Corporation Act of 1999. Agra Municipal Corporation in Agra district spans over an area of 120.57 sq. km, with population of around 15 lakhs as per Census 2011. The city of Agra inhabits the Western Bank of the river Yamuna and National Highway 2 (NH2). The city occupies a strategic location at the confluence of three distinct geo-physical regions namely the plain of Uttar Pradesh, the plateau of Madhya Pradesh and the desert of Rajasthan. The city also, holds a pivotal position as a center for the cultural rich regions of Braj, Bundelkhand, Rajputana and western Uttar Pradesh.

3.2.3 Land-Use And Urban Sprawl

The total developed area of Agra has increased by about 97% in the period between 2001 to 2018. The population density is estimated to have increased from 135 pph to

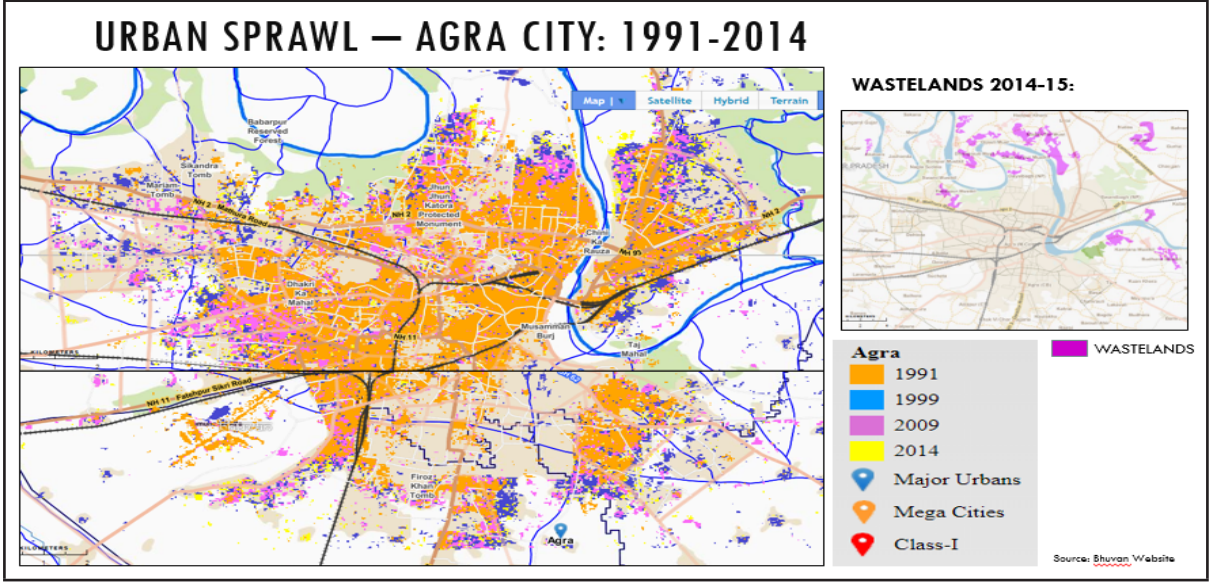
150 pph (person per hectare) between 2001 to 2018 (Census of India 2011). Growth in Agra has followed the central core to periphery pattern as can be observed from changes that occurred between 1991 and 2014. Agra's decadal growth rate has an average of 28%, most of which is concentrated in the core. The municipal area stands at 138.8 sq.km in 2018 in comparison to 120.57 sq.km as per Census 2011.

Map 3.12 Land Use of Agra, 2018



Source: Primary Survey, 2018

Map 3.13 Urban Sprawl of Agra 1991 - 2014



Source: Bhuvan Website and Land use land cover of Agra tehsil

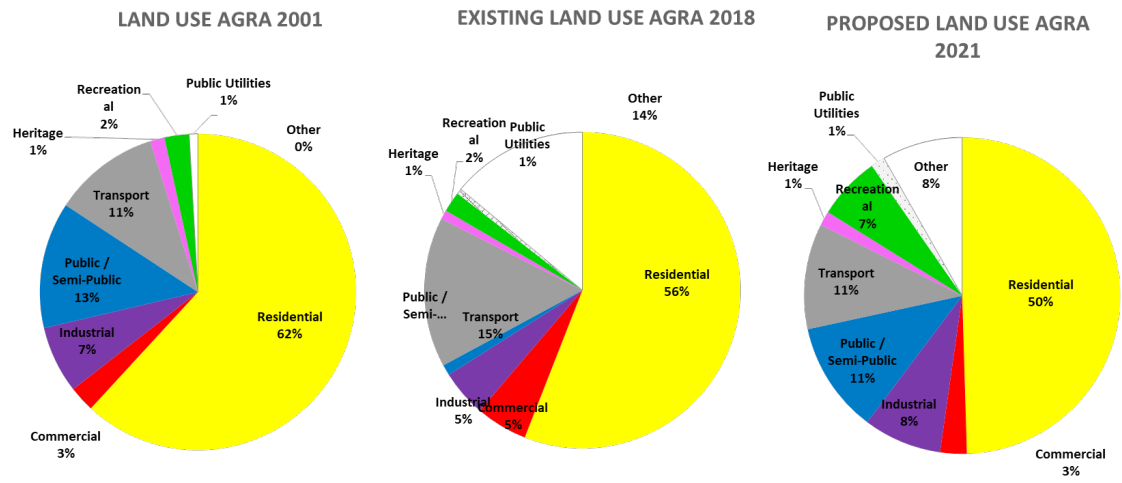
The detail land use for the year 2001, 2018 and 2021 (proposed) is given below.

Table 3.11 Land Use Distribution of Agra for year 2001, 2018 and 2021

Land Use	2001		2018		2021		Percentage of Land Use as per URDPFI Guidelines for Metropolitan City
	Area of Land Use (Ha.)	Percentage of Land Use (%)	Area of Existing Land Use (Ha.)	Percentage of Existing Land Use (%)	Area of Proposed Land Use (Ha.)	Percentage of Proposed Land Use (%)	
Total Developed Area of Agra							
Residential	4886.34	61.84	9039.55	55.95	9923.80	49.53	36-38%
Commercial	207.62	2.63	855.16	5.29	544.17	2.72	5-6%
Industrial	542.72	6.87	775.00	4.80	1606.31	8.02	7-8%
Public / Semi-Public	1020.55	12.92	175.83	1.09	2271.80	11.34	10-12%
Transport	858.65	10.87	2478.34	15.34	2161.60	10.79	12-14%
Heritage	116.48	1.47	151.41	0.94	294.66	1.47	-
Recreational + Green Areas	199.43	2.52	336.39	2.08	1296.98	6.47	14-16%
Public Utilities	69.60	0.88	89.38	0.55	288.53	1.44	-
Other	0	0	2256.15	13.96	1649.14	8.23	-
Total of Developed Area	7901.39	100.00	16157.22	100.00	20,036.99	100.00	-
Total Developed and Undeveloped Area of Agra							
Developed Area	7901.39	15.19	16157.22	34.15	-	-	-
Other undeveloped area (Agricultural, Forests, Rural Residential areas, Open Land, etc.)	44119.24	84.81	31153.34	65.85	-	-	-
Grand Total of Developed and Undeveloped area	52020.63	100.00	47310.56	100.00	-	-	-
Source	Agra Master Plan 2021		Primary Survey by SPA Delhi, 2018		Agra Master Plan 2021		URDPFI Guidelines 2015, Vol.-1

Source: Agra Master Plan 2021, URDPFI Guidelines 2015 Vol-1, Primary survey and preliminary analysis by SPA Delhi 2018. Note: As per Agra Forest Department, the area of Taj Forest Block is 183.10 Ha, Acquired/ Ceiling Land is 32.936 ha and total area is 216.036 ha. Internal Road layer has been integrated with the adjacent/corresponding land use. Hence, the transportation percentage may vary on ground.

Figure 3.13 Land Use Distribution of Agra for year 2001, 2018 and 2021



Source: Agra Master Plan 2021, Primary survey and preliminary analysis by SPA Delhi 2018.

3.2.4 Demographic Profile

The total population of Agra as per census 2011 was around 15.8 lakhs and the 2018 projected population estimate is around 18 lakhs. It is a 13.7% increase in 7 years. If the same trend continues, the projected population of 2051 is estimated to be around 28 lakhs. As the city continues to urbanize rapidly, there will be a greater need to reinforce the growing demands of the growing population particularly for basic infrastructure like housing, transportation, social and physical infrastructure.

Table 3.12 Demographic Profile of Agra

Sl. No.	Name of Cities	Class	Area (Ha.)	Population 2011					Density
				Total	Male		Female		
					Population	Percentage	Population	Percentage	
1	Agra (M. Corp.)	I	12057	1585704	845902	53.35	739802	46.65	132

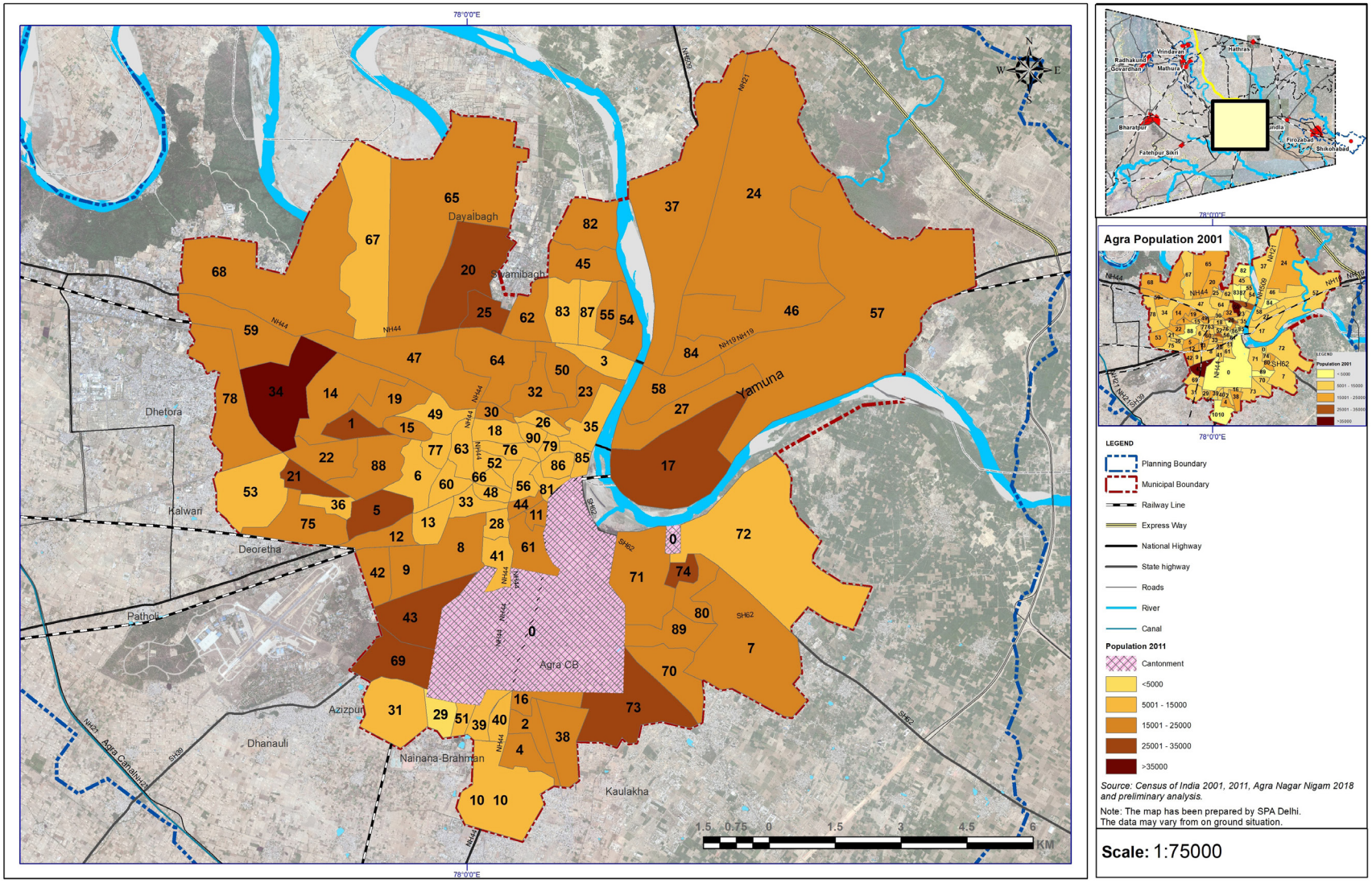
Source: Census of India 2011. (Note: M. Corp = Municipal Corporation)

Table 3.13 Population Projection of Agra till 2051 (using Linear Trend Method)

Sl. No.	Name of Cities	Population Projection						
		2001	2011	2018	2021	2031	2041	2051
1	Agra (M. Corp.)	1275134	1585704	1803103	1896274	2206844	2517414	2827984

Source: Census of India 2011 and Preliminary analysis 2018. (Note: M. Corp = Municipal Corporation)

Map 3.14 Population of Agra, 2011



Source: Census 2011

3.2.5 Socio-Economic Profile

The work force participation rate (WFPR) of the city is 32.59%. Based on the 2011 Census data, the occupational structure of the city shows that the majority (86.29%) of the population is engaged in tertiary sector, 5.3% of the pollution is engaged in primary sector and 8.32 % in the secondary sector. The percentage share of non-workers is 67.43% which is a high number.

3.2.6 Settlement Pattern

The new residential colonies are being developed by Agra Development Authority and Avas Vikas Parishad in Agra Nagar Nigam.[21] As the core city is dense, the peripheral areas are gradually attracting attention due to better planned infrastructure facilities. However, there is a substantial amount about 3.3 lakhs housing shortage that has been estimated for the year 2011.

About 33% of Agra's population resides in slums as per 2011 census data. More than 90% of the slums are occupied on state government land, out of which 84% of slums have legal land rights and 7% are occupied on public land. About 51% are notified slums while the remaining 49 are non-notified. About 50% houses in slums are pucca with brick wall, PCC flooring whereas the rest 40% people live in jhopris or shacks. Existence of squatters is also prevalent in many parts of the city. They are migrants from nearby villages and towns.[22]

Table 3.14 Slum Profile of Agra 2011

Sl. No.	UA Name	Total Population	Total No. of Households	HH Size (Person per HH)	Slum Households	Percentage of Slum Households
1	Agra (M. Corp.)	1585704	267945	5.9	89600	33.44

Source: Census of India 2011. (Note: HH = Household, M. Corp = Municipal Corporation)

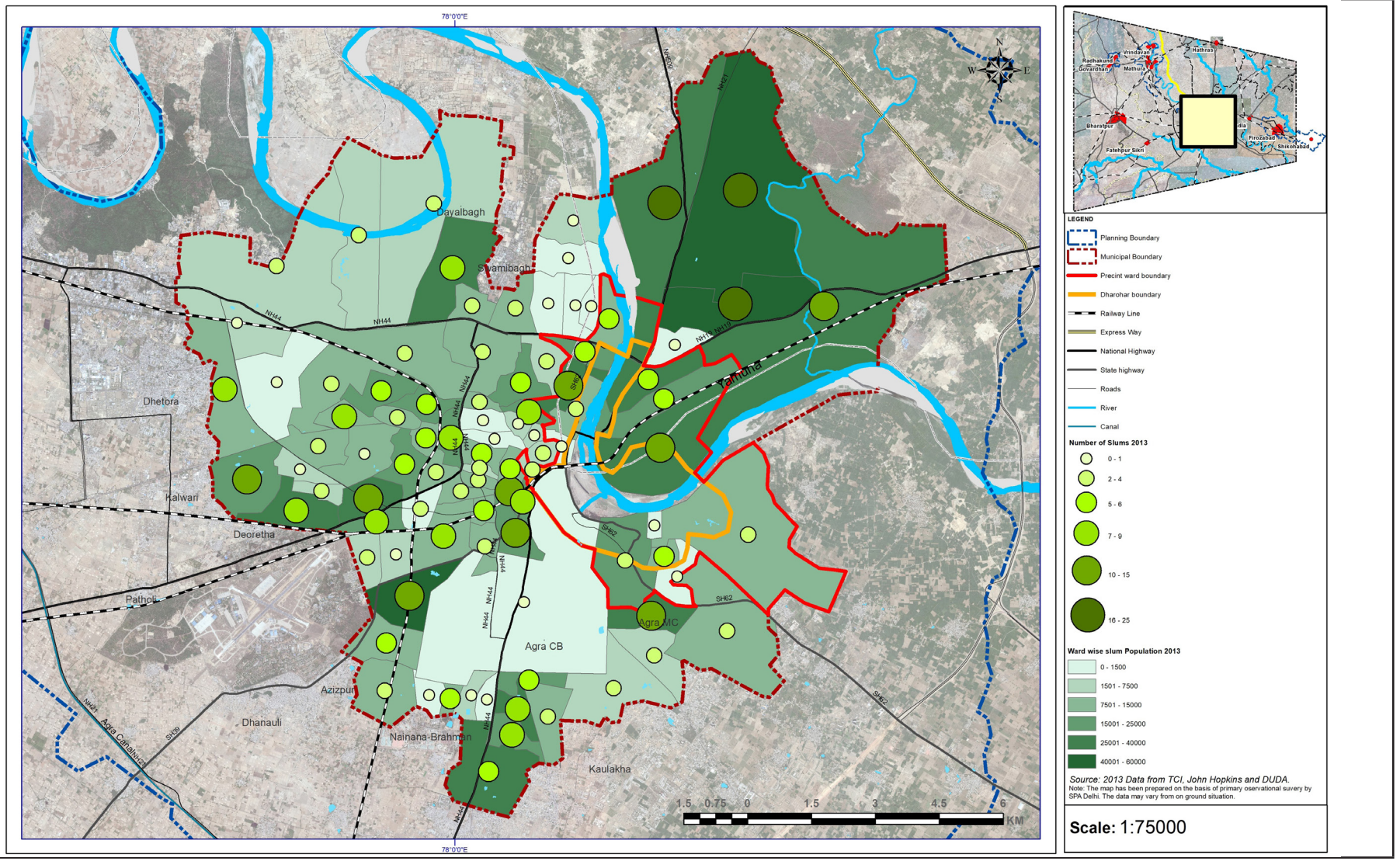
3.2.7 Social and Physical Infrastructure

The City's social and physical infrastructure are inadequate and do not meet the current demand of its people and visitors. As per Agra Municipal Corporation, the following are the existing infrastructure details:

21 Census of India, 2001 and 2011; Agra Master Plan 1971 and 2021

22 Slum Free City Plan of Action – Agra by Regional Centre for Urban and Environmental Studies (RCUES) 2011

Map 3.15 Slums in Agra



Source: Census 2011, ADA

Water Supply System

Agra has 3 water supply zones with 26 sub zones. Only 85 % of the area is covered by piped water network. There are two operational Water Treatment Plants in Agra. One in Jeoni Mandi and the other at Sikandra. Hand pumps and tankers meet the water requirement in Sikandra-II, Bodla-II, Shahganj-III, Tajganj-II & III, Trans Yamuna-II & Ghatwasan-II areas as treated water supply facilities are not available.

Sewerage System

The City is divided into 8 sewerage districts; North zone, West zone, Central zone, Tajganj zone, South Zone-I, South zone-II, South zone-III and East zone. These 8 districts are further divided into 25 subzones. There are 9 STP's having the capacity of 220.75 MLD are functional and treating about 143 MLD sewage.

As per Municipal Corporation of Agra (2018), the city has successfully eradicated open defecation. The construction of public toilets is in process. Responsibilities of cleaning and maintenance of public toilets is given to five organizations. Fines have been enforced for open defecation (Source: Agra Nagar Nigam, 2018).

Agra has total 818.99 Km drains, out of which only 48% are of RCC structure. The tapping of 21 drains has been done currently by the Agra Nagar Niagam 2018.

Storm Water System

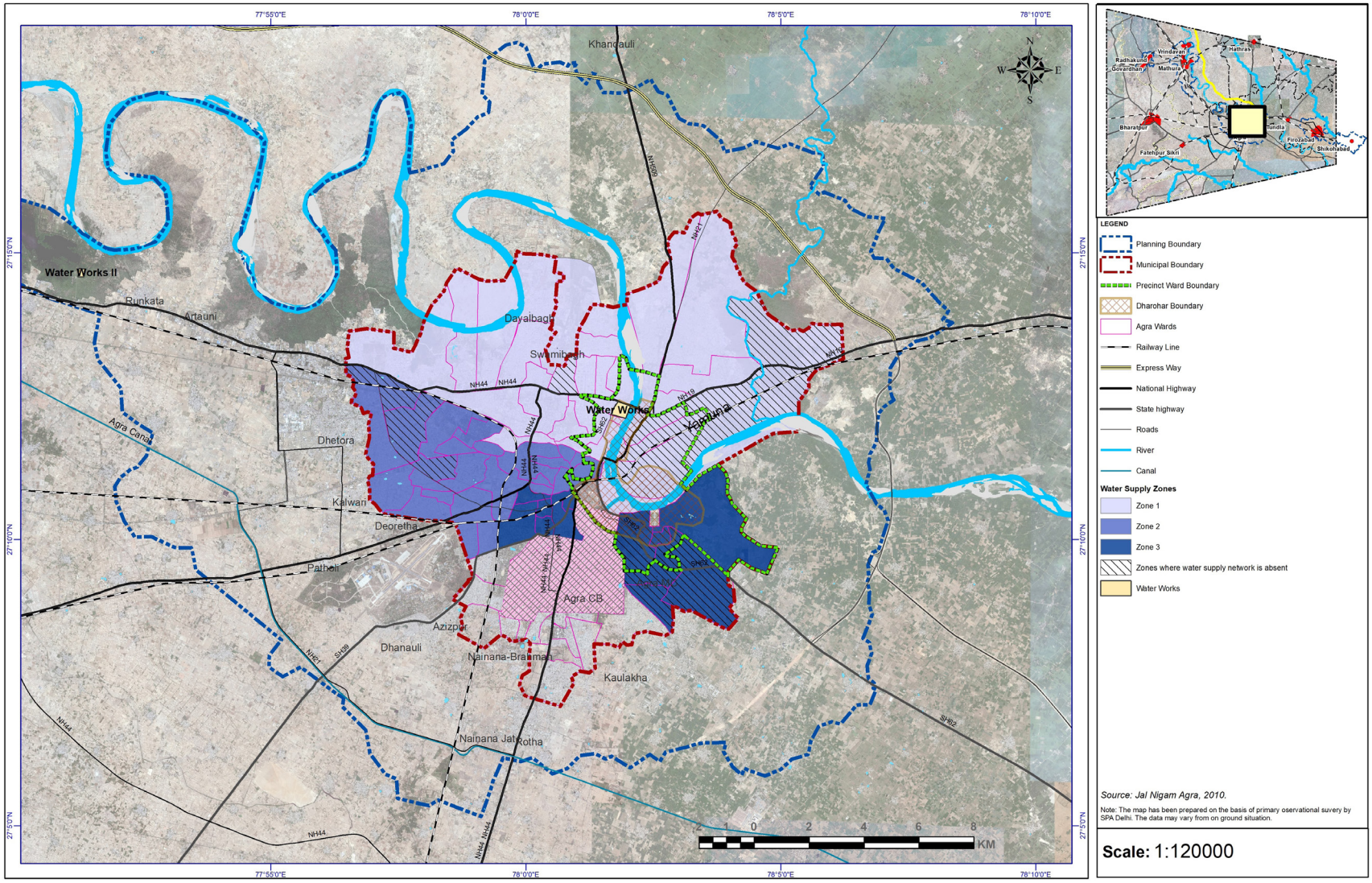
The storm water system of Agra is more than 55 years old. The waste is tapped near Kolhai & the entire discharge at that point is taken to a STP for treatment (Source: Jal Nigam Agra 2018).

Waste Management System

Waste to Energy Plant of 10 MW (extendable up to 15 MW) with electricity generated from 500 TPD (extended up to 750 MTD) has been proposed for disposal of the city waste. By 31st Dececmber 100% coverage is expected. (Source: Nagar Nigam Agra 2018).

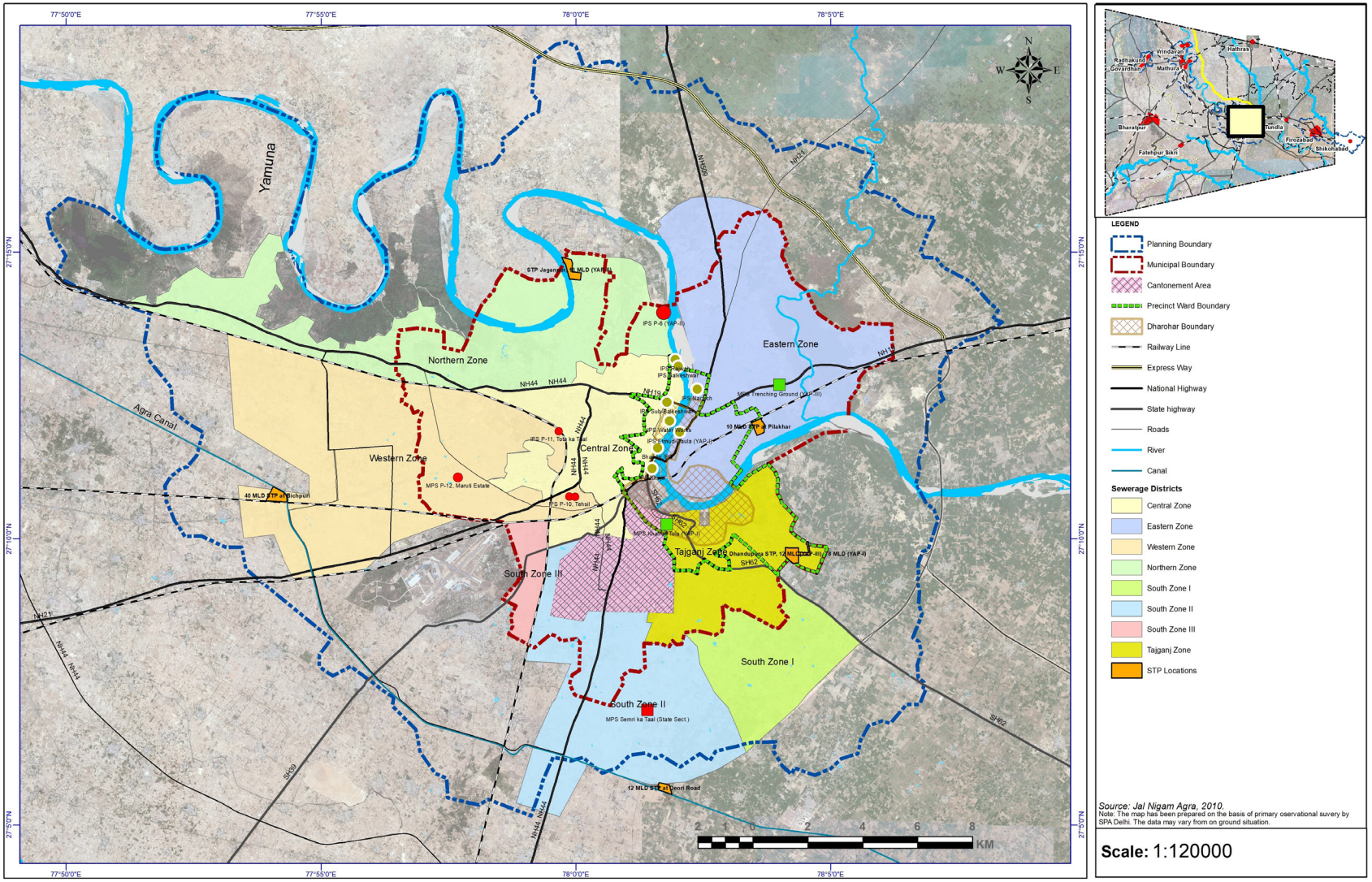
Five agencies collect solid waste by door-to-door collection method, covering 89.05 % of total households in the city. Currently all the city waste is disposed in Kuberpur Landfilling site, producing 20 MTD compost per day.

Map 3.16 Agra Water Supply Zone



Source: Agra Master Plan

Map 3.17 Sewerage System of Agra



LEGEND

- Planning Boundary
- Municipal Boundary
- Cantonement Area
- Precinct Ward Boundary
- Dharohar Boundary
- Railway Line
- Express Way
- National Highway
- State highway
- Roads
- River
- Canal

Sewerage Districts

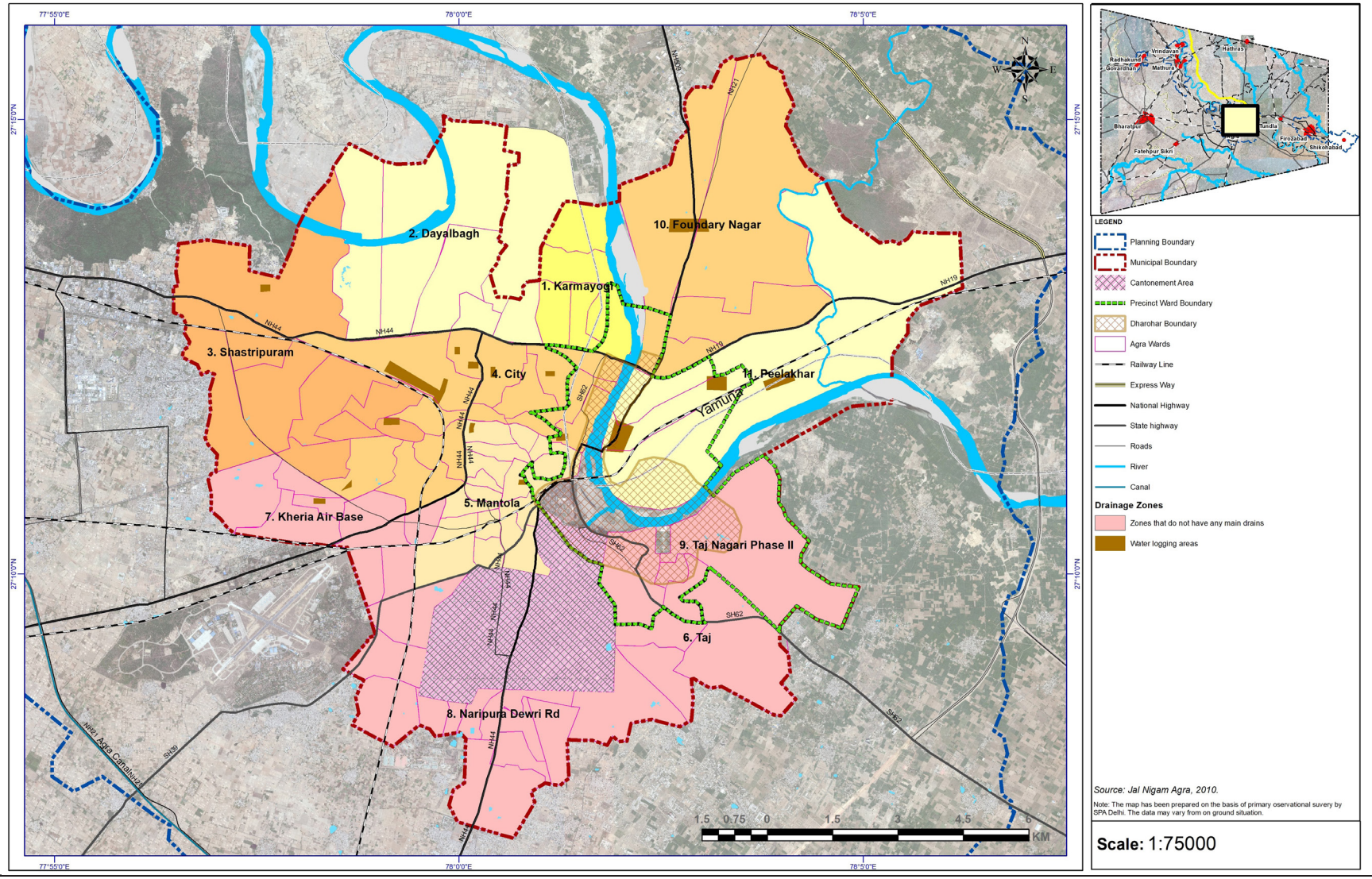
- Central Zone
- Eastern Zone
- Western Zone
- Northern Zone
- South Zone I
- South Zone II
- South Zone III
- Tajganj Zone
- STP Locations

Source: Jal Nigam Agra, 2010.
Note: The map has been prepared on the basis of primary oservational suvery by SPA Delhi. The data may vary from on ground situation.

Scale: 1:120000

Source: Agra Master Plan

Map 3.18 Drainage Zones of Agra



Source Agra Master Plan

Electricity

About 90% of the City has electricity supply connections. Electricity supply to the City is provided by Torrent Limited. About 443102 household are electrified in Agra town. Uttar Pradesh Saubhagya Yojna power for all scheme free electricity connection is another vital project that has been taken off to eradicate the issues of electricity supply in the region. Pradhan Mantri Ujjawala Yojana for free gas connection has also been implemented in the rural areas of the region.

3.2.8 Trade And Commerce

Agra has a booming craft industry that has been passed down from one generation to another since the time of Mughal Emperor Babur's reign. These royal crafts have become a legacy and are as much a heritage as are the monuments. Pietra Dura, marble inlay, leather shoes, carpets, zari and zardozi (embroidery work) are the major activities. Agra is known for its sweets (Petha and Gajak) and snacks (Dalmoth), garment manufacture and automobile industry. The city center at Agra has jewelry and garments shops. The sadar bazar has the oldest leather shoe store. The silver and gold jewelry hub is at Choube Ji Ka Fatak. The Shah Market houses the electronics market while Sanjay Place is the trade center of Agra. There are more than 50,000 shops and commercial establishments registered at Nagar Nigam. There are garment making (dry process) hand embroidered bag-making that is also practiced in parts of the city (Source: Secretary, UP Govt. Agra). Under the Smart City Agra mission, three street vending zones has been identified as i) Fatehabad Road near Vishal Mega Mart, ii) Double Tree by Hilton near 100-foot road Basai Sabji Mandi, and iii) Vibhav Nagar, Flower Mandi near Amar Hotel (Agra Nagar Nigam, 2018).

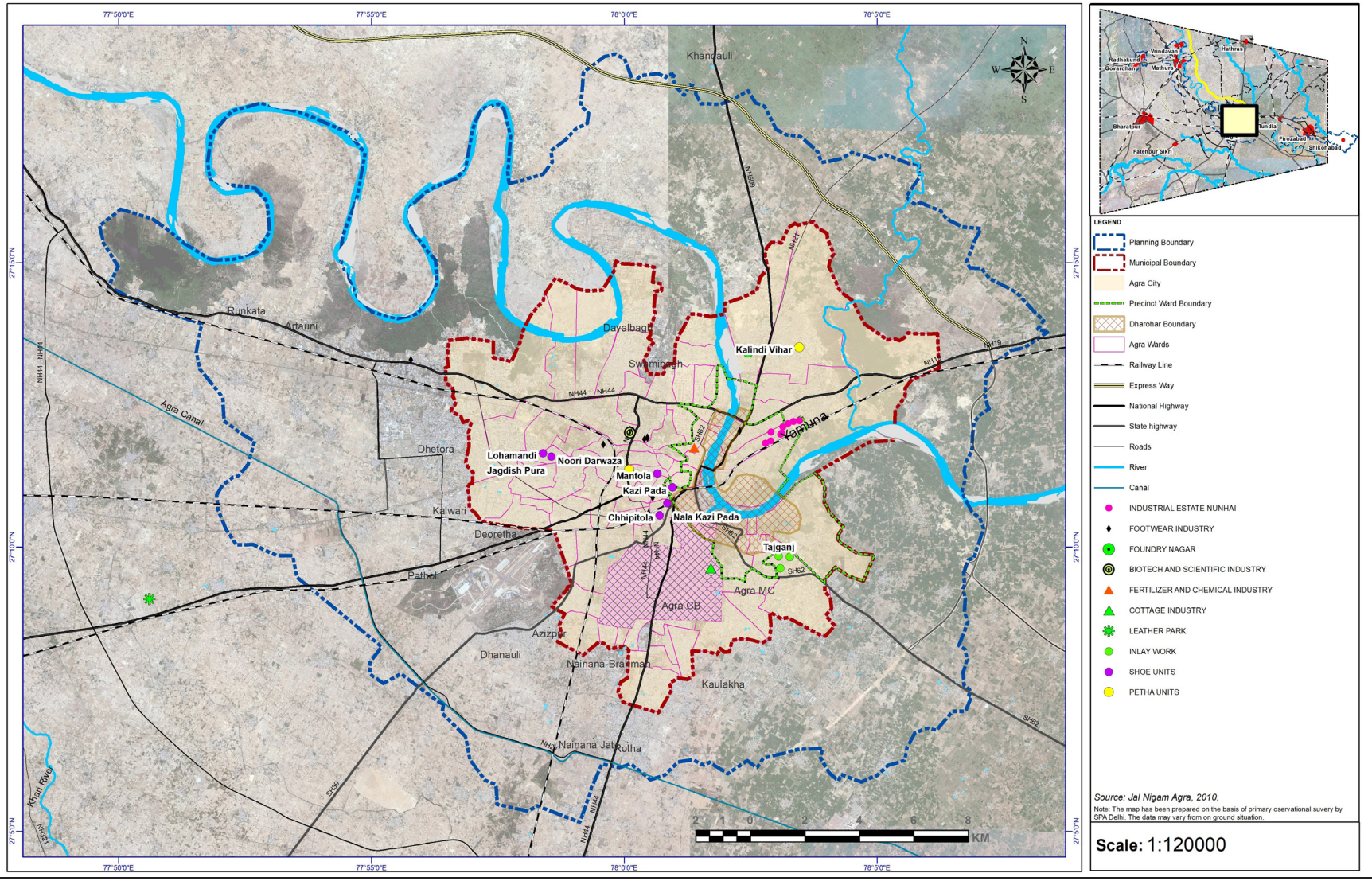
3.2.9 Industry

There are 6787 registered industries in Agra District.[23] Industries in Agra include: Foundries, Chemical, Automobile, Petha and Snacks, Food industry, Shoe Industry, Automobile among others.

Creative industries in Agra include: Leather Craft, Marble Work, Carpet Work, Brassware, Zari work, Dari work, Bone Articles, Dyeing and Cloth Printing, Wooden Ornamental work, Jewelry Craft, Cane and Bamboo Craft, Chikan work Textiles, China Clay items.

23 Source: Joint Commissioner of Industries, Agra Division, Agra, 2018. Note: The above data is available only at District level and not the City level.

Map 3.19 Location of Industries in Agra



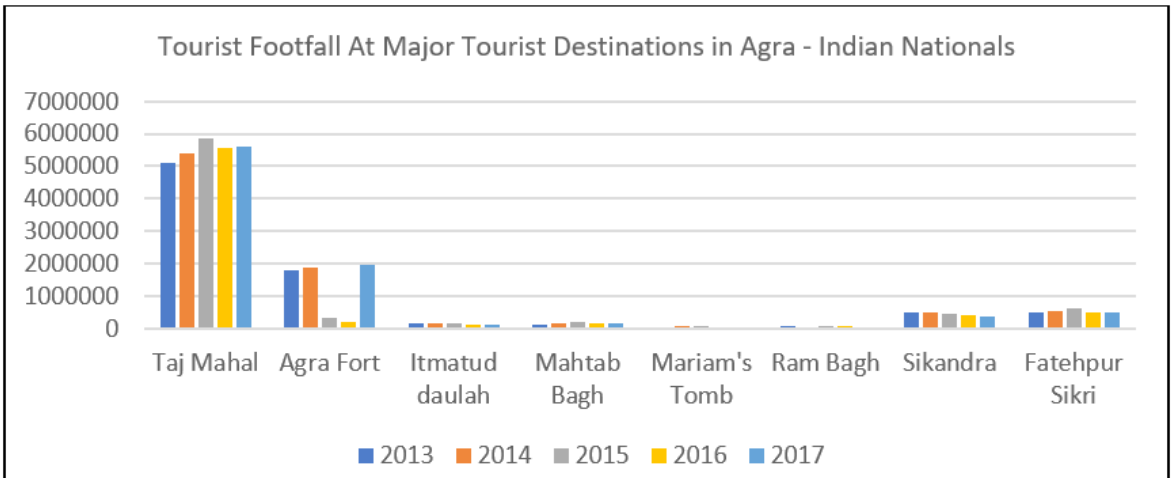
Source Agra Master Plan, Primary Survey, 2018

3.2.10 Tourism

The city of Agra is one of the three major cities of the prime tourist circuit in India (Refer Map No. 26 in Vol III), The Golden Triangle. Delhi and Jaipur are the other two cities that form the golden triangle. Statistics based on data from UP Tourism have indicated Taj Mahal as the main attraction in the city and has an average of 62,28,721 visitors per year (As per data of 2013-2017). A per day footfall at Taj Mahal peaks to 60, 000 to 70,000 visitors in peak season. The other attractions in the city are Agra fort, Itmad-ud-Daulah, Mahtab Bagh, Sikandram Mariam's Tomb and Ram Bagh. Fatehpur Sikri, though not in Agra, is a popular destination most visitors club with Agra. As per the 2017 Tourism Policy of Uttar Pradesh Government, seven new circuits are being introduced, which includes the Heritage Arc connecting the cities of Agra, Lucknow and Varanasi.

For tourism, drinking water scheme for the tourist is also being provided for 130 km by JAICA.

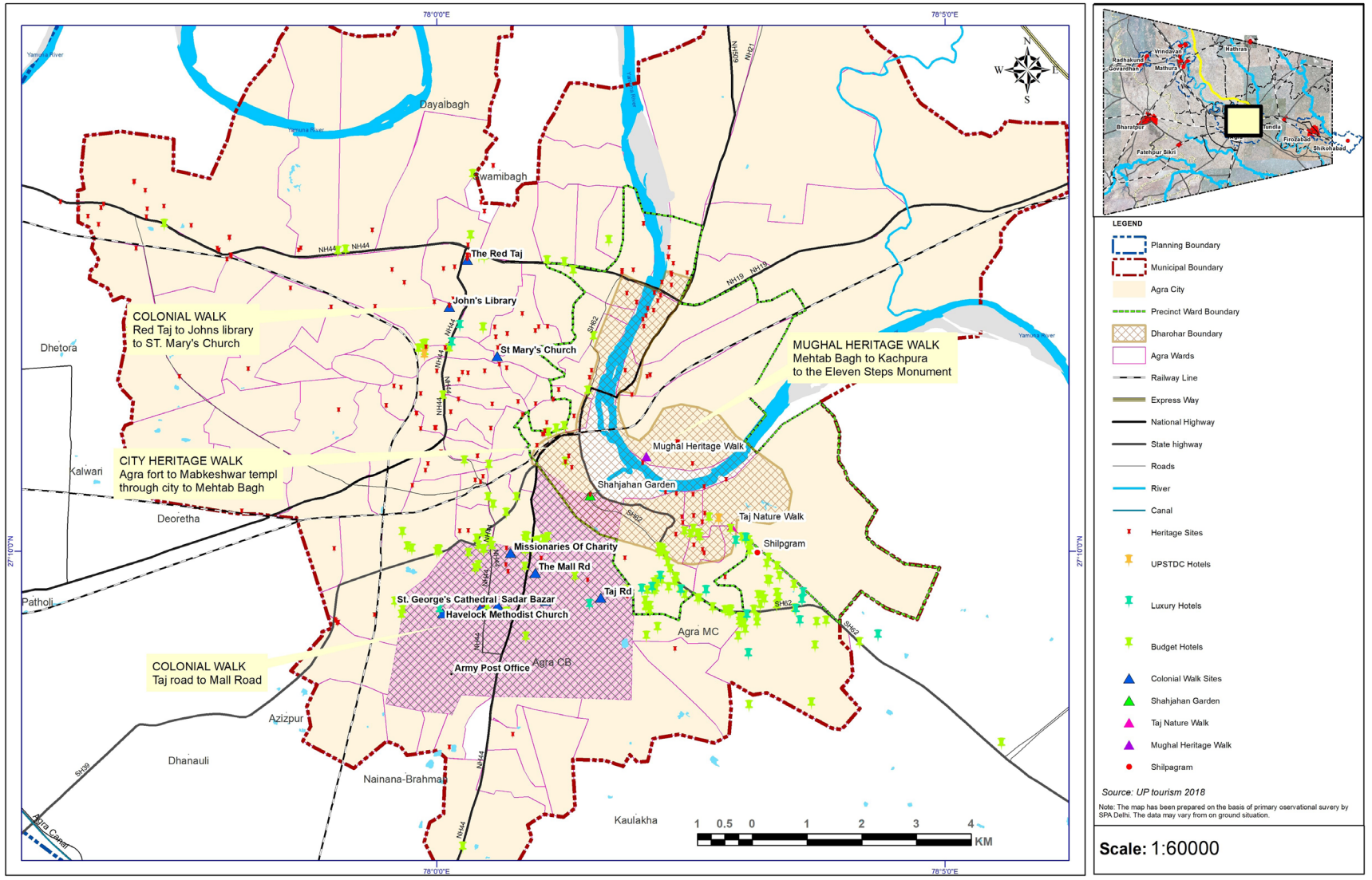
Figure 3.14 Tourist Footfall at Major Tourist Destinations in Agra - Indian Nationals



Source: UP Tourism, and Preliminary Analysis

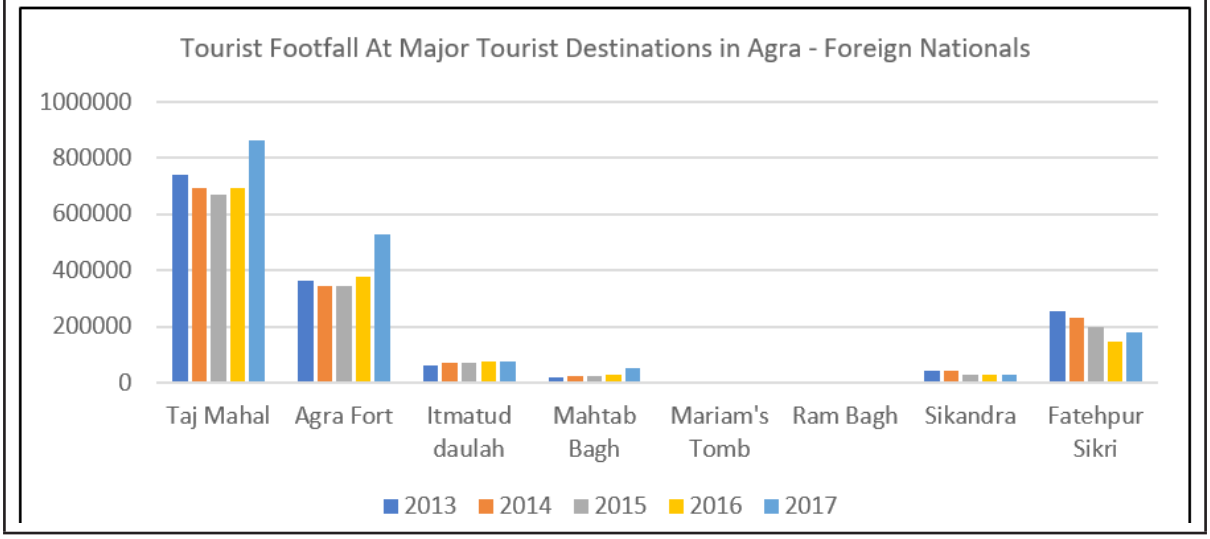
In order to attract tourists, pro tourist projects have been proposed and implemented like the international Golf course, stadiums, heritage walks but not much has been done towards the development of sustainable tourism in the core and the precinct area.

Map 3.20 Location of Tourists Places



Source: Primary Survey, 2018; SPA, Delhi

Figure 3.15 Tourist Footfall at Major Tourist Destinations in Agra - Foreign Nationals



Source: UP Tourism, and Preliminary Analysis

3.3 Precinct Level

3.3.1 Introduction

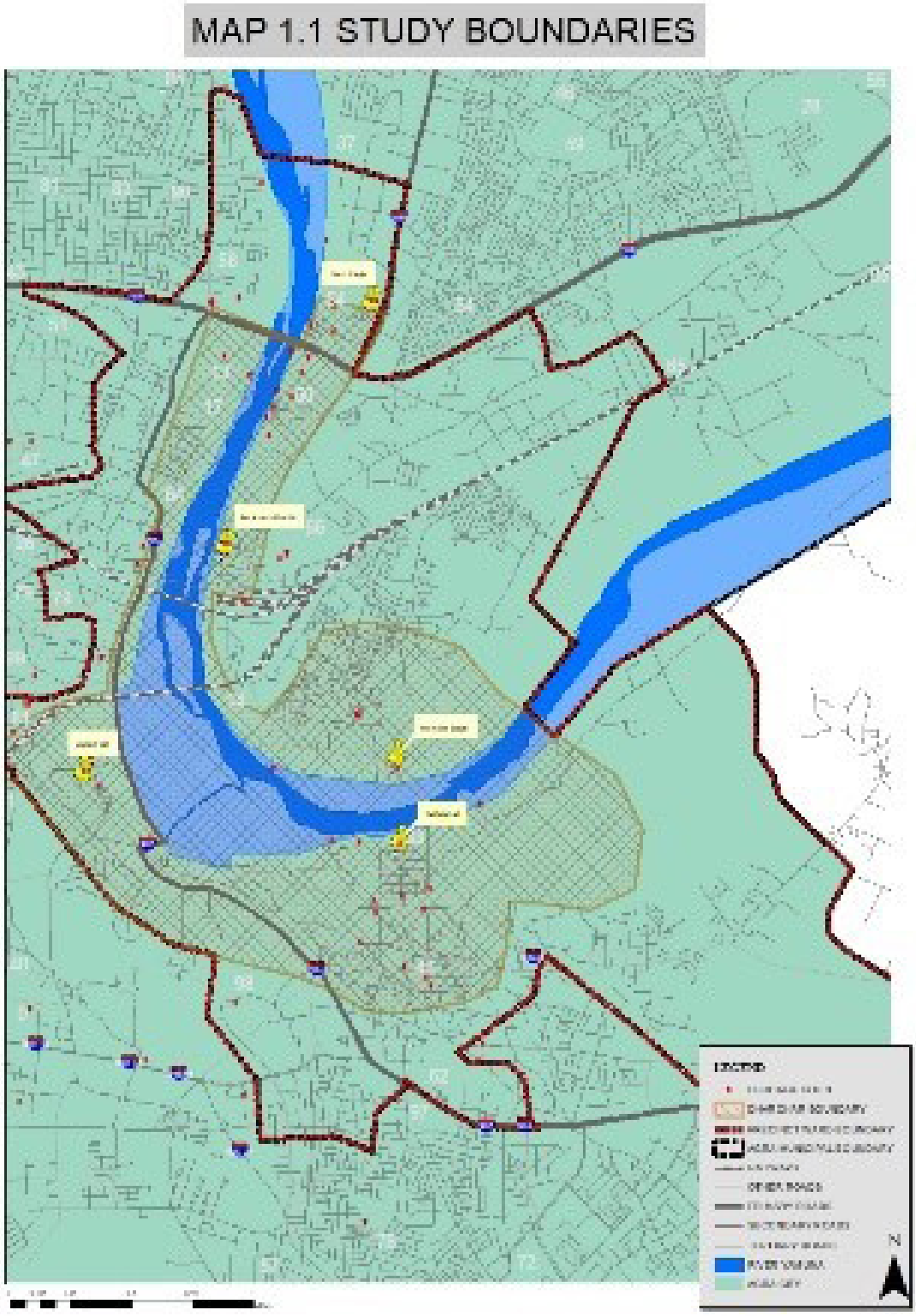
'The Precinct' is one of the three delineated study areas for developing the TTZ Vision document. As the word 'precinct' summarizes, the precinct zone comprises of the immediate regulated zone around the prominent heritage sites of Agra, which includes The River Yamuna, The Taj Mahal, The Agra Fort, Mehtab Bagh, Itmad-ud-daulah and Ram Bagh. 'Regulated area' means "an area near or adjoining a protected monument which the central Government has, by notification in the official gazette, declared to be a regulated area, for purpose of mining operation or construction of both."[24] The Central Government has declared up to 100 meters from the protected limits to be prohibited area and further beyond it up to 200 meters to be regulated area for purposes of both mining operation and construction around heritage sites of significance.

The Agra Precinct as adopted in this Vision Document, constitutes the core precinct and adjoining areas along the River Yamuna, encompassing the 'Taj Dharohar Kshetra' or the Heritage zone delineated in the Agra 2021 Master Plan as a strategy to protect the heritage sites of global and national importance. Further, from planning perspectives, the extended precinct boundary has been defined by the ward boundaries that include, whole or part of the Agra Precinct. The Other important precincts in the city are the Old City of Agra that forms the extended layer of the precinct because of its heritage value and historic character. The cantonment area reminiscent of the colonial period

24 Source: Archaeological Survey of India

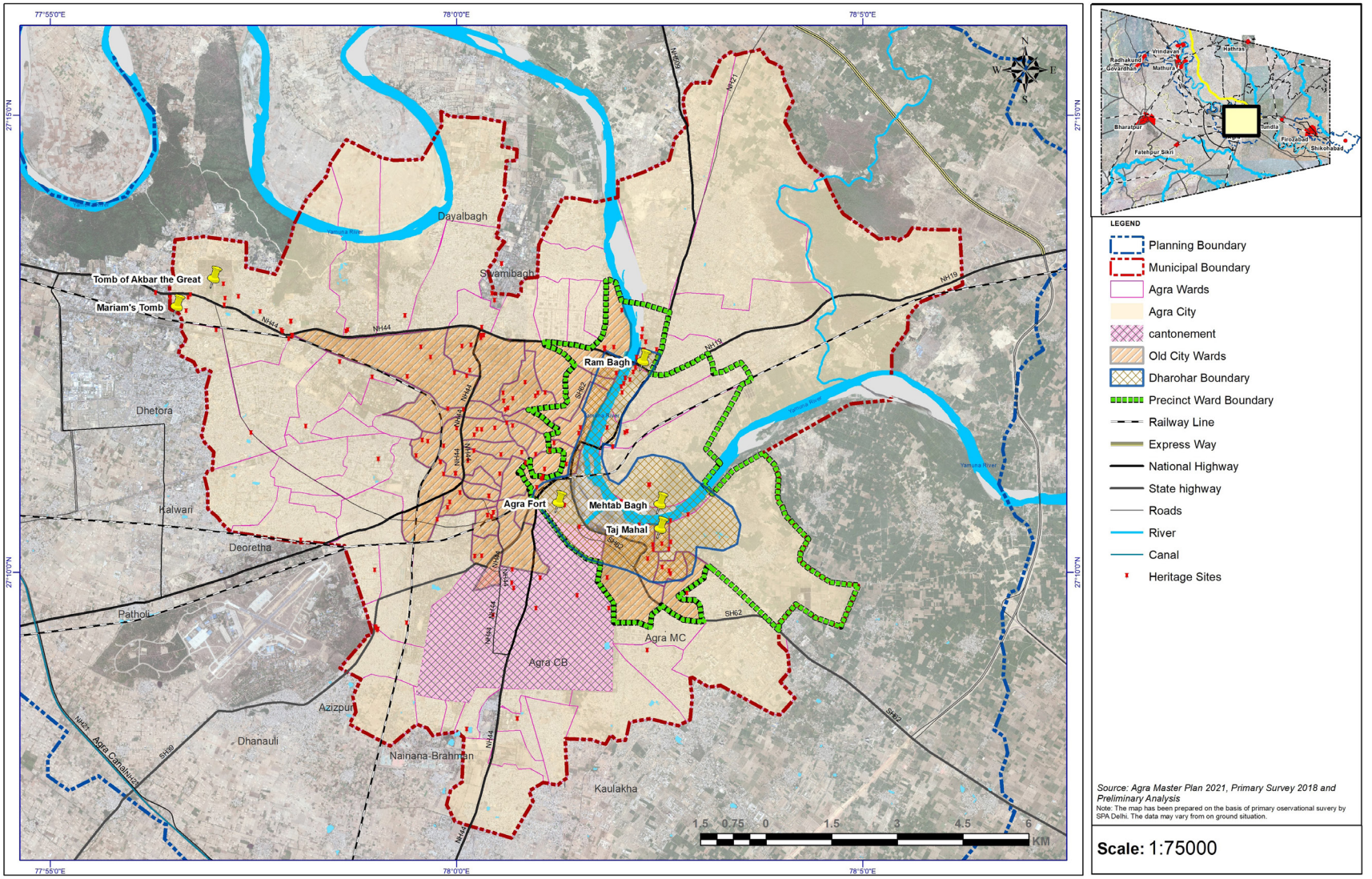
is the second extended layer of the precinct. Unlike the old city, this part has been well preserved and conserved. Most of the heritage buildings from the colonial period are used as administrative offices.

Map 3.21 Vision Plan Boundaries



Source: Primary Survey 2018 and Master Plan 2021

Map 3.22 Precinct Boundary Delineation



LEGEND

- Planning Boundary
- Municipal Boundary
- Agra Wards
- Agra City
- cantonement
- Old City Wards
- Dharohar Boundary
- Precinct Ward Boundary
- Railway Line
- Express Way
- National Highway
- State highway
- Roads
- River
- Canal
- Heritage Sites

Source: Agra Master Plan 2021, Primary Survey 2018 and Preliminary Analysis

Note: The map has been prepared on the basis of primary oservational suvery by SPA Delhi. The data may vary from on ground situation.

Scale: 1:75000

Source: SPA, Delhi

Map 3.23 Agra Master Plan 2021 “Dharohar Kshetra”

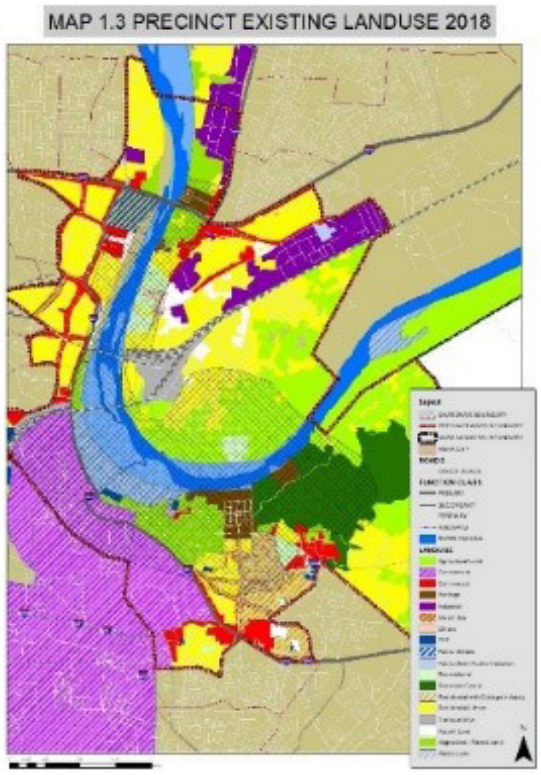


Source: Primary Survey 2018 and Master Plan 2021

3.3.2 Land-Use

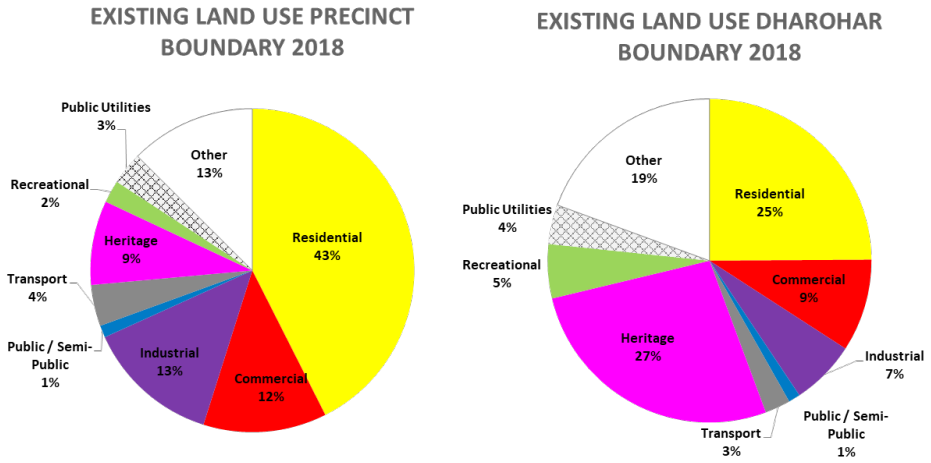
About 10% of the Land within the ‘Dharohar Kshetra’ boundary is water body, wetland and river. Agriculture, forest cover and reserve forest comprise about 35% of the landuse. Heritage sites constitute of about 11% while residential covers around 25% landuse of which 10% use also generates income through home-based cottage industry 5% land use is industrial.

Map 3.24 Existing Land-use of Precinct Zone



Source: Primary Survey 2018 and Master Plan 2021

Figure 3.16 Existing Land Use Distribution of Precinct Ward Boundary and Dharohar Boundary 2018



Source: Primary Survey and Preliminary Analysis by SPA Delhi 2018.

Table 3.15 Existing Land Use of Precinct Ward and Dharohar Boundary 2018

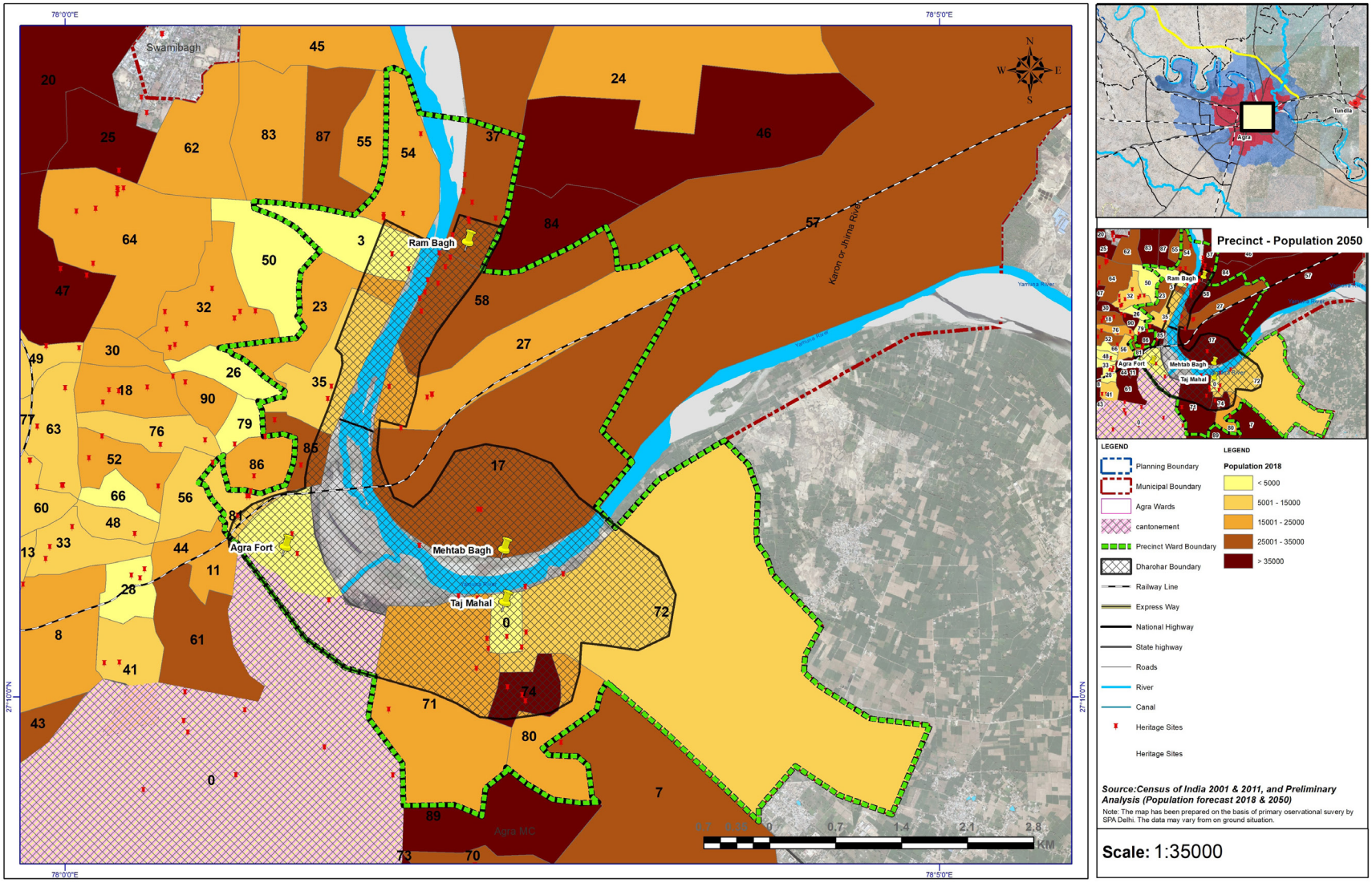
Land Use	Precinct Ward Boundary 2018		Darohar Boundary	
	Area (Ha.)	%	Area (Ha.)	%
Residential	545	42.56	95	24.90
Commercial	158	12.33	35	9.24
Industrial	171	13.35	25	6.48
Public / Semi-Public	15	1.21	5	1.18
Transport	53	4.12	10	2.53
Heritage	108	8.42	102	26.90
Recreational	29	2.24	21	5.41
Public Utilities	41	3.24	15	3.93
Other	160	12.53	74	19.41
Developed Area	1280	100.00	381	100.00
Agriculture	561	50.58	103	20.15
Vegetation/Forests Land	110	9.94	90	17.65
Reserved Forests	171	15.38	98	19.18
Water Bodies/ Wetland/ River	228	20.56	181	35.37
Waste Land	39	3.53	39	7.65
Undeveloped Area	1109	100.00	512	100.00
Total Area				
Developed Area	1280	53.58	381	42.65
Undeveloped Area	1109	46.42	512	57.35
Total Area	2389	100.00	892	100.00

Source: Primary Survey and Preliminary Analysis by SPA Delhi 2018.

3.3.3 Demographic Profile

As observed from the census data of 2001 and 2011, 26% of Agra's population of is concentrated in the old city and 12 % in the precinct.

Map 3.25 Precinct Population, 2018



Source: Primary Survey, 2018

3.3.4 Socio-Economic Profile

Majority of the working population in the slums is engaged in tertiary sector which comprise of wholesale businesses, home based small scale businesses and vending activities. Jobs such as tourist guides, rickshaw pullers, sweepers, street vendors, souvenir makers Women particularly, are involved in tertiary activities such as domestic help and petha making. In addition, a part of the slum working population is involved in industrial activities such as shoe making, leather goods manufacturing and other ancillary industries supporting foot wear."[25]

3.3.5 Slum Profile

Katra Wazirpura, a colony near itmad-ud-daulah is the city's largest slum with a population of more than 13,000 (as per a DPR conducted for the RAY project 2012-13). The RAY (Rajiv Aawas Yojana) survey conducted in 2011, noted that about 56% of the population of Agra lives in slum with an average household size of 6.4 persons per household. Most of the slum developments are concentrated in the precinct area or close to the precinct. The prominent colonies in the precinct include Kachpura, Tajganj, Dhandupura, Telipada, Vibhavnagar, Belanganj, Motiganj and Rawat Pada. Majority of these settlements are tenured slums on government land.

25 RAY Survey



B

Part B - Issues at TTZ, Agra, & Taj Precinct Level

4. ISSUES AT TTZ, CITY LEVEL & PRECINCT LEVEL

4.1 Regional Level Issues

4.1.1 Introduction

The TTZ lies in semi arid biogeographic zone and has a steady rise in resident and tourists population. As per Census 2011, the area has a population of 1 crore with 32% in urban areas. The gross density is 965 persons per sq. km. which is higher than the State/District average. Due to this there would be continuous pressure on the resources - land, air, water, and biotic resources. As detailed in Part A, the ground water is depleting. Most of the urban areas show high dust concentration and the forests cover is less than 10%. Any development trajectory would have to address the above aspects.

4.1.2 Urban Planning Issues

4.1.2.1 Introduction

Decadal projections based on census data predicts rapid growth in the TTZ considering the continuance of the current trends. This rising growth curve may result in excessive pressure on land and resources if suitable planning and development goals are not set for the region to sustain this growth and holistically deal with issues of environmental degradation, economic deprivation, waste management and functional space planning. The physical, social and infrastructural details of all chosen cities have been provided in Annexure I.

4.1.2.2 Urban Development and Land Use Pattern

In the last couple of decades, the TTZ has witnessed major transformation in terms of growth and development. While urbanization has seen a rapid rise, the region has faced many developmental issues and challenges. Most of the cities in the region are a result of planned and unregulated urban growth that has led to tremendous infrastructural pressure within the core cities of the region. Non-conforming uses, substantial dearth of recreational and open spaces, encroachment, congestion and squatter developments have emerged as major challenges.

A. Unregulated urban growth and development in the core areas

Areas adjacent to market centres and old core city areas experience a continuous play of centripetal and centrifugal forces exerted by impacts of urbanization. Heavy concentration of activities in the cores have led to dense residential growth, non-

conforming mixed uses and unregulated, haphazardly built vertical and lateral developments, particularly in close proximity to religious places and the river, thus straining the limited existing infrastructure facilities. The cores, being the nucleus of the cities are in great risk of collapse under the impact of unmet rising demand for housing and infrastructure needs which is rapidly threatening all the cities of TTZ.

B. Violation of land-use codes and unauthorized non- conforming uses

The land use allocations are limited to, on paper master plans and not strictly adhered to, on ground. The ground reality indicates violations in land-use and zoning codes. Allocated lands are being used for purposes other than intended in the Master Plans. Primary surveys have indicated that in the TTZ, industrial estates have been infiltrated by unauthorized residential development. The residential zones are encroached by unmonitored commercial and mixed-use development, open and green spaces, public and semi-public land uses have been intruded by residential or commercial activities, agricultural land and reserved green covers are taken in possession by realtors and heritage sites are occupied by squatters.

Master plans are prepared after thorough analyses of development requirements of a city or region. The land uses are prepared to accommodate these needs within a technical and spatial framework. It becomes pertinent to follow the codes to ensure an orderly and rational development for creating sustainable settlements.

C. Degenerative impact of urbanization on the river

The river Yamuna's role in TTZ is pivotal. It is symbolically and physically contributing to the economic, religious and social development of the TTZ. Yet, this very aspect has also led to its degeneration. While being the heart of the religious cities of Mathura and Vrindavan, the river is prominent in all religious ceremonies and invites thousands of devotees daily but the ghats of the river are not cleaned or maintained. The river is the key link of the heritage establishments of Agra, yet its banks have lost the heritage frame while serving the daily domestic needs of its people. While the river is the major source of water for the settlements in TTZ, it is also the unfortunate receptor of the untreated wastes of the settlements it feeds. Haphazard new developments and non-conforming uses along the Ghats and banks are polluting and destroying the riverine system and its bio diversity.

4.1.2.3 Development along Yamuna Expressway

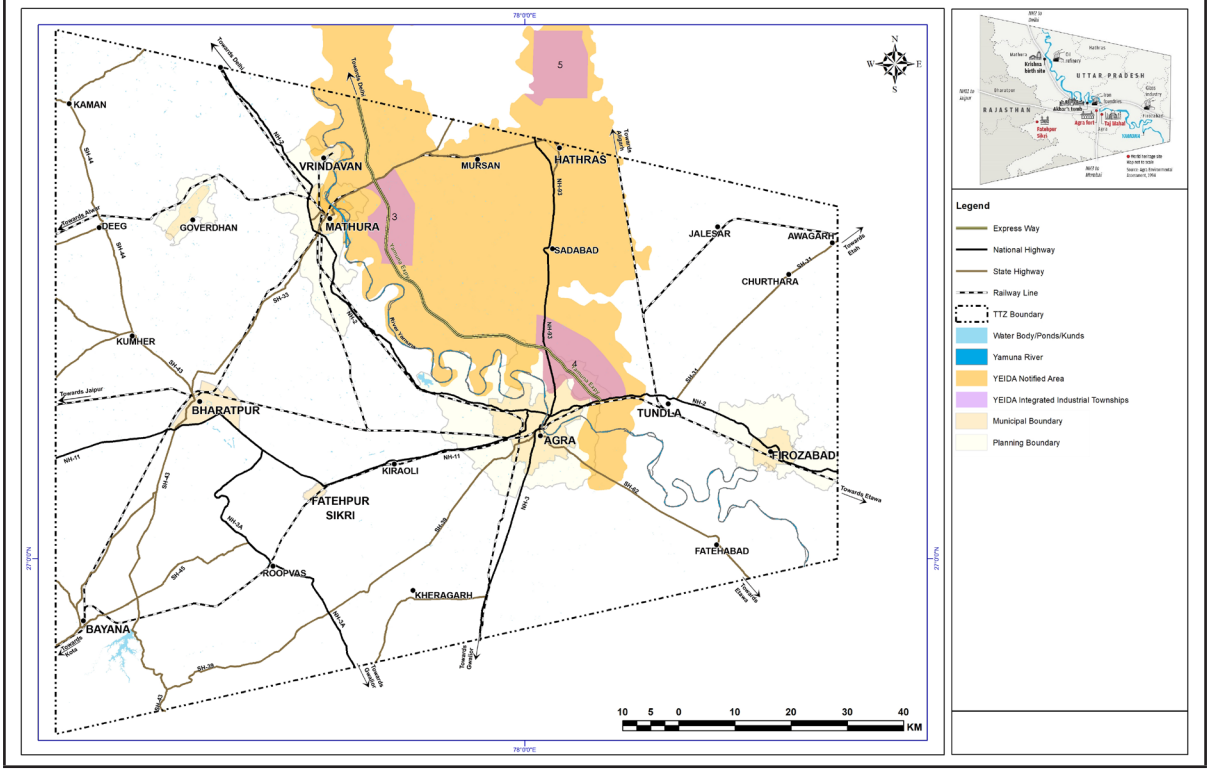
There is a need to understand the implications of the type of industries that are being approved in various developmental proposals. Land use plans being approved for industrial development along expressways are a matter of great concern. Proposals

such as, the leather park, in the outer expressway master plan (Refer Map 2) along the Agra Ring Road, should be thoroughly reviewed to assess whether it conforms with the mandates of the TTZ industry guidelines. Also, new non-conforming industries, burgeoning along the expressways need to be assessed and monitored.

A. Unregulated Development along Yamuna Expressway

The proposed and on-going developments along the Yamuna Expressway has given rise to land speculations and inflated the value of land in the region particularly near the exits of the expressway inviting bulk acquisition of land by big industrial conglomerates and corporate houses[26]. About 413 ha of agricultural land lie wasted as vacant land due to speculation and appreciation in land dealing.[27] In the last five years, about 190 ha of area has hap-hazardly developed along the expressway with cold storages, warehouses and transport carrier hubs. Industries that were banned in the TTZ have been relocated along the expressway near Kosi Kalan, Chhata and Nandgaon which lie on the immediate vicinity of the boundary of TTZ. Development in the direction of NNE to NNW must be avoided to control emission towards Agra city.

Map 4.1 Development Strategies along Yamuna Expressway and Land Use Plans of RAYA 2031 and Outer Ring Road Agra 2031



Source: Real Insights: Real Estate Overview Yamuna Expressway April-2015 and Yamuna Expressway

26 Real Insights: Real Estate Overview Yamuna Expressway April-2015

27 Real Insights: Real Estate Overview Yamuna Expressway April-2015 and Yamuna Expressway Industrial Development Authority; Primary and Secondary Surveys 2018

B. Non-Conforming Industries Escalating Along Expressways

The infrastructure development plans along Yamuna Expressways shows a lot of growth potentials in the near future. New non-conforming industries like Man Made Fiber, Nitric Acid, Paints Industries, Sulphuric Acid, Manufacturing of Asbestos, Cement Plant, Caustic Soda, Fertilizer Industries, Integrated Irons and Steel, Oil Refinery & Petroleum Refinery, Pesticides Industries, Pharmaceutical Industries, Petro Chemical Industries, Synthetic Rubber - which are permissible beyond TTZ boundary as per YEIDA, are burgeoning along the expressways in Kosi Kalan, Chatta and Nandgaon need to be assessed and monitored. Proposals for industrial development along expressways are a matter of concern. There is a need to understand the implications of type of industries that are being approved in various developmental proposal.

For industries permissible beyond TTZ boundary as per YEIDA, Buffer Zone allocation should be mandatory as per the Hon'ble Supreme Court order dated 10.05.1996 in W.P. (C) 13381/1984 regarding brick kilns that industry should be established beyond 20 KM radius of any significant monuments of TTZ. Yamuna Expressway Industrial Development Authority Should be involved in preservation of TTZ area. YEIDA should allow only non polluting industry in the proposed industrial areas.

C. Critical Industries along Expressway:

The Integrated Industrial Township Development Plans along the Yamuna Expressway have proposed development in five zones in two phases. Zone 3 of the development plan lies along the expressway near Mathura –Vrindavan i.e. Raya Urban Centre while Zone 4 lies near Agra. The land use plan of Raya Urban Centre illustrates that an extensive industrial hub is proposed across Mathura – Vrindavan. The detailed land use plan for Zone 4 is not available. However, the land use plan along expressway near Agra as given in the Master Plan 2031 and the draft Master Plan of Outer Ring Road 2031, proposes industrial growth along it.[28]

4.1.2.4 Demographic and Settlement Pattern

The City centres and the oldest parts of the cities are the heart and brain of all the cities in the TTZ. Major activities and settlements are concentrated in the cores and are further attracting newer developments and economy generators in the core. A growing core is a good sign but a disorganized and unmonitored growth raises the red flag. While growth is evident in the core, the growth is unplanned and beyond

28 Real Insights: Real Estate Overview Yamuna Expressway April-2015 and Yamuna Expressway Industrial Development Authority; Primary and Secondary Surveys 2018

the capacity of the existing infrastructure. The growth is thus primarily inviting slums and slum like developments with limited access to basic urban and social services, housing and physical infrastructure. A staggering 31% of the population resides in slums in the TTZ as per census data.

A. Large Non-Working Population in the Region

As per Census 2011, the total population of the region is about 10 million with 4 million (40%) in urban areas and 6 million (60%) in rural areas. The socio-economic profile of the cities shows that about 70% of the population is literate and 30% illiterate. More than 65% of the population are in the non-working group while 30% are in the working group and about 5% are marginal labourers. Low labour force numbers in a region is a matter of critical concern. Maintaining a healthy economy of a city depends on its workforce and it is essential that the non-workforce numbers do not out number workforce numbers.

B. Lack of strategic planning and intervention

The settlement pattern in TTZ follows an organic pattern. While organic growth is essential for the life of a city the planning perspective is as vital. There needs to be a symbiotic relationship between organic growth, planning and governance to create a sustainable city. The ecological footprint of a city is measured by the social and physical infrastructure, the transportation system, sewerage and sanitation systems, water supply systems, institutional systems etc., which cannot be laid out organically and needs thorough technical and planned action. The TTZ currently lacks the coordination between organic growth and planned infrastructural foundation which is leading to system failures and shortage in meeting basic needs of its people. Citizen ownership of planned government initiatives and government support for citizen generated initiatives would be an ideal way forward to creating a balance.

Among the many infrastructural shortcomings, housing shortage is quite evident in the TTZ as can be observed below:

Table 4.1 Housing Shortage and Requirement in the Cities of TTZ 2011

Sl. No.	Name of City	Total Population	Total No.of Households	HH sizes (Person per HH) (=1/2)	Census Houses (residential)	Dilapidated Houses	Slum Households	Slum Houses	Housing Requirement for Slum Households (=7-6)	Total Population (including institutional and houseless population)	Houseless HH (=9/3)	Housing Shortage {= (2-4)+5+8+7}	Vacant Houses	Housing Requirement (=11-12)
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Agra (M.Corp.)	1585704	267945	5.9	228357	3825	89600	68219	21381	1585704	267945	332739	17986	314753
2	Mathura (NPP)	349909	59781	5.9	51841	1043	27597	20002	7595	349909	59781	76358	5240	71118
3	Hathras (NPP+OG)	143020	25402	5.6	23022	634	18844	NA	18844	143020	25402	47260	3575	43685
4	Firozabad (NPP)	604214												
5	Bharatpur (M. Cl. + OG)	252342	45818	5.5	42367	807	6805	5184	1621	252838	45908	51787	5584	46203
6	Vrindavan (NPP)	63005	11637	5.4	NA	NA	1762	1282	480	63005	11637	23754	NA	23754
7	Tundla (NPP)	50423	8744	5.8	NA	NA	451	308	143	50423	8744	17631	NA	17631
8	Govardhan (NP)	22576	3910	5.8	NA	NA	NA	NA	NA	22576	3910	7820	NA	7820
9	Fatehpur Sikri (NPP)	32905	4936	6.7	NA	NA	NA	NA	NA	32905	4936	9872	NA	9872
Total		3211502	546628		456436	10925	168231	112039	56192	3211998	546718	704027	39693	664334

Source: Census of India 2011 and Preliminary Analysis 2018. (Note: HH = Household, M. Corp = Municipal Corporation, NPP = Nagar Palika Parishad, NP = Nagar Panchayat, M. Cl = Municipal Council, OG = Out Growth)

C. Burgeoning informal settlements

Cities attract migration from the rural areas due to their potential to provide better jobs and better quality of life thus brining the urbanization curve higher. Rapid urbanization in the TTZ has outpaced the ability of the city authorities to meet the infrastructural and economical needs of the current residents and the new migrants. There has been a lack in effectively linking the growth trajectories with the viability of the economy generators. Shortage in economic opportunities and dearth of low cost affordable infrastructure has led to slum like developments in the TTZ. The local governments lack the financial support and the expert capacity to manage the growing demands. 31% of TTZ lives in slums and about 77% of slum settlments in Agra and Mathura Vrindavan inhabit the core and are in close proximity to the protected and unprotected monuments and heritage sites thus endangering the conservation of these sites.

4.1.2.5 Economic Profile

Closure of a number of industries and restrictions on the industrial development in

the region shows a stagnation in growth trends in the secondary sector. Small scale industries which are listed as polluting industries as per CPCB norms, are still active in the TTZ. There are many household creative industries in cites of TTZ, that are surviving in highly impoverished state because of lack of skill building opportunities and promotional facilities. Lack of planned integrated mixed use development and inadequate infrastructure facilities in the commercial areas discourages economic growth in the region.

A. Industrial Sector

Low or no promotional and promotional incentives for small scale industries

About 8% of the population in TTZ depends on small scale industries such as brick kilns, Petha industry, Tanneries, Iron foundries, glass and chemical industries to name a few. Due to lack of economies of scale almost all of these industries find it challenging to meet the industry mandates of the TTZ. Owing to their limited capital, skill and marketing base, these industries are unable to upgrade from their obsolete manufacturing processes, many of which are pollution generating and non-conforming with TZ regulations. Therefore, upgrading these small scale industries into conforming units is crucial for the economy of this region with the help of financial incentives, skill building opportunities and marketing strategies.

B. Unexplored Creative Household Industries

Closure of large–scaled Industries for violating pollution control norms accelerated the unemployment Status curve of the region. While it is difficult to meet a rapid increase in demand for employment opportunities due to rapid urbanization through formal job creation, informal jobs and local industries have the capacity to develop fast and pace with fast population surge. There are about 27 types of household and creative industries in the TTZ particularly in Agra, Mathura and Vrindavan which, have the potential for growing into export houses and can contribute to improved livelihood and revenue generation. Unfortunately, these industries are slowly dying due to none/limited skill building opportunities and financial incentives. It is crucial for TTZ to support inclusive economic growth by reviving the creative industry base in the region.

C. Unplanned Commercial Sector

The main commercial hubs of the region have grown along with residential use but in an unplanned manner. Lack of planned integrated mixed use development has resulted in congestion, poor working and living conditions.

4.1.2.6 Infrastructure

Developmental programs like the Jawaharlal Nehru National Urban Renewal Program (JNNURM), AMRUT, RAY, Affordable Housing Scheme, Swacch Bharat Mission and Smart Cities projects have contributed to infrastructural developments in most of the primary cities of Uttar Pradesh and TTZ. However, there are inconsistencies in the distribution pattern of infrastructural services in the TTZ. Sources of treated water supply and quality of water needs greater attention as the domestic households that are not connected with tap-water from treated sources and are depended on ground water sources like bore-wells, hand-pumps, etc. Irregular electricity supply has resulted in the use of alternative energy sources in industries and residential areas that are adding pollution and risk of fire hazards in the region. Sewage and sanitary systems needs strengthening as per rising demand due to population growth in the region.

Work is in progress in the region and particularly, Agra, Mathura and Vrindavan for developing a well-connected network of water supply from treated resources.

However, as far as sewerage and sanitation facilities are concerned, since the advent of the Swacch Bharat Mission, there have been positive changes in this situation. Works are in progress as per the Municipal Corporation of Agra and they have claimed to have successfully completing the construction of 15703 individual household toilets, 2686 Community Toilets and 646 Public Toilets. Similar works are in progress in other major cities of TTZ.

Solid waste and construction and demolition waste are deposited at the landfill site at Kuberpur. Contruction and demolistion waste is also disposed at a separate area at Kuberpur.

A. Irregular Electricity Supply Facilities in the TTZ

About 92% of the households are provided with electricity connections. Yet, the region faces frequent power cuts and therefore the use of alternative fuel sources is very high which may contribute to pollution and risk of fire hazards in the region.[29] Work is in progress to improve the electricity supply and explore other renewable sources to provide seamless power supply in the future. In April 2002, the Supreme Court ordered the Agra Heritage Fund to set up a solar power plant to meet the energy needs of the Taj Mahal and the surrounding area.

4.1.2.7 Tourism

The TTZ encompasses many heritage sites of global and national significance that have the potential of attracting tourist influx in future and can become a prominent

29 Census of India 2011

economy generator. As per the census 2011, the tourist inflow in this region has been increasing considerably in few cities like Agra, Mathura-Vrindavan followed by Bharatpur, Fatepur Sikri and Govardhan. There are various other locations like Gokul, Deeg, Nandgaon, and Chhatta in the TTZ that are unexplored and untouched but have great potential for developing into significant tourist destinations.

A. Monocentric Tourism

TTZ has huge potential for developing into a significantly large tourist hub. However, currently the entire focus of tourism in the region is focused on a counted few prime destinations. This increases the pressure on the few centres particularly because they also form the core central part of the cities as is clearly evident for Agra Mathura and Vrindavan, Bharatpur. There are various heritage significant locations like Gokul, Deeg, Nandgaon, and Chhatta in the TTZ that are unexplored and untouched but have great potential for developing into significant tourist destinations thus reducing the pressure off from the destinations which are bearing the brunt of over-crowding and crashing under the pressure. Also, culture tourism has great potential in the region which has been not been explored to its full potential. Tourism development strategies need to tap and promote tangible and intangible cultural heritage of lesser known destinations.

B. Insufficient Tourism Infrastructure

The tourism infrastructure of primary tourist destinations in the region like Taj Mahal, Agra fort, Fatehpur Sikri, Mathura, Vrindavan and Bharatpur is not adequate to serve the growing influx of tourists. “Tourism infrastructure is a range of devices and institutions constituting material and organizational basis for tourism development. It comprises four basic elements: accommodation facilities, food and beverage facilities, accompanying facilities and communication facilities”.[30] Also, potential tourist attractions which are unexplored and unprotected in Deeg, Nandgaon, and Chhata lack the required tourist infrastructure to become potential tourist magnates. Increasing number of tourists and pilgrims (five to seven million annually) add stress to the carrying capacity of the parent city and the tourist sites. But prior to developing the tourist infrastructure, the infrastructure used by the residing population must be catered to. If a city cannot sustain its inhabitants, it will fail to sustain its visitors.

C. Inefficient maintenance of tourism significant sites

The temple and river ghats are not regularly cleaned or maintained. Narrow entrances gates to the premises of Kunds are not well guarded leading to commotion and

30 http://su.lt/bylos/mokslo_leidiniai/ekonomika/7_8/panasiuk.pdf

accidents.

4.1.2.8 Rural Infrastructure

A rural setlement heirarchy indicating availability of infrastructure refers to the arrangement of settlements within a given area into a certain order of importance based upon the population size of a settlement, the range and number of services provided by a settlement, and the sphere of influence or market area of a settlement. Settlements within an area vary greatly in physical size, population, and the number of services that they provide. A settlement hierarchy is when settlements are put into an order based upon their size or the services that they provide for people. The hierarchy of settlements is the product of the centrality of settlements in a region. The centrality of a place is equal to its surplus of importance, that is, equal to the relative importance of this place in regard to region belonging to it. It is the outcome of the quality and quantity of central functions performed by a settlement. These central functions are available in few settlements but are availed by a number of settlements. The hierarchy of settlement is closely associated with the hierarchy of central functions. Hence, higher the level of functional hierarchy, higher will be the centrality of the place having that function.

Identification of hierarchy of rural settlements helps in regional planning as higher order services are allocated in higher order centres and lower order services are provided in lower order centres. It serves as an essential tool in helping to ensure that new development should take place in the most sustainable locations. In rural areas, development should be focused on settlements that can act as service centres for surrounding areas. Therefore settlement hierarchy is required in order to identify those villages that are capable of accommodating and sustaining growth, and to limit development in those smaller settlements that are not sustainable. The government should also base their rural settlement policies on the existing hierarchy of service centres as a means of reducing regional economic imbalances and distributing government services in an equitable basis. In the study area, hierarchy of rural settlements has been determined to examine the role of these settlements in the development of the area in terms of the distribution of facilities or the number the services provided by a settlement.

The Blocks of TTZ have been analyzed on the basis of the facilities available in them. It emerges that health facilies are on the lower side in most of them. The status of other facilities are also indicated in Scalogram.

Figure 4.1 Scalogram

Districts	Blocks	Population	Footpaths (FP)	Power Supply for Domestic Use (ED)	Others (Nutritional Centres)	Hand Pump	ASHA (Accredited Social Health Activist)	Anganwadi Centre (Nutritional Centres)	Primary school (P)	Kutchcha roads	Power Supply for Agricultural Use (EAG)	Connected to others district road	Mobile phone coverage	Assembly Polling station	Carts driven by animals	Tractors	Newspaper Supply	Integrated Child Development Scheme (Nutritional Centres)	Power Supply for All Uses (EA)	Public distribution system (PDS) shop	Pucca roads	Tube wells / Bore well	Power Supply for Commercial Use (EC)	Water bounded macadam(WBM) roads	Sports Field	Middle school (M)	Birth & Death Registration Office	Telephones (Land lines)	Pre-Primary school (PP)	Self-Help Group (SHG)	Well water (Covered / Uncovered well)	Tap water (Treated /Untreated)	Public call office (PCO)	Taxis and Vans	Community centre with/without TV	Tank / Pond / Lake	Sub post office (SPO)	Connected to major district road (MDR)	Bus service (Public & Private)	Secondary School (S)	Medical practitioner with no degree	Cycle-pulled rickshaws(Manual & Machine driven)	Medicine Shop	Internet cafes/ Common service centre (CSC)	Traditional practitioner and faith healer .	Connected to state highway (SH)
Firozabad	Shikohabad	188800	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Agra	Barauli Ahir	239659	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Karauli	Karauli	266168	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Dhaulpur	Dhaulpur	318668	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Bharatpur	Weir	240761	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Bharatpur	Rupbas	257952	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mathura	Baldeo	186138	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mathura	Mathura	265006	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Bharatpur	Kaman	285133	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Bharatpur	Kumher	177801	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	0.00	4.23	4.75	4.78	5.02	5.17
Bharatpur	Sewar	200177	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Etah	Nidhauli Kalan	193992	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Bharatpur	Bayana	225144	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Firozabad	Eka	202461	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	0.00	5.02	5.17
Mathura	Mat	168220	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mathura	Govardhan	195658	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mathura	Chaumuha	133576	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mathura	Farah	154411	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mathura	Raya	188991	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Dhaulpur	Rajakhera	230683	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Etah	Jalesar	149545	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	0.00	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Dhaulpur	Baseri	226786	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	0.00	4.23	4.75	4.78	5.02	5.17
Agra	Achhnera	179687	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Firozabad	Tundla	269690	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Bharatpur	Nadbai	188725	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Bharatpur	Deeg	181711	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Firozabad	Kheragarh	160064	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Aligarh	Iglas	181816	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Agra	Kheragarh	157936	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mahamaya Nagar	Mursan	182514	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Agra	Shamsabad	204121	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Agra	Fatehabad	200049	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Etah	Awagarh	152899	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mathura	Chhata	186472	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Agra	Bichpuri	107843	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mathura	Nandgaon	129488	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	0.00	5.02	5.17
Agra	Khandauli	176019	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Agra	Etmadpur	160900	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Agra	Fatehpur Sikri	163448	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Agra	Saiyan	163468	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mahamaya Nagar	Hathras	174014	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	0.00	4.78	5.02	5.17
Agra	Akola	133509	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mahamaya Nagar	Sadabad	207545	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Mahamaya Nagar	Sahpau	126928	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	0.00	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	0.00	0.00	5.17
Firozabad	Kotla	154844	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Firozabad	Firozabad	223917	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Agra	Jagner	112360	1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.11	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17
Functional Weightage (FW)			1.01	1.04	1.06	1.08	1.13	1.13	1.15	1.15	1.17	1.17	1.18	1.21	1.25	1.27	1.36	1.42	1.47	1.47	1.49	1.49	1.49	1.59	1.61	1.67	1.87	1.90	2.10	2.13	2.21	2.36	2.36	2.46	3.07	3.33	3.57	3.58	3.63	3.80	4.09	4.23	4.75	4.78	5.02	5.17

Source: Adpated from Cenus 2011, SPA Delhi

Figure 4.2 Sclaogram (Cont.)

Districts	Blocks	Population	Mandis / Regular market	Sports Club / Recreation Centre	Public Reading Room	Auto/Modified Autos	River / Canal	Agricultural marketing society	Public Library	Weekly Haat	Senior Secondary school (SS)	Cinema / Video Hall	Agricultural Credit Societies	Primary health sub centre (PHS)	Medical practitioner with other degree	Maternity and child welfare centre (MCW)	Commercial & Co operative Banks	Medical practitioner with MBBS Degree	Others	Connected to national highway(NH)	ATM	Veterinary hospital (VH)	Rural sanitary mart or sanitary hardware outlet available near the village.	Primary health centre (PHC)	Charitable non Govt. hospital /Nursing home.	Post office (PO)	Family welfare centre (FWC)	Hospital-alternative medicine (HO)	Community toilet excluding bath.	Community bio- gas or recycle of waste for productive use.	Dispensary (D)	Others	Railway stations	Sea / River ferry service	Degree college of arts science & commerce (ASC)	Spring	Post & Telegraph office (P&TO)	Non-formal training centre (NFTC)	Private courier facility	Vocational training school /ITI	Community toilet including bath.	Community health centre (CHC)	Mobile health clinic (MHC)
Firozabad	Shikohabad	188800	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	0.00	11.08	11.27	0.00	0.00	17.11	18.04	0.00	18.47	19.64	0.00	22.06	22.70	0.00	29.46	33.72	0.00	34.73	34.99	38.46	45.18	45.63	50.04	0.00	54.12	80.24	0.00	81.65	0.00
Agra	Barauli Ahir	239659	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	34.73	34.99	38.46	45.18	0.00	50.04	52.89	54.12	80.24	80.24	81.65	101.17
Karauli	Karauli	266168	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	0.00	80.24	81.65	0.00
Dhaulpur	Dhaulpur	318668	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	45.18	45.63	50.04	0.00	54.12	80.24	80.24	81.65	0.00
Bharatpur	Weir	240761	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	0.00	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	0.00	0.00	0.00	45.63	50.04	0.00	54.12	0.00	80.24	81.65	0.00
Bharatpur	Rupbas	257952	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	0.00	18.04	18.18	18.47	19.64	21.45	22.06	0.00	23.51	29.46	33.72	34.22	0.00	34.99	0.00	45.18	0.00	50.04	0.00	54.12	80.24	80.24	81.65	101.17
Mathura	Baldeo	186138	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	12.15	0.00	0.00	18.04	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	0.00	0.00	34.73	0.00	38.46	45.18	0.00	50.04	52.89	54.12	80.24	80.24	81.65	0.00
Mathura	Mathura	265006	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	0.00	34.22	34.73	34.99	38.46	45.18	0.00	50.04	52.89	54.12	80.24	80.24	81.65	0.00
Bharatpur	Kaman	285133	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	0.00	0.00	0.00	45.63	50.04	0.00	54.12	80.24	80.24	0.00	0.00
Bharatpur	Kumher	177801	5.31	5.38	5.86	5.92	6.21	0.00	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	0.00	80.24	81.65	101.17
Bharatpur	Sewar	200177	5.31	5.38	5.86	5.92	6.21	0.00	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	0.00	80.24	0.00	0.00
Etah	Nidhauli Kalan	193992	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	0.00	0.00	34.73	34.99	38.46	45.18	0.00	50.04	52.89	54.12	0.00	0.00	81.65	101.17
Bharatpur	Bayana	225144	5.31	5.38	5.86	5.92	6.21	0.00	6.85	6.99	7.07	7.96	8.11	8.49	0.00	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	0.00	0.00	0.00	0.00
Firozabad	Eka	202461	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	0.00	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	33.72	34.22	34.73	0.00	38.46	45.18	45.63	0.00	52.89	54.12	80.24	80.24	81.65	0.00
Mathura	Mat	168220	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	12.15	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	34.73	0.00	38.46	45.18	0.00	50.04	0.00	54.12	80.24	80.24	81.65	101.17
Mathura	Govardhan	195658	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	0.00	34.73	34.99	38.46	45.18	0.00	50.04	52.89	54.12	80.24	80.24	0.00	0.00
Mathura	Chaumuha	133576	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	0.00	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	34.73	34.99	0.00	45.18	45.63	50.04	52.89	54.12	80.24	80.24	81.65	0.00
Mathura	Farah	154411	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	0.00	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	0.00	0.00	0.00	34.22	34.73	34.99	38.46	45.18	45.63	50.04	52.89	0.00	80.24	80.24	81.65	0.00
Mathura	Raya	188991	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	12.15	0.00	17.11	0.00	18.18	0.00	19.64	21.45	22.06	22.70	0.00	0.00	0.00	34.22	34.73	34.99	38.46	0.00	0.00	50.04	52.89	0.00	80.24	0.00	81.65	0.00
Dhaulpur	Rajakhera	230683	5.31	5.38	5.86	5.92	6.21	0.00	6.85	6.99	7.07	7.96	8.11	8.49	0.00	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	0.00	0.00	0.00	0.00	50.04	0.00	54.12	0.00	0.00	81.65	0.00
Etah	Jalesar	149545	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	33.72	34.22	0.00	34.99	38.46	45.18	0.00	50.04	52.89	0.00	80.24	0.00	81.65	101.17
Dhaulpur	Baseri	226786	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	80.24	80.24	81.65	0.00
Agra	Achhnera	179687	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	0.00	0.00	0.00	0.00	34.73	34.99	38.46	45.18	45.63	0.00	52.89	54.12	80.24	80.24	81.65	0.00
Firozabad	Tundla	269690	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	0.00	13.37	17.11	18.04	18.18	18.47	19.64	21.45	0.00	22.70	0.00	29.46	33.72	34.22	0.00	0.00	38.46	45.18	45.63	50.04	52.89	0.00	80.24	0.00	81.65	0.00
Bharatpur	Nadbai	188725	5.31	5.38	5.86	5.92	6.21	0.00	6.85	6.99	7.07	7.96	8.11	8.49	0.00	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	0.00	50.04	0.00	54.12	0.00	0.00	0.00	0.00
Bharatpur	Deeg	181711	5.31	5.38	5.86	5.92	6.21	0.00	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	0.00	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	80.24	80.24	81.65	101.17
Firozabad	Kheragarh	160064	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	0.00	0.00	0.00	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	0.00	34.22	0.00	0.00	0.00	45.18	0.00	50.04	52.89	0.00	0.00	0.00	81.65	101.17
Aligarh	Iglas	181816	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	12.15	0.00	0.00	0.00	18.18	18.47	0.00	21.45	22.06	22.70	0.00	29.46	0.00	0.00	34.73	0.00	38.46	0.00	0.00	50.04	0.00	54.12	0.00	80.24	0.00	0.00
Agra	Kheragarh	157936	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	12.15	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	0.00	0.00	29.46	33.72	34.22	0.00	0.00	38.46	45.18	0.00	50.04	52.89	0.00	80.24	80.24	81.65	0.00
Mahamaya Nagar	Mursan	182514	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	0.00	13.37	17.11	0.00	18.18	0.00	19.64	0.00	0.00	22.70	0.00	0.00	0.00	34.22	0.00	0.00	38.46	45.18	45.63	0.00	52.89	0.00	0.00	0.00	0.00	0.00
Agra	Shamsabad	204121	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	0.00	34.22	34.73	34.99	0.00	45.18	0.00	50.04	52.89	0.00	80.24	0.00	81.65	101.17
Agra	Fatehabad	200049	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	0.00	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	0.00	0.00	34.22	0.00	0.00	38.46	45.18	45.63	50.04	52.89	54.12	0.00	0.00	81.65	0.00
Etah	Awagarh	152899	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	0.00	17.11	0.00	0.00	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	0.00	0.00	34.99	38.46	45.18	45.63	50.04	52.89	54.12	80.24	80.24	0.00	101.17
Mathura	Chhata	186472	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	0.00	8.49	9.50	11.08	11.27	12.15	0.00	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	23.51	0.00	33.72	34.22	34.73	34.99	38.46	45.18	0.00	50.04	52.89	54.12	80.24	80.24	81.65	101.17
Agra	Bichpuri	107843	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	33.72	34.22	34.73	34.99	38.46	45.18	0.00	0.00	52.89	54.12	80.24	80.24	81.65	101.17
Mathura	Nandgaon	129488	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	0.00	34.22	34.73	0.00	0.00	45.18	45.63	0.00	52.89	0.00	80.24	80.24	81.65	0.00
Agra	Khandauli	176019	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	12.15	0.00	17.11	18.04	18.18	0.00	19.64	21.45	22.06	22.70	0.00	29.46	33.72	34.22	34.73	34.99	38.46	45.18	45.63	0.00	0.00	0.00	80.24	80.24	81.65	0.00
Agra	Etmadpur	160900	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	0.00	33.72	34.22	34.73	34.99	0.00	45.18	0.00	50.04	0.00	0.00	0.00	80.24	81.65	101.17
Agra	Fatehpur Sikri	163448	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	0.00	0.00	18.47	19.64	21.45	22.06	22.70	23.51	0.00	33.72	0.00	34.73	34.99	38.46	45.18	0.00	50.04	0.00	0.00	0.00	0.00	81.65	0.00
Agra	Saiyan	163468	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	0.00	0.00	17.11	0.00	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	0.00	0.00	34.99	0.00	45.18	0.00	50.04	0.00	0.00	80.24	80.24	81.65	0.00
Mahamaya Nagar	Hathras	174014	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	0.00	9.50	11.08	11.27	0.00	0.00	17.11	0.00	18.18	0.00	19.64	0.00	22.06	22.70	0.00	0.00	0.00	0.00	0.00	34.99	0.00	45.18	45.63	50.04	52.89	54.12	80.24	0.00	0.00	0.00
Agra	Akola	133509	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	0.00	34.22	0.00	34.99	0.00	45.18	45.63	50.04	52.89	54.12	80.24	0.00	81.65	0.00
Mahamaya Nagar	Sadabad	207545	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	0.00	17.11	0.00	0.00	18.47	19.64	21.45	22.06	22.70	0.00	0.00	33.72	0.00	0.00	0.00	38.46	45.18	0.00	50.04	52.89	54.12	80.24	0.00	81.65	0.00
Mahamaya Nagar	Sahpau	126928	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	0.00	0.00	17.11	0.00	18.18	0.00	19.64	0.00	22.06	22.70	23.51	0.00	33.72	0.00	0.00	34.99	38.46	45.18	0.00	50.04	0.00	54.12	0.00	0.00	81.65	0.00
Firozabad	Kotla	154844	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	0.00	17.11	0.00	18.18	18.47	19.64	0.00	22.06	22.70	23.51	0.00	0.00	34.22	0.00	34.99	0.00	45.18	45.63	50.04	0.00	0.00	80.24	0.00	81.65	101.17
Firozabad	Firozabad	223917	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	0.00	0.00	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	0.00	29.46	0.00	34.22	34.73	34.99	38.46	0.00	0.00	50.04	0.00	0.00	0.00	0.00	81.65	0.00
Agra	Jagner	112360	5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	0.00	0.00	17.11	18.04	18.18	0.00	19.64	21.45	22.06	22.70	0.00	0.00	0.00	0.00	34.73	34.99	0.00	45.18	0.00	50.04	0.00	0.00	80.24	80.24	81.65	0.00
Functional Weightage (FW)			5.31	5.38	5.86	5.92	6.21	6.46	6.85	6.99	7.07	7.96	8.11	8.49	9.50	11.08	11.27	12.15	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	34.73	34.99	38.46	45.15	45.63	50.04	52.89	54.12	80.24	80.24	81.65	101.17

Source: Adpated from Cenus 2011, SPA Delhi

Figure 4.3 Scalogram (Cont.)

Districts	Blocks	Population	Others	Connected to national highway(NH)	ATM	Veterinary hospital (VH)	Rural sanitary mart or sanitary hardware outlet available near the village.	Primary health centre (PHC)	Charitable non Govt. hospital /Nursing home.	Post office (PO)	Family welfare centre (FWC)	Hospital-alternative medicine (HO)	Community toilet excluding bath.	Community bio- gas or recycle of waste for productive use.	Dispensary (D)	Others	Railway stations	Sea / River ferry service	Degree college of arts & science & commerce (ASC)	Spring	Post & Telegraph office (P&TO)	Non-formal training centre (NFTC)	Private courier facility	Vocational training school /ITI	Community toilet including bath.	Community health centre (CHC)	Mobile health clinic (MHC)	Management institute (MI)	Medical college (MC)	Engineering college(EC)	Polytechnic (Pt)	Hospital-allopathic (HA)	Navigable waterway (river/canal)(NW)	Special school for disabled (SSD)	T.B. clinic (TBC)	Others (specify)	Total Functional Index	Total No. of Facilities Available	Centrality Score	Order
Firozabad	Shikohabad	188800	0.00	17.11	18.04	0.00	18.47	19.64	0.00	22.06	22.70	0.00	29.46	33.72	0.00	34.73	34.99	38.46	45.18	45.63	50.04	0.00	54.12	80.24	0.00	81.65	0.00	101.17	150.13	0.00	155.13	0.00	290.88	0.00	0.00	581.75	2125.75	80.00	42378.91	I
Agra	Barauli Ahir	239659	13.37	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	34.73	34.99	38.46	45.18	0.00	50.04	52.89	54.12	80.24	80.24	81.65	101.17	101.17	150.13	150.13	155.13	172.37	290.88	290.88	310.27	581.75	3352.40	92.00	22913.07	
Karauli	Karauli	266168	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	0.00	80.24	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	860.69	79.00	19880.42	
Dhaulpur	Dhaulpur	318668	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	45.18	45.63	50.04	0.00	54.12	80.24	80.24	81.65	0.00	0.00	0.00	0.00	155.13	0.00	0.00	0.00	0.00	0.00	1141.25	82.00	16822.95	
Bharatpur	Weir	240761	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	0.00	0.00	0.00	45.63	50.04	0.00	54.12	0.00	80.24	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	794.75	76.00	16233.50	II
Bharatpur	Rupbas	257952	13.37	0.00	18.04	18.18	18.47	19.64	21.45	22.06	0.00	23.51	29.46	33.72	34.22	0.00	34.99	0.00	45.18	0.00	50.04	0.00	54.12	80.24	80.24	81.65	101.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1001.85	79.00	15779.52	
Mathura	Baldeo	186138	0.00	0.00	18.04	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	0.00	0.00	34.73	0.00	38.46	45.18	0.00	50.04	52.89	54.12	80.24	80.24	81.65	0.00	101.17	150.13	150.13	155.13	172.37	290.88	0.00	310.27	0.00	2231.22	83.00	15716.73	
Mathura	Mathura	265006	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	0.00	34.22	34.73	34.99	38.46	45.18	0.00	50.04	52.89	54.12	80.24	80.24	81.65	0.00	101.17	150.13	150.13	155.13	172.37	290.88	0.00	310.27	0.00	2354.43	88.00	15513.13	
Bharatpur	Kaman	285133	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	0.00	0.00	0.00	45.63	50.04	0.00	54.12	80.24	80.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	802.84	77.00	14427.24	
Bharatpur	Kumher	177801	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	0.00	80.24	81.65	101.17	0.00	0.00	0.00	155.13	0.00	0.00	0.00	310.27	0.00	1395.26	79.00	13441.24	
Bharatpur	Sewar	200177	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	0.00	80.24	0.00	0.00	0.00	150.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	901.26	77.00	13379.74	
Etah	Nidhauli Kalan	193992	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	0.00	0.00	34.73	34.99	38.46	45.18	0.00	50.04	52.89	54.12	0.00	0.00	81.65	101.17	0.00	150.13	0.00	0.00	0.00	290.88	290.88	0.00	0.00	1647.69	82.00	13226.93	
Bharatpur	Bayana	225144	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	682.83	75.00	13196.96	
Firozabad	Eka	202461	0.00	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	33.72	34.22	34.73	0.00	38.46	45.18	45.63	0.00	52.89	54.12	80.24	80.24	81.65	0.00	0.00	0.00	0.00	0.00	0.00	290.88	0.00	0.00	0.00	1258.34	79.00	12797.43	
Mathura	Mat	168220	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	34.73	0.00	38.46	45.18	0.00	50.04	0.00	54.12	80.24	80.24	81.65	101.17	101.17	0.00	0.00	0.00	172.37	290.88	0.00	0.00	0.00	1622.41	83.00	12436.81	
Mathura	Govardhan	195658	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	0.00	34.73	34.99	38.46	45.18	0.00	50.04	52.89	54.12	80.24	80.24	0.00	0.00	101.17	0.00	0.00	155.13	0.00	290.88	0.00	0.00	581.75	2071.14	85.00	12435.44	
Mathura	Chaumuha	133576	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	34.73	34.99	0.00	45.18	45.63	50.04	52.89	54.12	80.24	80.24	81.65	0.00	101.17	150.13	150.13	155.13	172.37	290.88	0.00	0.00	0.00	2080.17	88.00	12390.55	
Mathura	Farah	154411	0.00	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	0.00	0.00	0.00	34.22	34.73	34.99	38.46	45.18	45.63	50.04	52.89	0.00	80.24	80.24	81.65	0.00	101.17	0.00	150.13	155.13	0.00	290.88	0.00	0.00	0.00	1637.29	82.00	12357.04	III
Mathura	Raya	188991	0.00	17.11	0.00	18.18	0.00	19.64	21.45	22.06	22.70	0.00	0.00	0.00	34.22	34.73	34.99	38.46	0.00	0.00	50.04	52.89	0.00	80.24	0.00	81.65	0.00	101.17	0.00	150.13	155.13	0.00	290.88	0.00	0.00	0.00	1439.28	77.00	12306.04	
Dhaulpur	Rajakhera	230683	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	0.00	0.00	0.00	45.63	50.04	0.00	54.12	0.00	0.00	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	662.42	73.00	12304.41	
Etah	Jalesar	149545	13.37	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	33.72	34.22	0.00	34.99	38.46	45.18	0.00	50.04	52.89	0.00	80.24	0.00	81.65	101.17	101.17	0.00	150.13	155.13	172.37	290.88	0.00	0.00	0.00	1825.32	83.00	12241.91	
Dhaulpur	Baseri	226786	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	80.24	80.24	81.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	915.39	78.00	12142.47	
Agra	Achhnera	179687	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	0.00	0.00	0.00	0.00	34.73	34.99	38.46	45.18	45.63	0.00	52.89	54.12	80.24	80.24	81.65	0.00	101.17	150.13	150.13	0.00	0.00	290.88	0.00	0.00	581.75	2206.81	83.00	11927.43	
Firozabad	Tundla	269690	0.00	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	0.00	29.46	33.72	34.22	0.00	0.00	38.46	45.18	45.63	50.04	52.89	0.00	80.24	0.00	81.65	0.00	0.00	0.00	0.00	0.00	172.37	290.88	0.00	0.00	0.00	1312.42	79.00	11666.11	
Bharatpur	Nadbai	188725	13.37	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	0.00	50.04	0.00	54.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	615.76	73.00	10944.89	
Bharatpur	Deeg	181711	13.37	0.00	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	34.22	0.00	34.99	0.00	0.00	45.63	50.04	0.00	54.12	80.24	80.24	81.65	101.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	997.08	78.00	10770.24	
Firozabad	Kheragarh	160064	0.00	0.00	0.00	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	0.00	34.22	0.00	0.00	0.00	45.18	0.00	50.04	52.89	0.00	0.00	0.00	81.65	101.17	0.00	0.00	0.00	0.00	172.37	290.88	0.00	310.27	0.00	1536.22	77.00	10514.82	
Aligarh	Iglas	181816	0.00	0.00	0.00	18.18	18.47	0.00	21.45	22.06	22.70	0.00	29.46	0.00	0.00	34.73	0.00	38.46	0.00	0.00	50.04	0.00	54.12	0.00	80.24	0.00	0.00	101.17	0.00	150.13	0.00	0.00	290.88	0.00	0.00	0.00	1145.69	73.00	10508.05	
Agra	Kheragarh	157936	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	0.00	0.00	29.46	33.72	34.22	0.00	0.00	38.46	45.18	0.00	50.04	52.89	0.00	80.24	80.24	81.65	0.00	0.00	150.13	0.00	0.00	172.37	290.88	0.00	310.27	0.00	1798.29	80.00	9877.80	
Mahamaya Nagar	Mursan	182514	13.37	17.11	0.00	18.18	0.00	19.64	0.00	0.00	22.70	0.00	0.00	0.00	34.22	0.00	0.00	38.46	45.18	45.63	0.00	52.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	290.88	0.00	0.00	0.00	799.71	69.00	9760.47	
Agra	Shamsabad	204121	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	0.00	34.22	34.73	34.99	0.00	45.18	0.00	0.00	52.89	0.00	80.24	0.00	81.65	101.17	0.00	0.00	0.00	0.00	0.00	290.88	290.88	0.00	0.00	1479.53	80.00	9611.60	
Agra	Fatehabad	200049	0.00	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	23.51	0.00	0.00	0.00	0.00	0.00	38.46	45.18	45.63	50.04	52.89	54.12	0.00	0.00	81.65	0.00	0.00	0.00	0.00	0.00	172.37	290.88	0.00	0.00	0.00	1213.01	77.00	9598.72	
Etah	Awagarh	152899	0.00	17.11	0.00	0.00	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	0.00	0.00	34.99	38.46	45.18	45.63	50.04	52.89	54.12	80.24	80.24	0.00	101.17	0.00	150.13	0.00	155.13	172.37	290.88	0.00	0.00	0.00	1781.68	83.00	9520.06	
Mathura	Chhata	186472	0.00	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	23.51	0.00	33.72	34.22	34.73	34.99	38.46	45.18	0.00	50.04	52.89	54.12	80.24	80.24	81.65	101.17	0.00	0.00	150.13	0.00	172.37	290.88	0.00	310.27	0.00	2022.40	84.00	9084.32	
Agra	Bichpuri	107843	13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	33.72	34.22	34.73	34.99	38.46	45.18	0.00	0.00	52.89	54.12	80.24	80.24	81.65	101.17	101.17	150.13	150.13	155.13	172.37	290.88	0.00	0.00	0.00	2114.00	88.00	9056.59	
Mathura	Nandgaon	129488	13.37	17.11	0.00	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	0.00	34.22	34.73	0.00	38.46	45.18	45.63	0.00	52.89	0.00	80.24	80.24	81.65	0.00	101.17	150.13	150.13	155.13	172.37	0.00	0.00	310.27	0.00	1893.73	82.00	8794.62	
Agra	Khandauli	176019	0.00	17.11	18.04	18.18	0.00	19.64	21.45	22.06	22.70	0.00	29.46	33.72	34.22	34.73	34.99	38.46	45.18	45.63	0.00	0.00	0.00	80.24	80.24	81.65	0.00	101.17	150.13	150.13	0.00	172.37	290.88	0.00	310.27	0.00	1986.01	82.00	8389.07	
Agra	Etmadpur	160900	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	0.00	33.72	34.22	34.73	34.99	0.00	45.18	0.00	50.04	0.00	0.00	80.24	80.24	81.65	101.17	101.17	150.13	150.13	155.13	172.37	290.88	0.00	310.27	0.00	2229.28	85.00	8378.43	
Agra	Fatehpur Sikri	163448	13.37	17.11	0.00	0.00	18.47	19.64	21.45	22.06	22.70	23.51	0.00	33.72	0.00	34.73	34.99	38.46	45.18	0.00	50.04	0.00	0.00	0.00	0.00	81.65	0.00	0.00	150.13	150.13	0.00	0.00	290.88	0.00	0.00	0.00	1290.32	78.00	8282.09	
Agra	Saiyan	163468	0.00	17.11	0.00	18.18	18.47	19.64	0.00	22.06	22.70	23.51	29.46	33.72	0.00	0.00	34.99	0.00	45.18	0.00	50.04	0.00	0.00	80.24	80.24	81.65	0.00	0.00	0.00	0.00	0.00	172.37	290.88	0.00	310.27	0.00	1560.65	77.00	8070.04	IV
Mahamaya Nagar	Hathras	174014	0.00	17.11	0.00	18.18	0.00	19.64	0.00	22.06	22.70	0.00	0.00	0.00	0.00	0.00	34.99	0.00	45.18	45.63	50.04	52.89	54.12	80.24	0.00	0.00	0.00	0.00	150.13	0.00	0.00	0.00	290.88	0.00	0.00	0.00	1100.48	71.00	7887.24	
Agra	Akola	133509	0.00	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	0.00	29.46	0.00	34.22	0.00	34.99	0.00	45.18	45.63	50.04	52.89	54.12	80.24	0.00	81.65	0.00	101.17	0.00	0.00	0.00	172.37	290.88	0.00	310.27	0.00	1762.84	82.00	7511.05	
Mahamaya Nagar	Sadabad	207545	0.00	17.11	0.00	0.00	18.47	19.64	21.45	22.06	22.70	0.00	0.00	33.72	0.00	0.00	0.00	38.46	45.18	0.00	50.04	52.89	54.12	80.24	0.00	81.65	0.00	0.00	0.00	0.00	0.00	0.00	290.88	0.00	0.00	0.00	1070.70	75.00	6853.48	
Mahamaya Nagar	Sahpau	126928	0.00	17.11	0.00	18.18	0.00	19.64	0.00	22.06	22.70	23.51	0.00	33.72	0.00	0.00	34.99	38.46	45.18	0.00	50.04	0.00	54.12	0.00	0.00	81.65	0.00	0.00	0.00	0.00	0.00	0.00	290.88	0.00	0.00	0.00	950.17	70.00	6633.37	
Firozabad	Kotla	154844	0.00	17.11	0.00	18.18	18.47	19.64	0.00	22.06	22.70	23.51	0.00	0.00	34.22	0.00	34.99	0.00	45.18	45.63	50.04	0.00	0.00	80.24	0.00	81.65	101.17	101.17	0.00	150.13	155.13	0.00	290.88	290.88	0.00	0.00	1825.08	80.00	6579.03	
Firozabad	Firozabad	223917	0.00	17.11	18.04	18.18	18.47	19.64	0.00	22.06	22.70	0.00	29.46	0.00	34.22	34.73	34.99	38.46	0.00	0.00	50.04	0.00	0.00	0.00	0.00	81.65	0.00	0.00	0.00	0.00	0.00	172.37	0.00	0.00	0.00	0.00	822.06	74.00	6417.68	
Agra	Jagner	112360	0.00	17.11	18.04	18.18	0.00	19.64	21.45	22.06	22.70	0.00	0.00	0.00	0.00	34.73	34.99	0.00	45.18	0.00	50.04	0.00	0.00	80.24	80.24	81.65	0.00	0.00	0.00	0.00	0.00	172.37	290.88	0.00	310.27	0.00	1541.86	77.00	5542.04	
Functional Weightage (FW)			13.37	17.11	18.04	18.18	18.47	19.64	21.45	22.06	22.70	23.51	29.46	33.72	34.22	34.73	34.99	38.46	45.15	45.63	50.04	52.89	54.12	80.24	80.24	81.65	101.17	101.17	150.13	150.13	155.13	172.37	290.88	290.88	310.27	581.75				

Source: Adpated from Cenus 2011, SPA Delhi

4.1.2.9 Observation

Scalogram has been done with the help of 94 parameter of facilities available in Blocks of five districts in Uttar Pradesh and one district in Rajasthan. The facilities are including education (14 parameter), Health (14 parameter), Drinking water facilities (8 parameter), Community facilities (4 parameter), Transport and Communication facilities (25 parameter),Bank and Credit facilities (3 parameter), Miscellaneous and recreational facilities (18 parameter), and Power Supply (4 parameter). The highest facility are available in Barauli Ahir Block in Agra with 92 number facilities available and also lower facilities are Panihat block in Agra with 65 facilities among 94. From above table it can be said that the most backward district is Hathras which is characterized by lower number of facilities whereas Agra is more developed than others.

The status of social and physical infrastructure indicates, many tehsils do not have facilities as per Rural and Urban development norms. There is inequitable distribution of infrastructure facilities across all blocks with health facilities being the most underprovided.

Higher order facilities (Health & Medical) seems to be absent in a large number of blocks. The distortion in the Figure of scalogram or uneven distribution of scalogram can be observed due to uneven distribution of facilities in Blocks. This can also be supported by the absence of Regional Planning for TTZ Region.

4.1.3 Heritage Issues

The entire region has a very rich history resulting in a diversity of heritage, spanning centuries of building activity from the Mauryan to the Colonial period, comprising of archaeological sites, havelis, temples, mosques, gardens, water bodies, groves. The table below very briefly outlines the key aspects of this history.

Table 4.2 History, Typologies and significance of the settlements in TTZ region

District: Agra					
Settlement	Agra	Period	Lodi, Mughal, Colonial	Significance	Architectural, Archaeological, Ecological, Socio-Cultural, Economic
History					Major Typologies
Sultan Sikandar Lodhi (1488-1517) moved his capital from Delhi to Agra in 1506 CE before it became the capital of the Mughal Empire from 1556 to 1658 CE. The colonial imprint of the city was established with the setting up of the cantontment in the early nineteenth century.					Fort, Memorial; Tombs, Chattris, Mosques, River Front Gardens, Havelis, Gateways, Churches, Institutions.
Setllement	Sikandra	Period	Lodi, Mughal, Colonial	Significance	Architectural, Archaeological
History					Major Typologies

Sikandra is named after Sikandar Lodi, who was in power from 1488 to 1517 CE. Sikandra Fort is located in the western periphery of the city at a distance of about 10 kms from the city center. Sikandra also has the mausoleum of the Mughal emperor Akbar.					Fort, Tombs, Tank, Archaeological remains.
Setllement	Etmadpur	Period	Mughal	Significance	Architectural, Ecological
History					Major Typologies
The town is believed to be named after Mirza Ghiyas Beg or Itimad-ud-Daulah, a Mughal official, father of Nur Jahan and grandfather of Mumtaz Mahal.					Memorial, Water tank, Pavilion
Settlement	Fatehpur Sikri	Period	Mughal, Colonial	Significance	Architectural, Archaeological, Ecological
History					Major Typologies
The city was founded as the capital of Mughal Empire in 1571 CE by Emperor Akbar. After settling in Agra in 1803 CE, the British established an administrative center here and it remained so until 1850.					Walled city, Mosque, Havelis, Gateways, Kos minars
Settlement	Fatehabad	Period	Mughal	Significance	Architectural, Ecological
History					Major Typologies
Fatehabad was founded by the Mughal ruler Aurangzeb after his victory over his brother Dara Shikoh in 1658 CE. Fatehabad was later associated with Maratha king DaulatRao Scindia (1794–1827) who ruled from Gwalior.					Sarai, Mosque, Bagh
District : Mathura					
Settlement	Mathura	Period	Ancient,Medieval, Colonial	Significance	Architectural, Ecological,Religious, Socio – Cultural and Archaeological
History					Major Typologies
Mathura is principally associated with the birthplace of Krishna. In times 5th century BCE, it was a major metropolis and the capital of the Surasena kingdom. Mathura saw its `golden age' during the rule of the Kushanas. It remained a center of power during the Mauryan period, through the rule of Emperor Ashoka to the Gupta era (4th century CE). During Akbar's reign the city again became the center of religious, artistic and literary activities. Jats ruled it till 1770 CE after which it came under the Marathas and then to the British when the Cantonment was established in 1804 CE. Mathura district was formed in 1832 CE.					Ghats, temples, Kunds,dharamshala, archaeological mounds and remains, mosques, Fort, havelis, bazaars, Baoli, Matha, Institutional and Residential buildings in Cantonment area.

Settlement	Vrindavan	Period	Ancient, Medi-aeval	Significance	Architectural, Ecological, Religious, Socio-Cultural and Archaeological
History					Major Typologies
Vrindavan was not a very significant settlement until 1515, when Chaitanya Mahaprabhu interpreted Vrindavan and its surrounding landscape as the homeland of Lord Krishna. It received patronage during the Mughal and Jat period.					Ghats, Temples, Kunds, Baithak,Havelis, Vans, Dharamshalas
Settlement	Govardhan	Period	Ancient, Medi-aeval	Significance	Architectural, Ecological, Socio-cultural, Archaeological and Religious
History					Major Typologies
Govardhan hill has great religious significance in view of its association with Lord Krishna. It has architectural ensembles attributed to Bundela and Jat rulers, Veer Singh Deo, ruler of Orchha 1675 CE and Jat rulers Suraj Mal, and Jawahar Singh, the king of Bharatpur (1707–1763).					Hill, Archaeological Mound, Temple, cenotaph, Chattri,Kunds.
Settlement	Gokul	Period	Ancient, Medi-aeval	Significance	Architectural, Religious, Ecological, Social
History					Major Typologies

Gokul is believed to be the settlement where Lord Krishna was brought up by his foster mother Yasodha.					Residential, Ghats, Temples.
Settlement	Barsana	Period	Ancient, Medi-aeval	Significance	Architectural, Religious, Ecological, Social
History					Major Typologies
The settlement is associated with Radha, the favourite gopi of Krishna, who was born in Barsana and spent her childhood here. Barsana is surrounded by hills, which is why it has high ecological value because of the presence of numerous kunds. It also has Jat period havelis and monuments and a red sandstone temple of Hari Deva built by Raja Man Singh during the reign of Akbar.					Temples, Palaces, Havelis, Bagh and kunds. It also has Jat period havelis and monuments and a red sandstone temple of Hari Deva built by Raja Man Singh during the reign of Akbar.
Settlement	Nandgaon	Period	Ancient, Medi-aeval	Significance	Architectural, Religious, Ecological, Social
History					Major Typologies
Nandgaon is believed to be the home of Lord Krishna, where he spent his childhood along with his foster father Nanda Baba and mother Yashoda.					Kunds, Temples, Havelis
Settlement	Baldeo	Period	Ancient, Medi-aeval	Significance	Architectural, Religious, Ecological, Social
History					Major Typologies
According to Hindu mythology, it is believed that Baldeo is the place where Lord Krishna's elder brother named 'Baldeo' use to reside.					Temples, Havelis, Kunds
Settlement	Mahavan	Period	Ancient, Medi-aeval	Significance	Religious and Ecological
History					Major Typologies
Mahavan is also called Brihadvan, because it was the largest of all the forests. It is believed that Krishna and his friends used to come for Ras to the Mahavan forests.					Vans, Kunds
Settlement	RadhaKund	Period	Ancient, Medi-aeval	Significance	Architectural, Religious, Ecological
History					Major Typologies
It is believed that Krishna and Radha spent time together at this site and has many myths about their pastimes.					Kunds, Temples
Settlement	Chaumuha	Period	Ancient, Medi-aeval	Significance	Religious, Ecological
History					Major Typologies
Chaumuha is a settlement where Brahma Vimohan Leela took place during Krishna's time. Because of this the village has been named Chaumuha, indicating four heads of Brahma.					Kunds, Temples
Settlement	Chatta	Period	Ancient, Mughal	Significance	Architectural, Ecological
History					Major Typologies
The place has derived its name from Chhatra Dharana in Krishna's life. It has a fort like seraiwith high walls and bastions built in the reign of Sher Shah Suri and later embellished by emperor Akbar.					Kund, Serai, Kos minar
Settlement	Kosi Kalan	Period	Mughal	Significance	Architectural and Ecological
History					Major Typologies
The settlement was an important trade centre on the Mughal imperial highway and has a large serai known as Shahi Serai, ascribed to Khwaja Itibar Khan, governor of Delhi during Akbar's reign. It was briefly occupied by Ranjit Singh, the Jat king, when retreating to Barsana in 1774 CE.					Kunds and Serai
District : Hathras					

Settlement	Hathras	Period	Ancient, Jat Period, Colonial	Significance	Archaeological, Architectural, Ecological, Religious, Socio-cultural, Economic
History					Major Typologies
Archaeological remains of Hindu, Buddhist, and Jain culture as well as items from the Shung and Kushan periods were found at many locations in Hathras. The fort dates from the Mauryan period. Many bagichis or the gardens of Jat period survive. A typical feature of almost every bagichi is the akhara or the wrestling ring where juveniles and adults practice various forms of wrestling. In 1716 CE, the Jat ruler Raja Nandram's son, Bhoj Singh, took over the rule of Hathras from the Rajput rulers, followed by the Scindia ruler Madhavrao I Scindia in 1784 CE. Hathras was an industrial hub during the British Raj with several cotton-presses and spinning mills.					Fort, Archaeological remains, Bagichis, Havelis, temples, Tanks
Settlement	Sadabad	Period	Late Mughal, Colonial	Significance	Architectural
History					Major Typologies
Sadabad was a zamindari of Lalkhani Muslim Rajput in the eighteenth and nineteenth century.					Haveli of Nawabs,Mosque
District : Firozabad					
Settlement	Firozabad	Period	Mughal, Jat, Marathas	Significance	Architectural, Economic
History					Major Typologies
Firozabad was founded by Firoz Shah Tughlaq and flourished during the time of Akbar and Jehangir. Bajirao Peshwa looted Firozabad and Etmadpur in 1737 CE. The Jats of Mahawan also ruled Firozabad for 30 years.					Mosques, Tombs, Havelis, Residences, Bazaars
Settlement	Tundla	Period	Colonial	Significance	Architectural
History					Major Typologies
Tundla developed as a major junction on the East Indian Railway in the colonial period and a main center of British administration resulting in a typical railway colony settlement with a railway station, bungalows, churches and barracks exemplifying industrial heritage.					Residential colony with Barracks, Church
District : Bharatpur					
Settlement	Bharatpur	Period	Jat, Marathas, Colonial	Significance	Architectural, Economic
History					Major Typologies
Bharatpur is also known as Lohagarh. In 1733 AD, Maharaja Suraj Mal built the city of Bharatpur as a well-fortified settlement. It changed hands between the Jats and Marathas in the eighteenth and early nineteenth century till Lord Combermere laid siege in 1825 CE and Bharatpur became a part of the British empire.					Fort, Moat, Temples, Palace, Gateways, Residences and havelis.
Settlement	Deeg	Period	Jat	Significance	Architectural, Socio-Cultural, Ecological
History					Major Typologies
Deeg was a palace garden retreat town in north of Bharatpur, laid by the Jats of Bharatpur.					Deeg Fort, Palaces, Gardens
Settlement	Kumher	Period	Jat, Marathas	Significance	Architectural, Ecological
History					Major Typologies
Kumher was founded by a Jat chieftain Kumbh. In 1754 CE, when Raja Surajmal of Bharatpur was the king, the fort at Kumher was under siege by the Marathas.					Fort, Palaces, Kunds, Talaab, Pavilions
Settlement	Bayana	Period	Ancient, Medi-aeval, Jat	Significance	Archaeological, Architectural.

History					Major Typologies
Bayana is famous for Bijaigarh (Vijaygarh) fort which was built by Raja Bijai Pal in 1040 CE. It was an important settlement in the period of Sikandar Lodi, Humayun and Akbar and finds mention in Ain e Akbari by Abul Fazl as “this town is the burial place of many illustrious men”.					Fort, Archaeological remains and inscriptions, Temples, Mosques, Tombs, Gateways, Chattri
Settlement	Roopwas	Period	Mediaeval	Significance	Architectural, Ecological
History					Major Typologies
The settlement was important in the period of Akbar, Shahjehan and Jat rulers.					Chattri, Tank, Residences

The Taj Trapezium Zone (TTZ) is a region with a diverse and rich heritage having ecological, historical, cultural, associational, architectural, and aesthetic significance. This heritage is under threat due to absence of a holistic approach which should aim at an inclusive urban and economic development model focused on heritage assets located in the region.

The following section identifies some of the key issues threatening this precious heritage, based on which strategies for its protection and conservation can be formulated.[31] The issues pertain to protection of heritage assets, ecological linkages with heritage, community engagement with heritage, access to heritage sites, urban development impact on heritage and administration of heritage assets.

4.1.3.1 Lack of Protection of Heritage

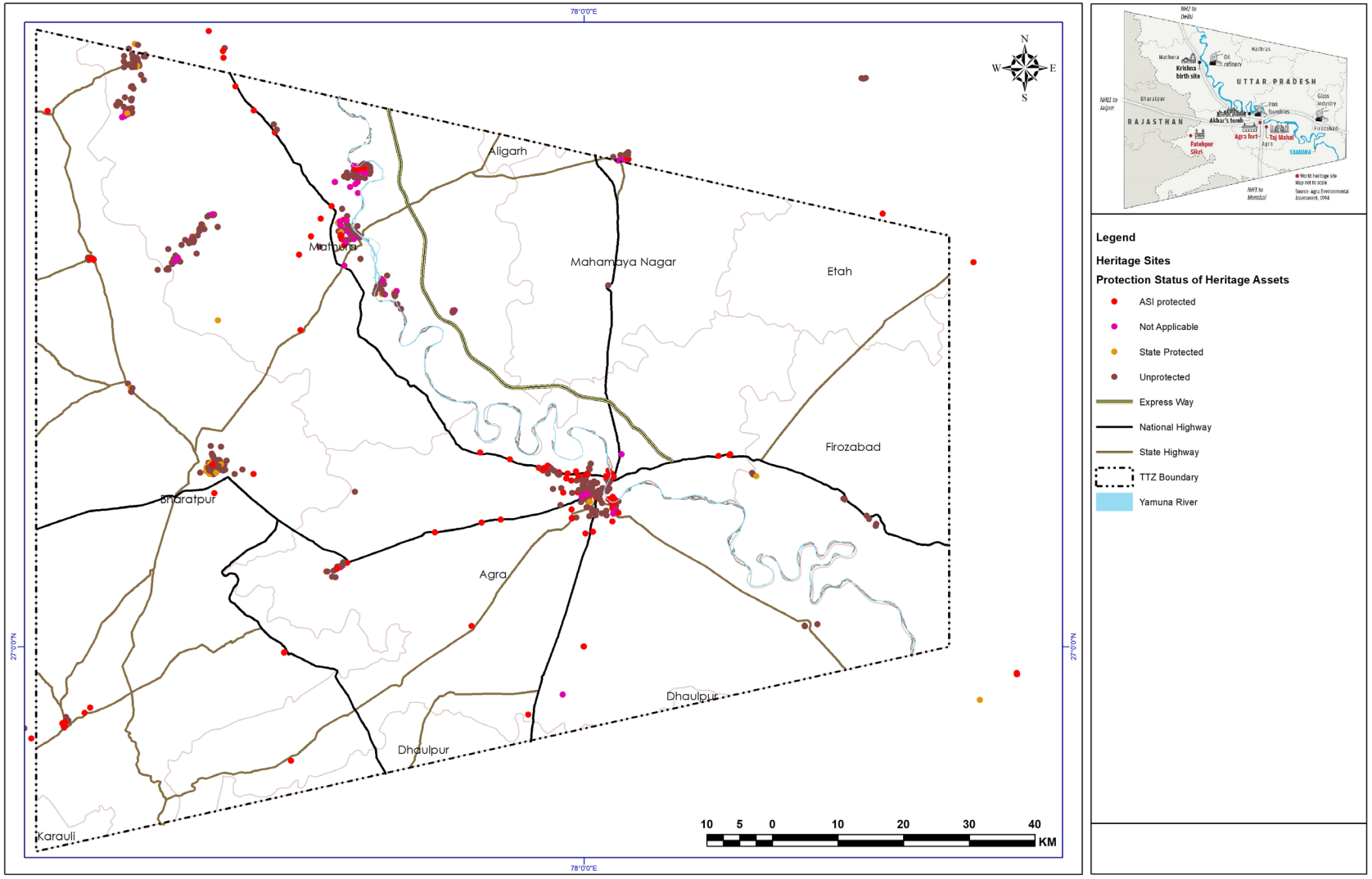
No comprehensive record and recognition of heritage assets:

There is no comprehensive record of all the built, natural and intangible heritage assets of the region.

The entire region is a cultural landscape, but heritage is understood and recognised only in terms of a few buildings. This layering of history goes largely unrecognised with a few settlements and layers of history getting precedence over others and in the process other settlements are neglected and the heritage lost. Each of the settlements in the region has a rich history, which has expressed itself in very distinct morphological character and functional and economic base. This is reflected in the core historic areas as heritage zones, heritage precincts, and heritage streetscapes, each with a unique urban character. However only individual buildings are recognised and protected as heritage and large areas and precincts and core areas go unprotected and hence prone to urban transformations resulting in loss of heritage character. In the absence of this recognition of their specific identity, the potential to highlight and enhance their unique urban character, which would additionally help them become major visitor destinations, is lost.

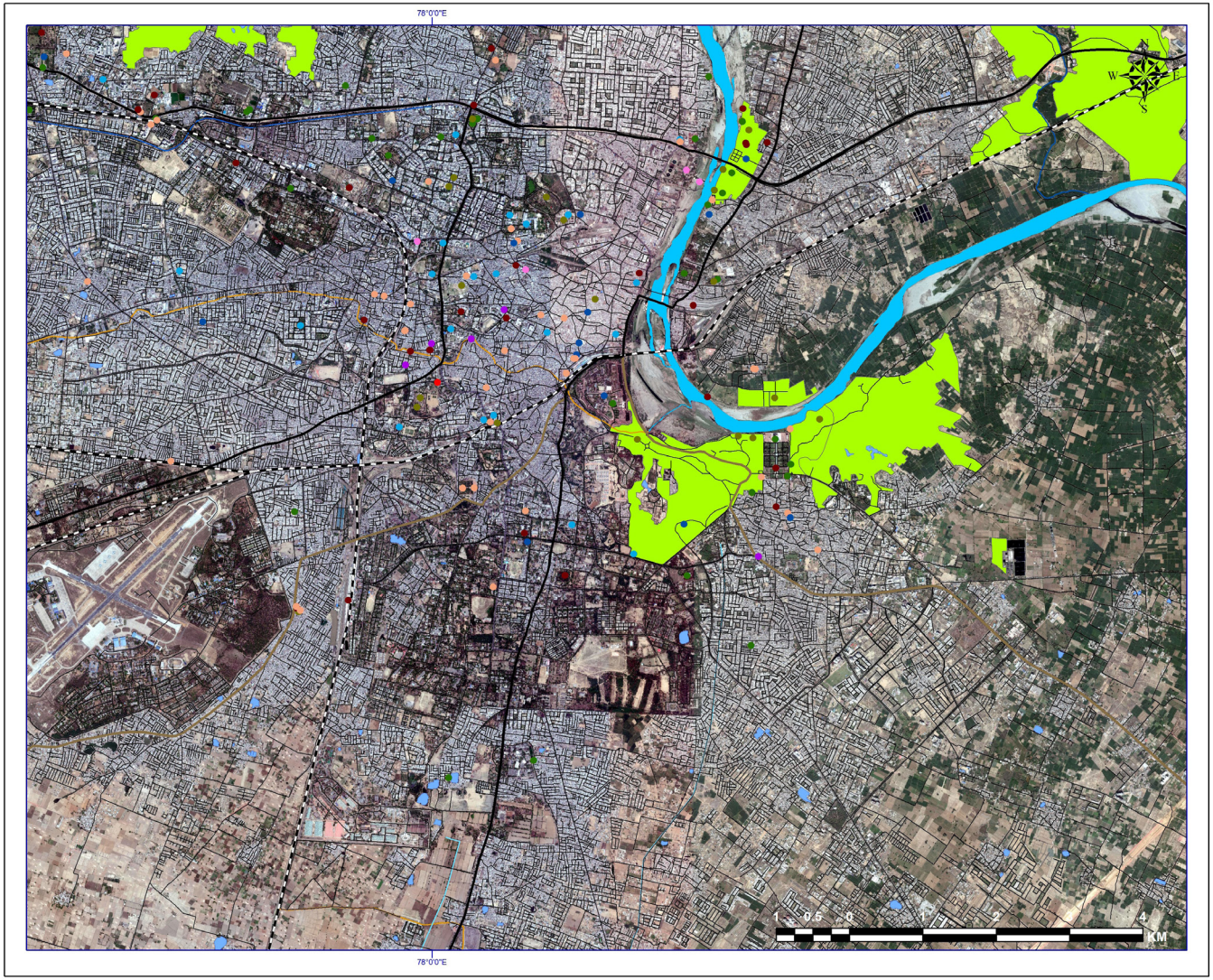
31 The list of heritage assets compiled for analysis and reflected in all the tables that follow is based on secondary sources and preliminary site surveys. It is not a comprehensive list of heritage resources in the region but is only indicative.

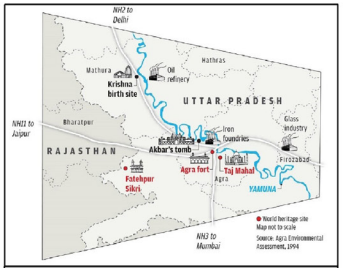
Map 4.2 Protection Status of Heritage Sructures



Source: Primary Survey; SPA, Delhi

Map 4.3 Heritage Asset in Agra





Legend

Heritage Sites

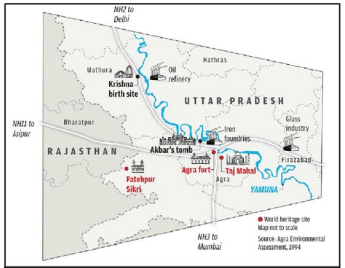
Typology of Heritage Asset

- Archaeological Sites
- Commercial
- Institutional
- Memorial
- Intangible
- Physical Infrastructure
- Religious
- Residential
- Social Infrastructure
- National Highway
- State Highway
- Secondary Roads
- Railway Line
- Distributary
- Drain
- Vegetation
- Water Body/Ponds/Kunds
- Yamuna River

Source: Primary Survey; SPA, Delhi

Map 4.4 Heritage Asset Vrindavan





Legend

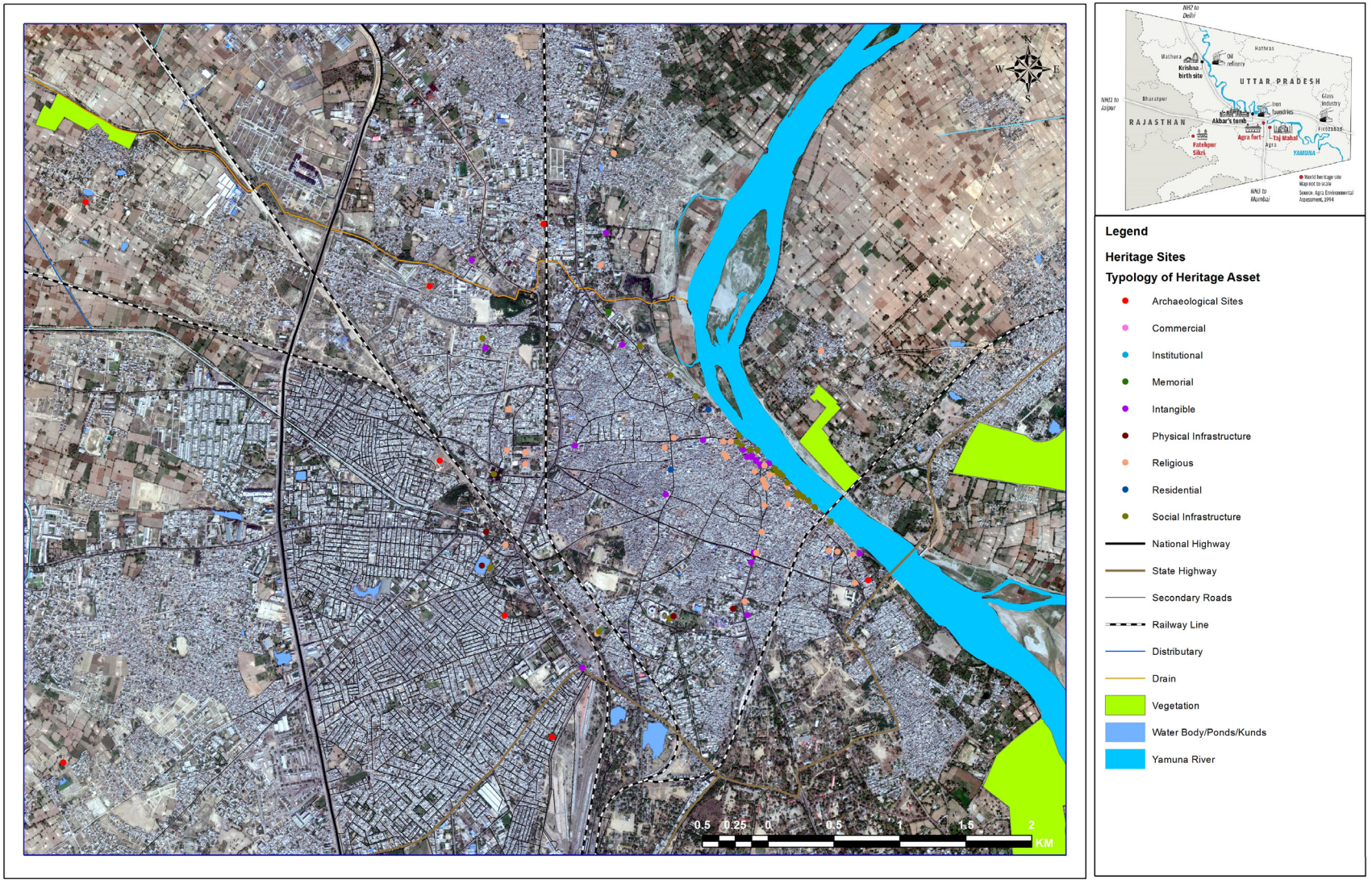
Heritage Sites

Typology of Heritage Asset

- Archaeological Sites
- Commercial
- Institutional
- Memorial
- Intangible
- Physical Infrastructure
- Religious
- Residential
- Social Infrastructure
- National Highway
- State Highway
- Secondary Roads
- Railway Line
- Drain
- Vegetation
- Water Body/Ponds/Kunds
- Yamuna River

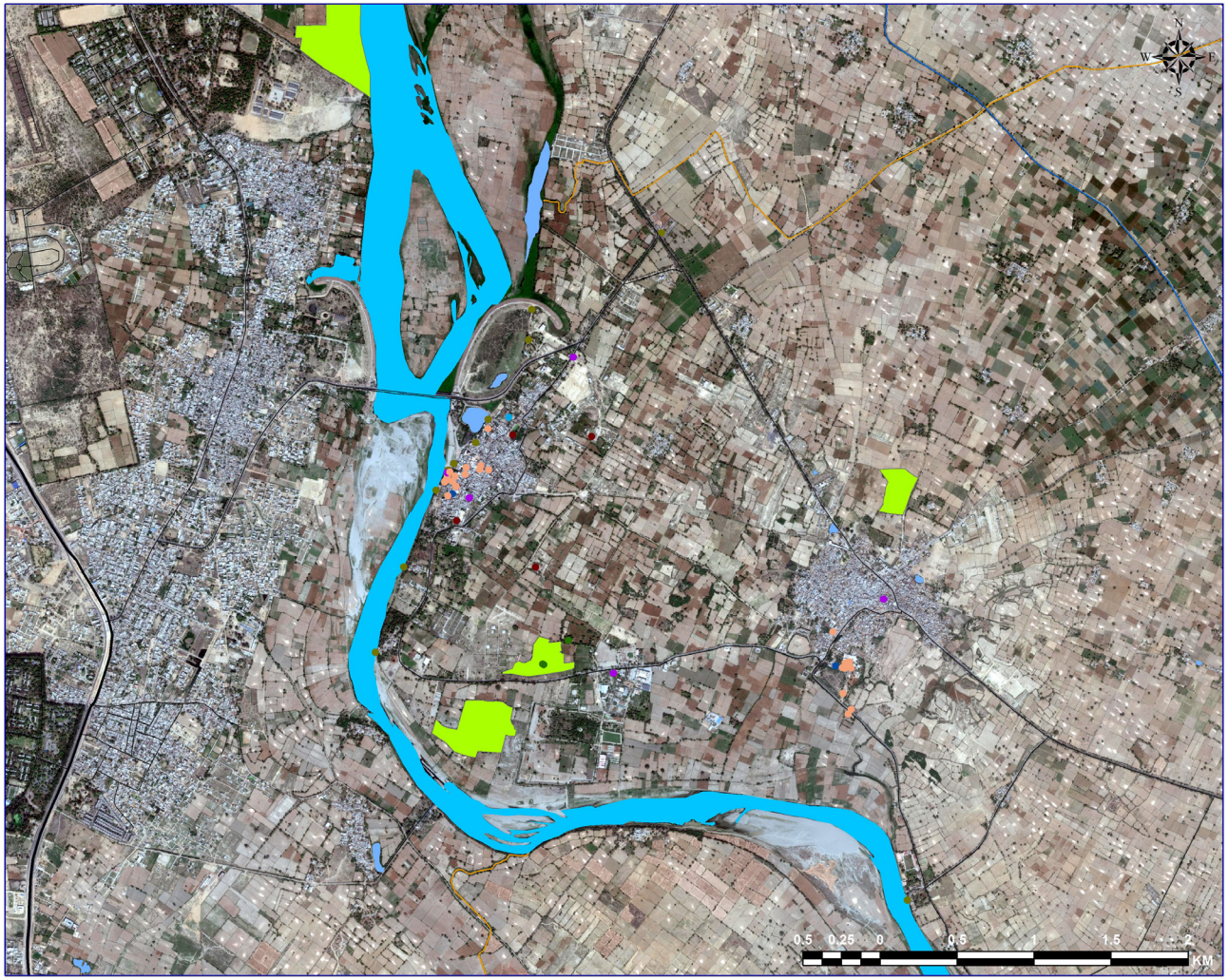
Source: Primary Survey; SPA, Delhi

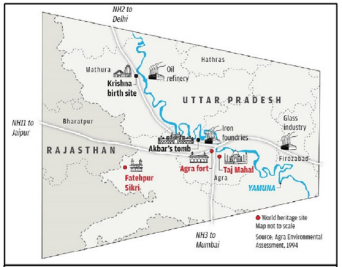
Map 4.5 Heritage Asset in Mathura



Source: Primary Survey; SPA, Delhi

Map 4.6 Heritage Asset in Gokul & Mahavan





Legend

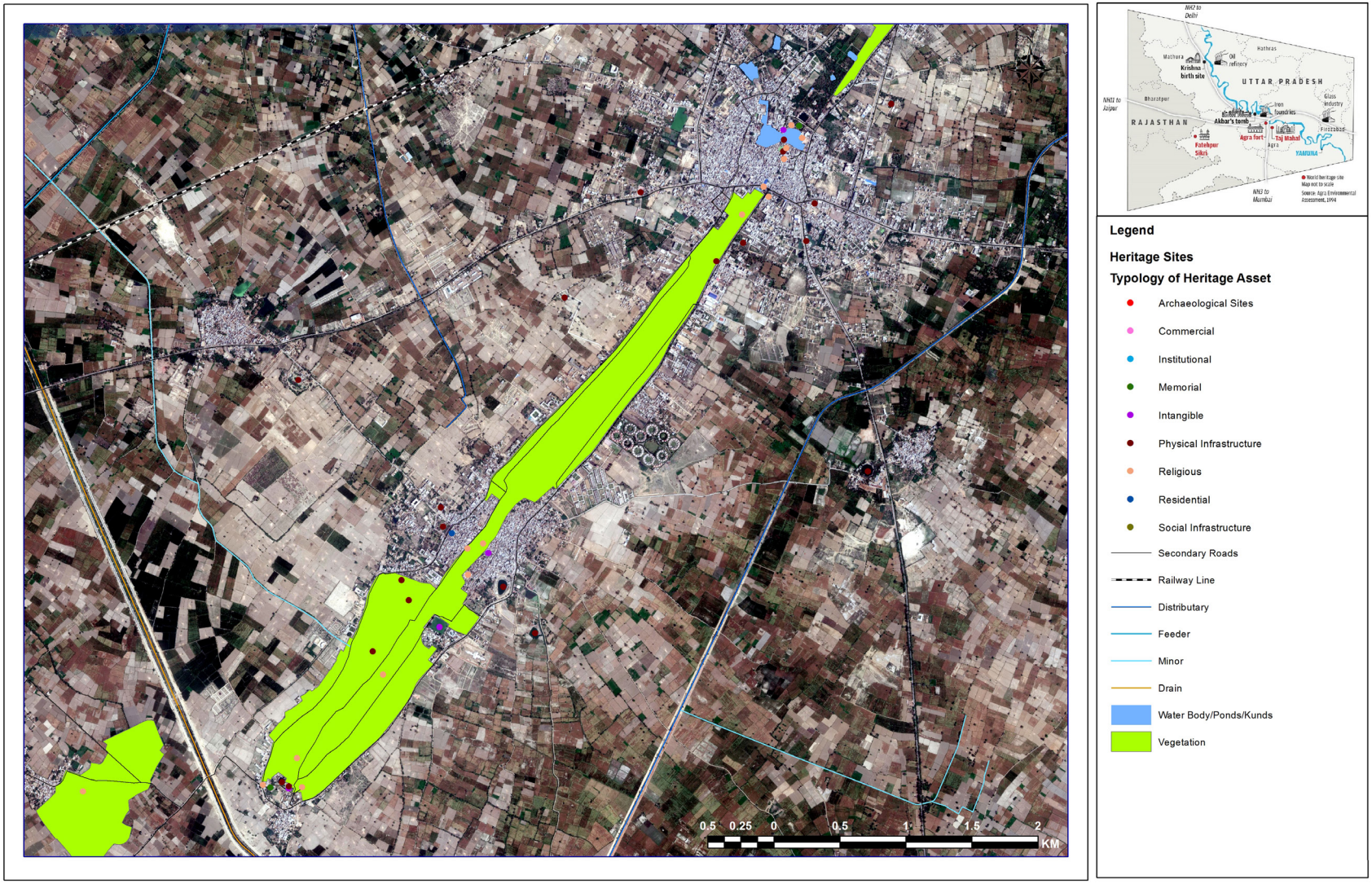
Heritage Sites

Typology of Heritage Asset

- Archaeological Sites
- Commercial
- Institutional
- Memorial
- Intangible
- Physical Infrastructure
- Religious
- Residential
- Social Infrastructure
- National Highway
- Secondary Roads
- Distributary
- Drain
- Water Body/Ponds/Kunds
- Vegetation

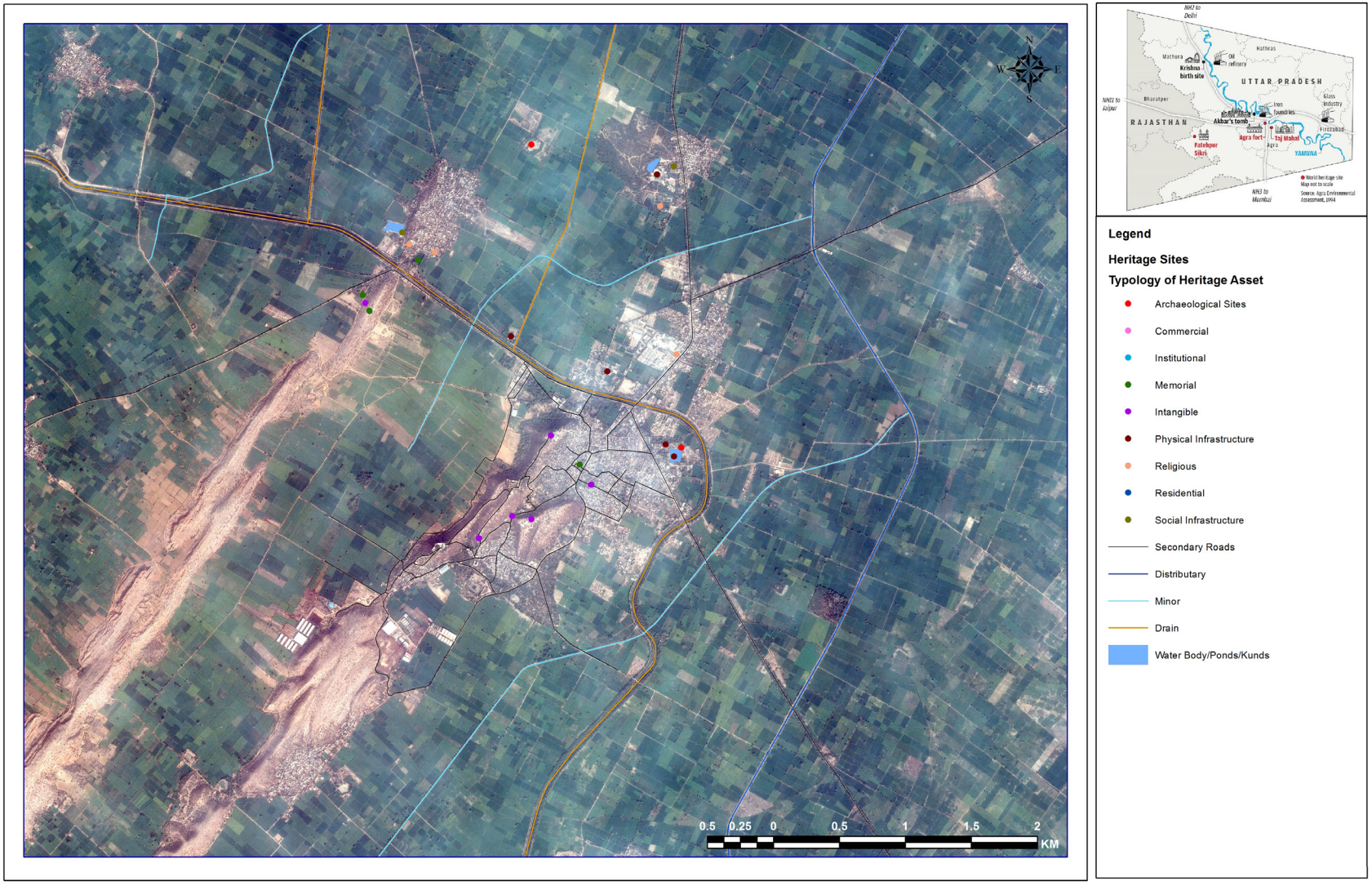
Source: Primary Survey; SPA, Delhi

Map 4.7 Heritage Assets in Govardhan



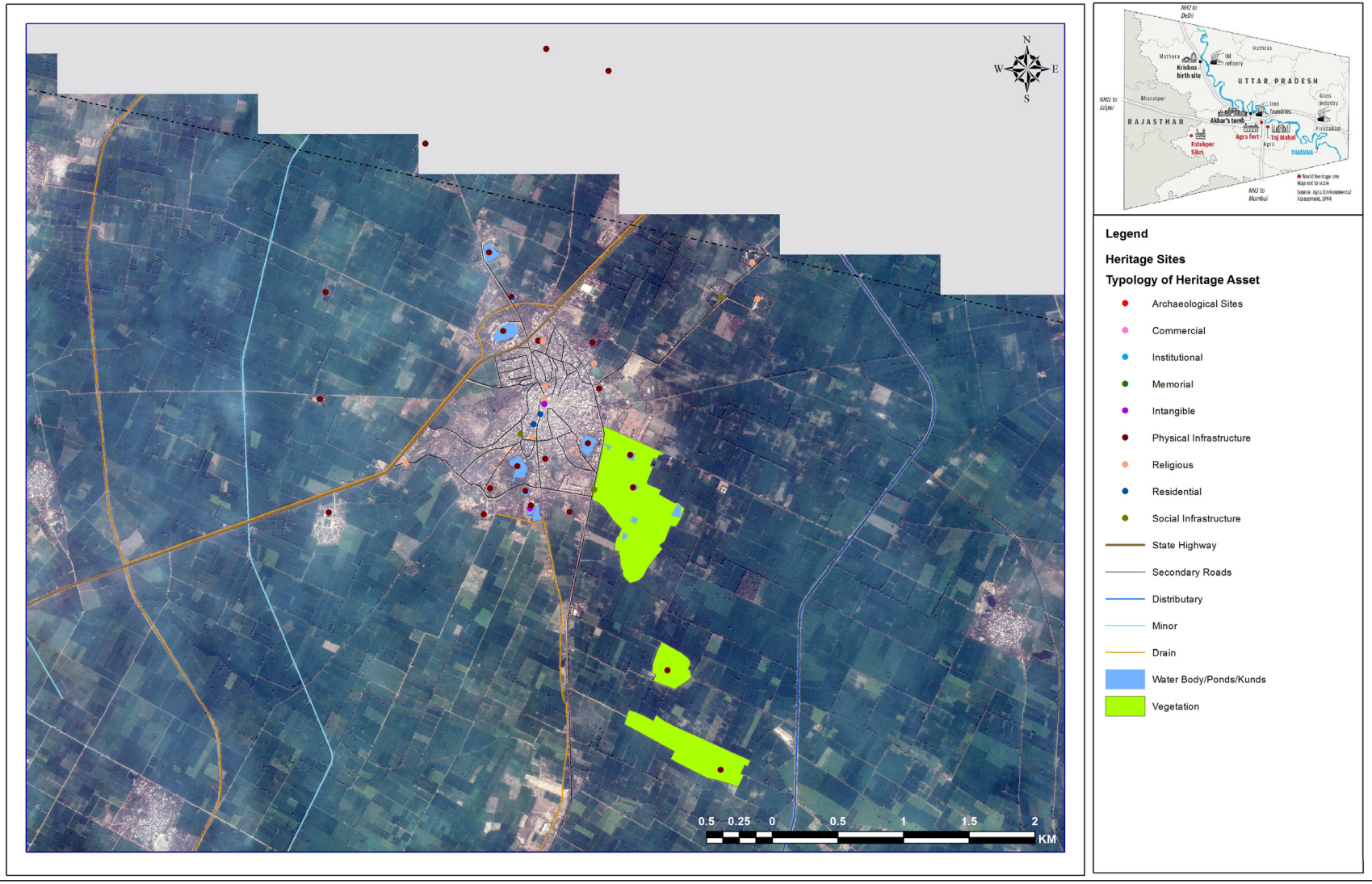
Source: Primary Survey; SPA, Delhi

Map 4.8 Heritage Assets in Barsana



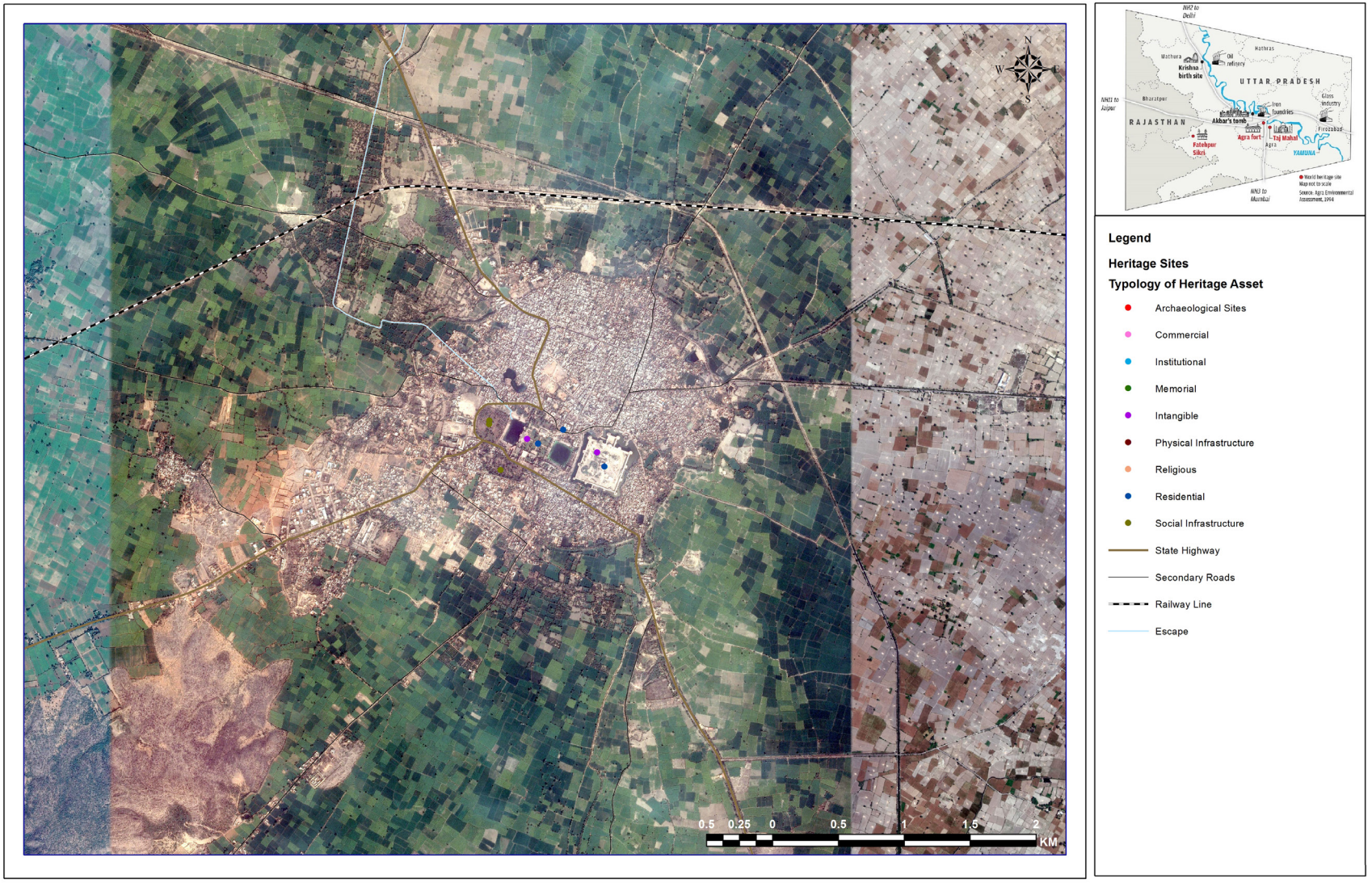
Source: Primary Survey; SPA, Delhi

Map 4.9 Heritage Assets in Nandgaon



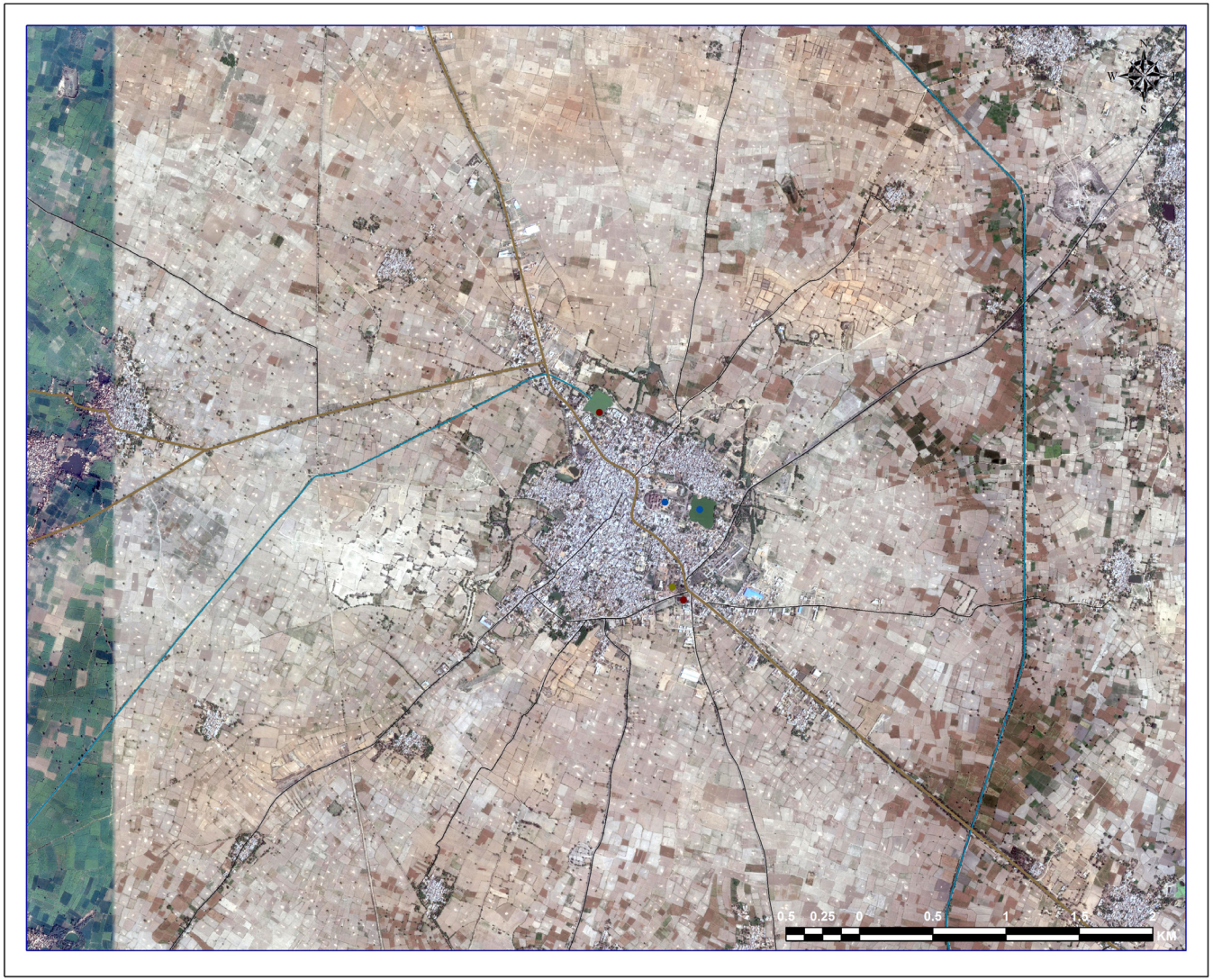
Source: Primary Survey; SPA, Delhi

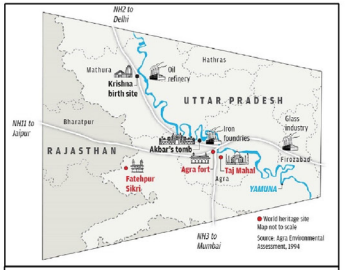
Map 4.10 Heritage Assets in Deeg



Source: Primary Survey; SPA, Delhi

Map 4.11 Heritage Assets in Kumher





Legend

Heritage Sites

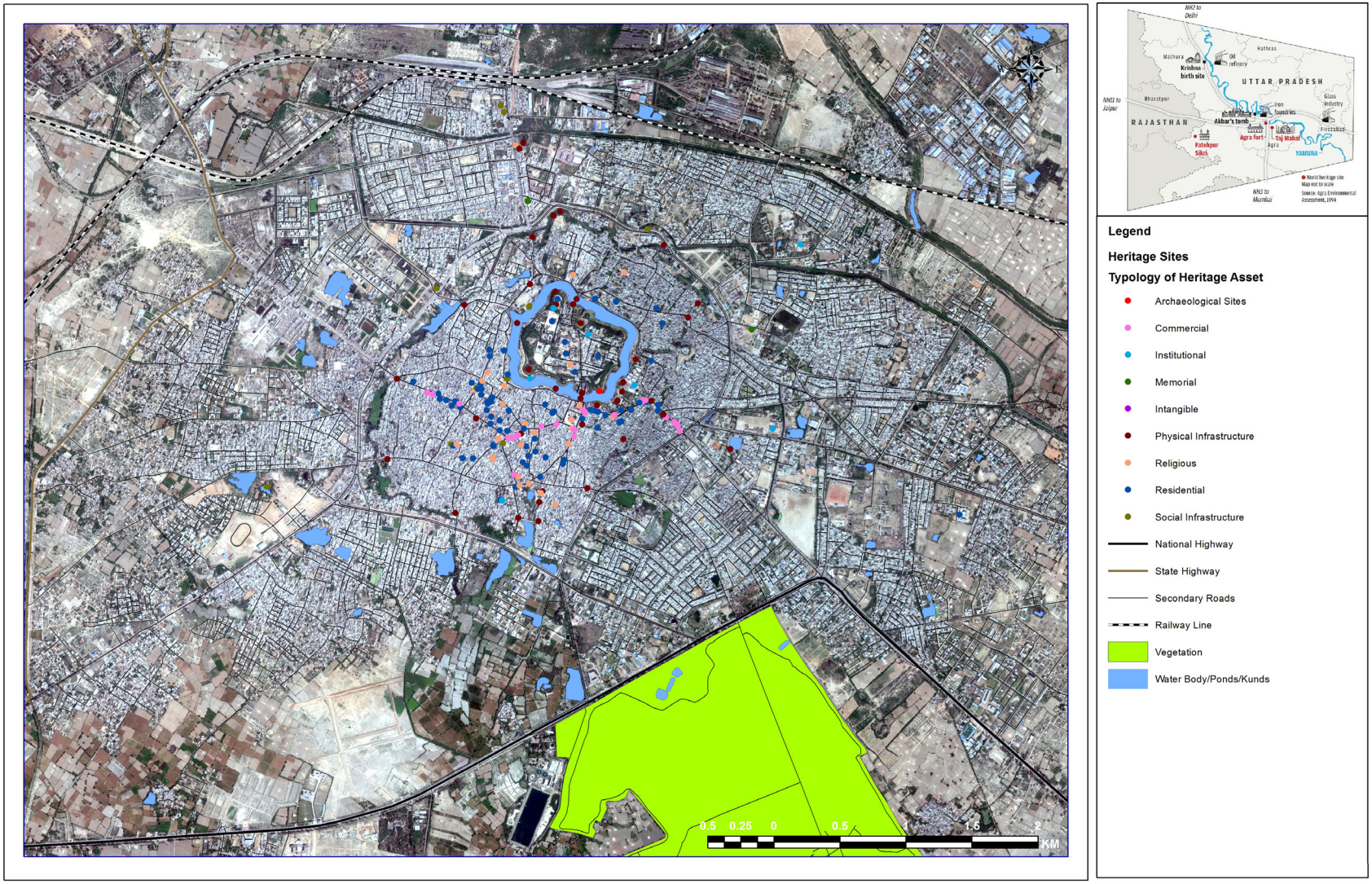
Typology of Heritage Asset

- Archaeological Sites
- Commercial
- Institutional
- Memorial
- Intangible
- Physical Infrastructure
- Religious
- Residential
- Social Infrastructure

- State Highway
- Secondary Roads
- Canal

Source: Primary Survey; SPA, Delhi

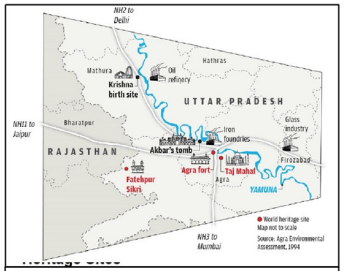
Map 4.12 Heritage Assets in Bharatpur



Source: Primary Survey; SPA, Delhi

Map 4.13 Heritage Assets in Bayana



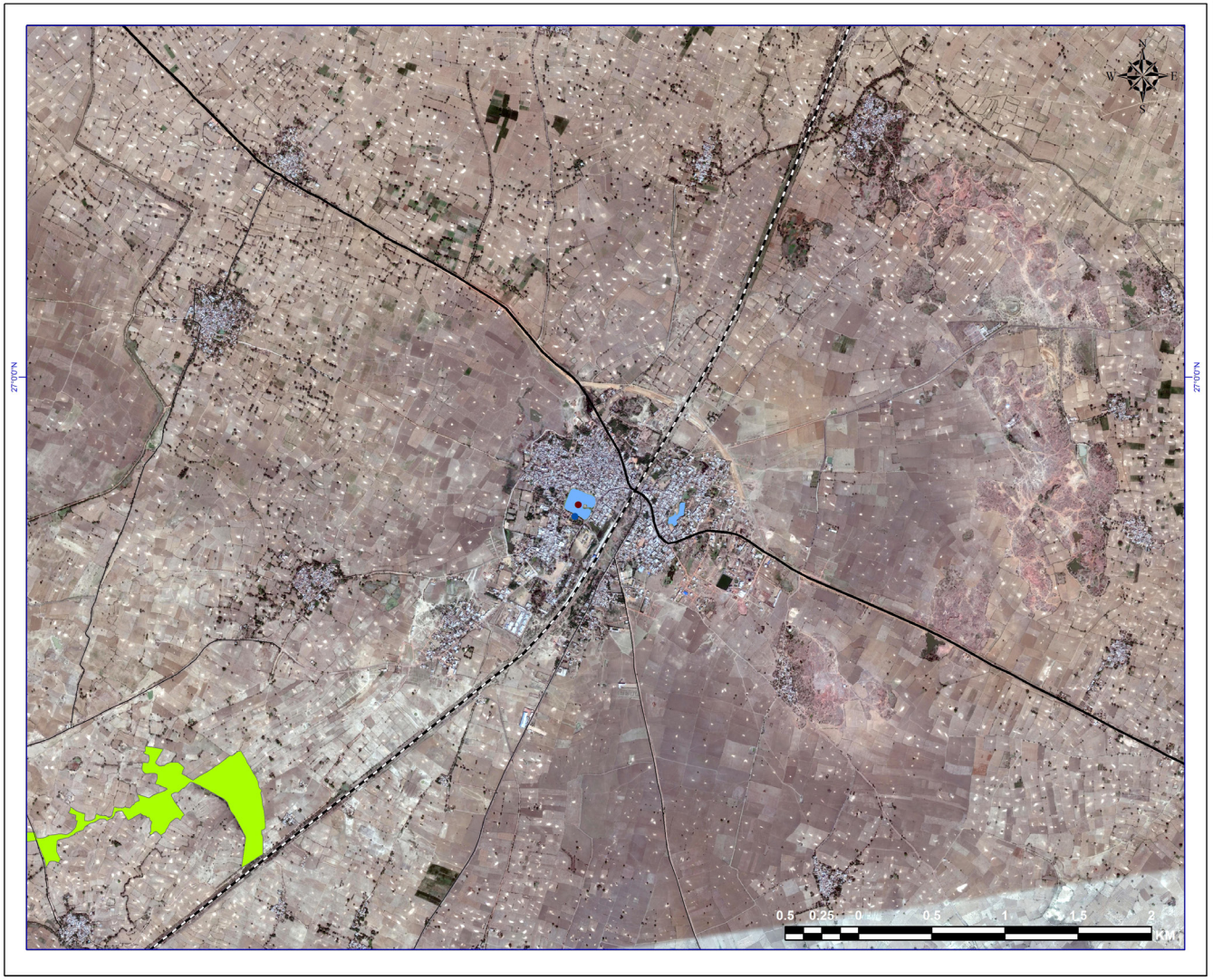


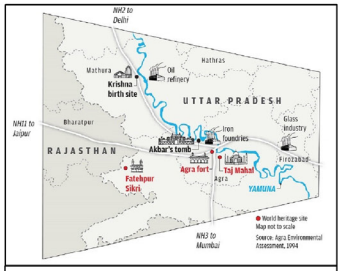
Typology of Heritage Asset

- Archaeological Sites
- Commercial
- Institutional
- Memorial
- Intangible
- Physical Infrastructure
- Religious
- Residential
- Social Infrastructure
- State Highway
- Secondary Roads
- Railway Line
- River
- Water Body/Ponds/Kunds

Source: Primary Survey; SPA, Delhi

Map 4.14 Heritage Assets in Roopvas





Legend

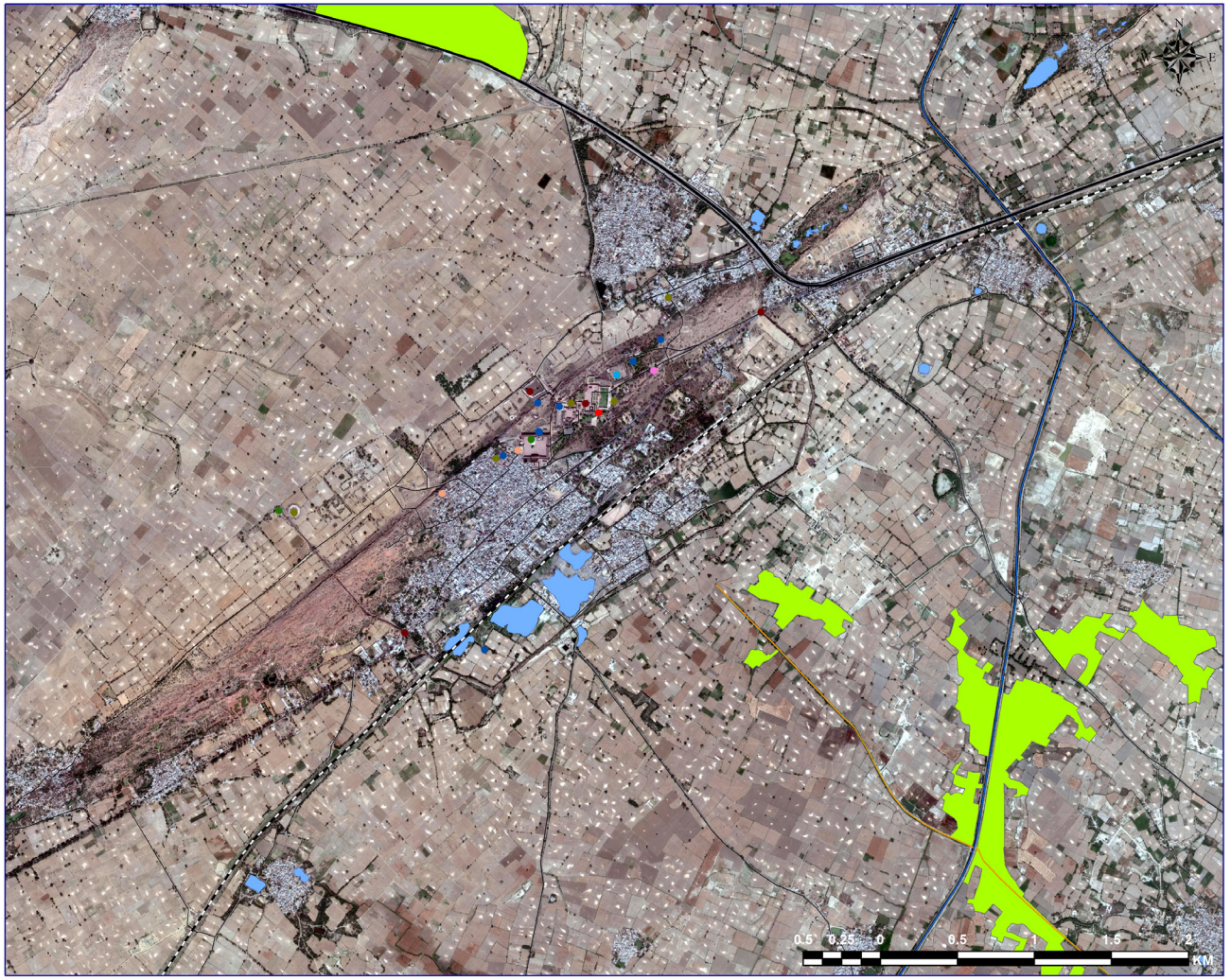
Heritage Sites

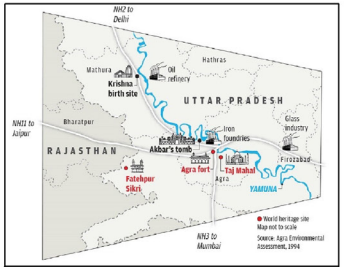
Typology of Heritage Asset

- Archaeological Sites
- Commercial
- Institutional
- Memorial
- Intangible
- Physical Infrastructure
- Religious
- Residential
- Social Infrastructure
- National Highway
- Secondary Roads
- Railway Line
- Water Body/Ponds/Kunds
- Vegetation

Source: Primary Survey; SPA, Delhi

Map 4.15 Heritage Assets in Fatehpur Sikri





Legend

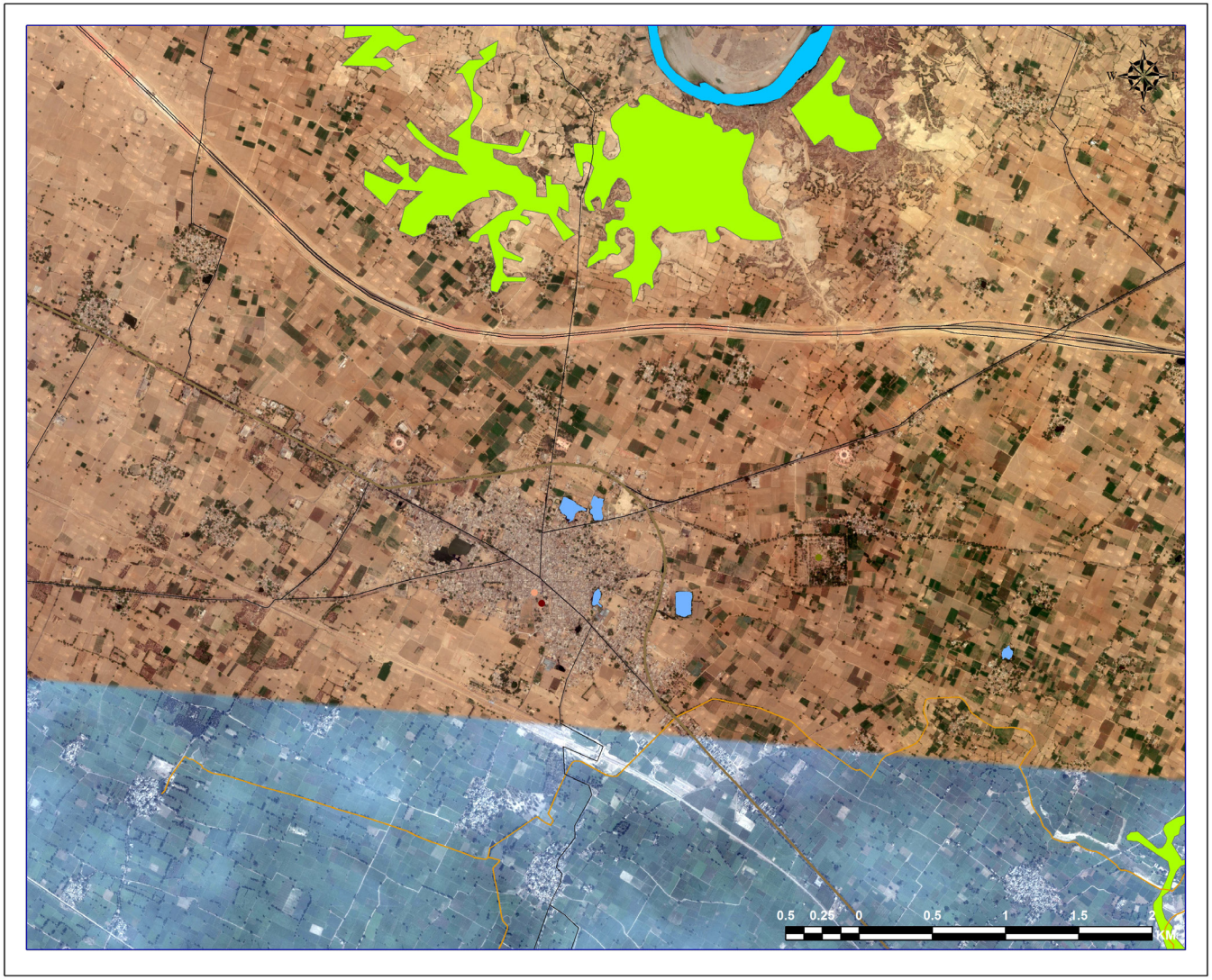
Heritage Sites

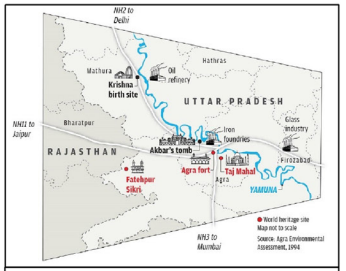
Typology of Heritage Asset

- Archaeological Sites
- Commercial
- Institutional
- Memorial
- Intangible
- Physical Infrastructure
- Religious
- Residential
- Social Infrastructure
- National Highway
- Secondary Roads
- Railway Line
- Distributary
- Drain
- Vegetation
- Water Body/Ponds/Kunds

Source: Primary Survey; SPA, Delhi

Map 4.16 Heritage Assets in Fatehabad





Legend

Heritage Sites

Typology of Heritage Asset

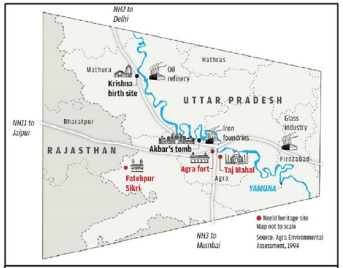
- Archaeological Sites
- Commercial
- Institutional
- Memorial
- Intangible
- Physical Infrastructure
- Religious
- Residential
- Social Infrastructure

- State Highway
- Secondary Roads
- Railway Line
- Drain
- Water Body/Ponds/Kunds
- Vegetation

Source: Primary Survey; SPA, Delhi

Map 4.17 Heritage Assets in Tundla and Etmadpur





Legend

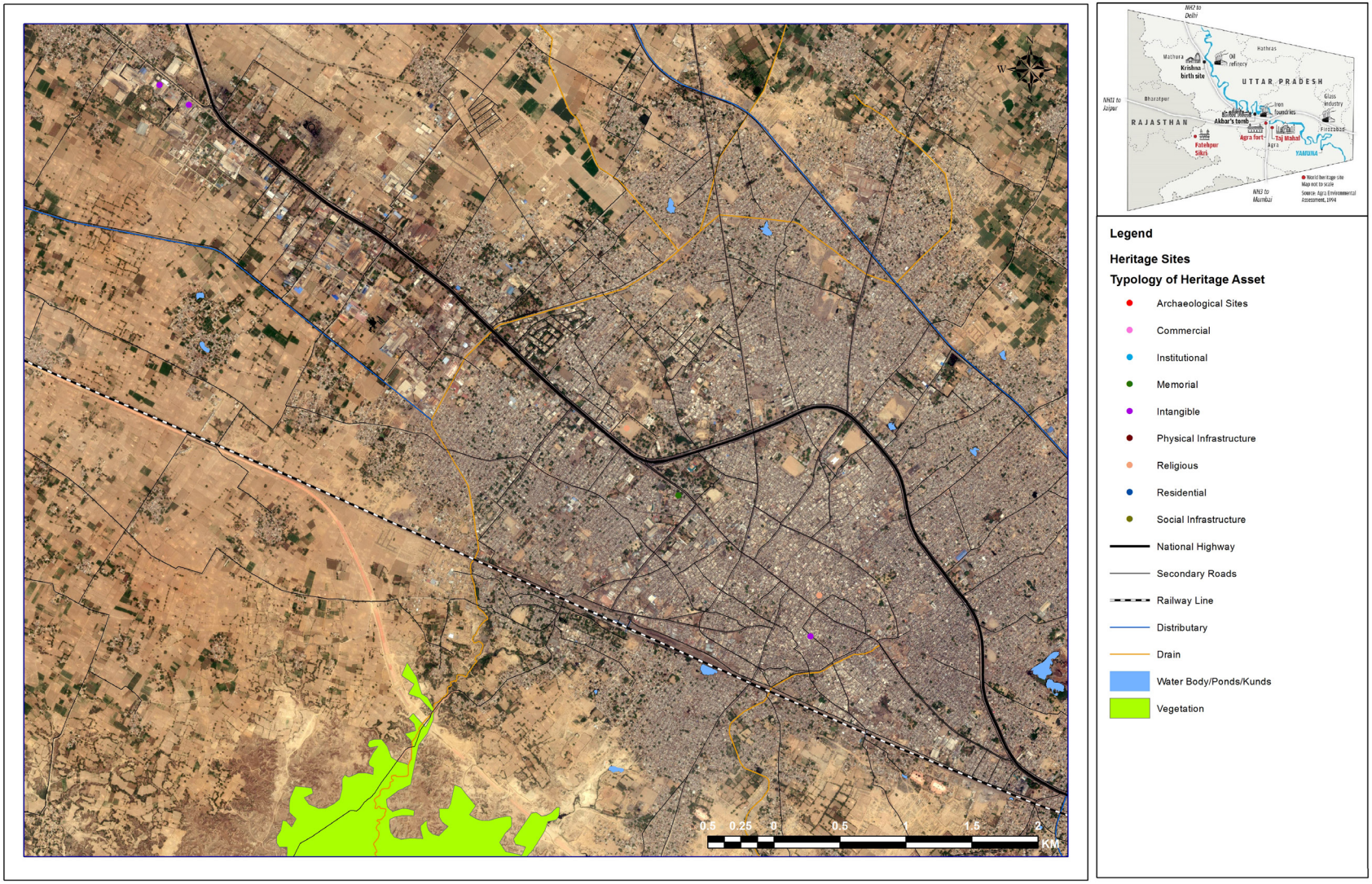
Heritage Sites

Typology of Heritage Asset

- Archaeological Sites
- Commercial
- Institutional
- Memorial
- Intangible
- Physical Infrastructure
- Religious
- Residential
- Social Infrastructure
- National Highway
- State Highway
- Secondary Roads
- Railway Line
- Minor
- Drain
- Water Body/Ponds/Kunds

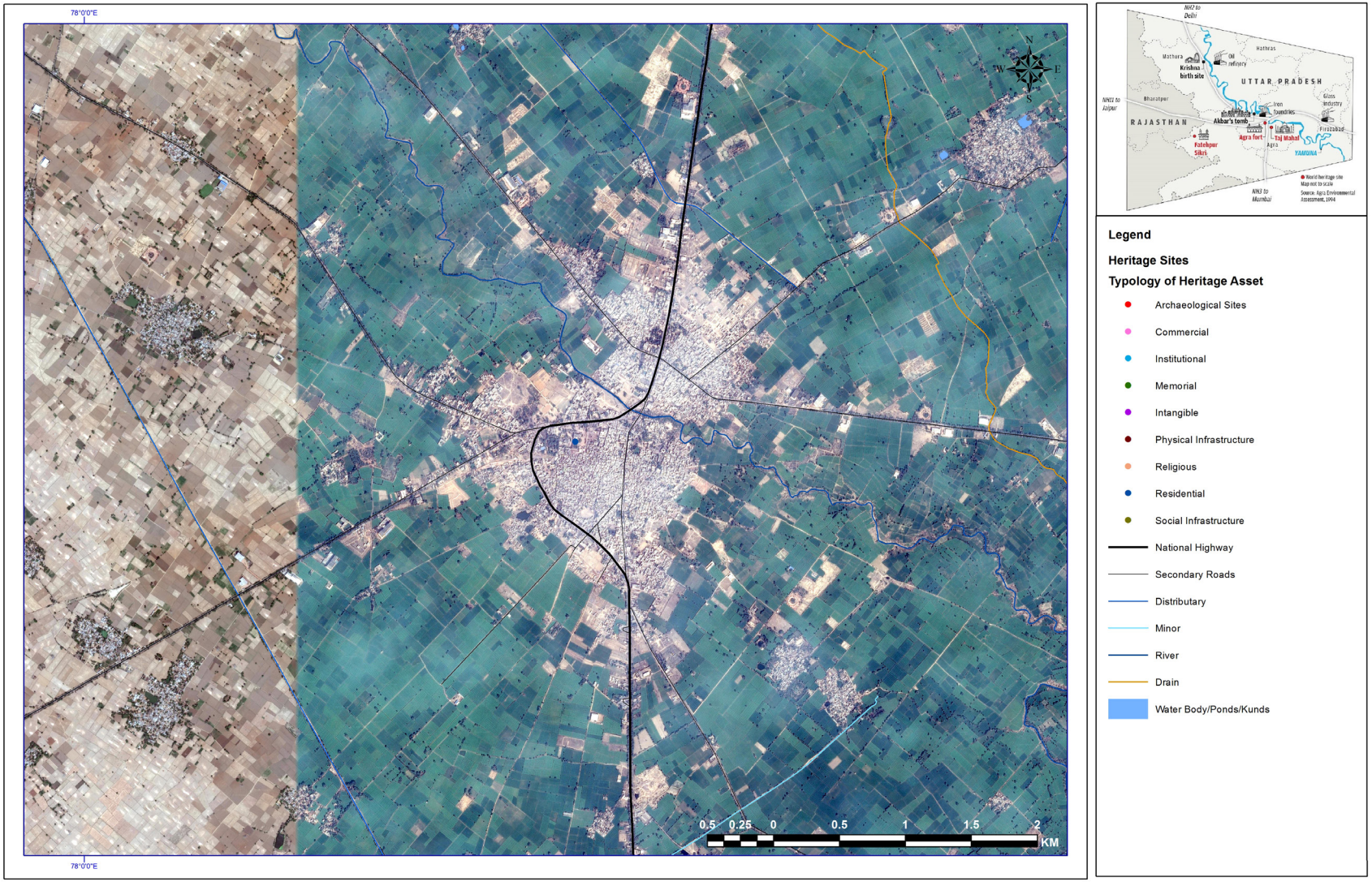
Source: Primary Survey; SPA, Delhi

Map 4.18 Heritage Assets in Firozabad



Source: Primary Survey; SPA, Delhi

Map 4.19 Heritage Assets in Sadabad



Source: Primary Survey; SPA, Delhi

Table 4.3 Settlement wise Heritage precinct/heritage streets[32]

AGRA
Taj Precinct and Riverfront Gardens, Agra
Precinct 1: Taj Mahal and immediate surroundings, Agra
Precinct 2 : Extended Riverfront Gardens
Historic Core of Agra
Precinct 3 : Hing ki Mandi and Surrounding areas
Precinct 4: Marble industry of Gokulpura, Agra
Precinct 5 : Belanganj and its bazaars
Precinct 6 :Colonial Bungalow precinct, Agra
Precinct 7: Colonial Institutional Precinct, Agra
Precinct 8: Precinct of Sikandra
FATEHPUR SIKRI
Precinct 1: City of Victory: Settlement of Fatehpur and Sikri
Precinct 2: Mughal Imperial Highway Precinct
HATHRAS
Precinct 1: Baghs and Bagichis of Hathras
BARSANA
FOOT HILLS AND HISTORIC CORE
Precinct 1 : Core settlement at the foot hills
KUNDS AND VANS OF BARSANA
Precinct 2 : Vrishbhanu Kund Precinct
Precinct 3 : Kunds and Temple
Precinct 4 : Sakhi Giri Parvat Precinct
MATHURA
Historic Core of Mathura
Precinct 1: Tilas and Ghats of Mathura
Precinct 2: Bazaar Streets with Havelis and shops
Archaeological and Mythological Core of Mathura
Precinct 2: Mosque and Janmabhoomi Precinct with the bazaar, Mathura
Precinct 3: Shiv Taal Precinct
Precinct 3: Bhuteshwar Road Precinct
Colonial Core of Mathura
Precinct 3: Colonial Precinct of Mathura
VRINDAVAN
Parikrama Marg Zone

32 Source: Preliminary surveys, INTACH Listing of Agra, Built Heritage Resource Mapping of Bharatpur and Braj Corridor Report for UP Pro Poor Tourism Development Project prepared by INTACH

Precinct 1: Ghat Precinct of Vrindavan
Precinct 2: Temple precinct of Parikrama Route
Significant Temples and Environs
Precinct 3: Rangji Temple and Govind Dev Temple precinct, Vrindavan
Precinct 4: Banke Bihari Temple and Bazaar lanes of Vrindavan
GOVARDHAN
Parikrama Zone
Precinct 1: Hills enveloped by Parikrama Marg
NANDAGAON
Mythological and Ecological Settlement of Nandgaon
Precinct 1: Ecological envelope of Nandgaon
Precinct 2: Mythological core precinct of Nandgaon
GOKUL
Mythological Settlement of Gokul
Precinct 1: Ghat precinct of Gokul
Precinct 2: Mythological core of Gokul
BALDEO
Precinct 1: Temple and Kund Precinct of Baldeo
BAYANA
Precinct 1 : Group of Mughal Monuments of Bayana
Precinct 2 : Syncretic Precinct of Bayana
ROOPWAS
Precinct 1 : Lal Mahal Precinct
TUNDLA
Precinct 1- Colonial Precinct of Tundla
BHARATPUR
Fortified City of Bharatpur
Precinct 1 : Fort including the moat
Precinct 2 : Colonial Precinct
Precinct 3 : Historic haveli and bazaar street of Bharatpur
DEEG
Precinct 1:Royal Garden and palaces precinct of Deeg
KUMHER
Precinct 1 : Historic and Ecological precinct of Kumher
FATEHABAD
Precinct 1 : Mughal Precinct of Fatehabad
Precinct 2 : Mughal Garden of Fatehabad
FIROZABAD
Precinct 1 : Historic Bazaar Street
SIKANDRARAO

Precinct 1 : Old fort/ Tehsil precinct
SADABAD
Precinct 1 : Nawabi Palace Complex

There are many water bodies which, as an integral part of heritage structures or heritage precincts, offer an opportunity for water harvesting and improving the health of local ecosystems. These water structures work in tandem with the local streams in the regional landscape. They go unnoticed and unprotected as an important component of the natural heritage in their ability to catch the surface runoff and become part of a larger hydrological system.

Table 4.4 List of Heritage sites with water bodies[33]

Sl. No.	District	Settlement	No. of sites with water bodies	Sites with water bodies				
				Moat	Tank	Kund	Well	Baoli
1	Agra	Agra	5	1	2	1	2	1
2	Agra	Etmadpur	1		1			
3	Agra	Fatehabad						
4	Agra	Fatehpur Sikri	2			1		1
5	Agra	Sikandra	1		1			
6	Bharatpur	Bayana	2			1	1	
7	Bharatpur	Bharatpur	10	2		3	5	
8	Bharatpur	Kumher	2		2			
9	Bharatpur	Roopwas	1		1			
10	Bharatpur	Deeg	1		1			
11	Firozabad	Firozabad						
12	Hathras	Hathras	1		1			
13	Hathras	Sikandra Rao	1		1			
14	Mathura	Baldeo	1			1		
15	Mathura	Barsana	7			7		
16	Mathura	Chatta	2			2		
17	Mathura	Chaumuha	2			2		
18	Mathura	Gokul	4			4		
19	Mathura	Govardhan	28			28		
20	Mathura	Mahavan	5			5		
21	Mathura	Mathura	5			5		
22	Mathura	Nandgaon	23			23		
23	Mathura	Radhakund	5			5		
24	Mathura	Vrindavan	7			5	1	1

33 The information is based on preliminary site survey, INTACH listing of Agra, Bharatpur listing by Urvashi Srivastava and Braj Corridor Report for UP Pro Poor Tourism Development Project prepared by INTACH.

The kunds and vans (groves) were a manifestation of the weave of natural and cultural ecology. They have not been recognised as heritage of immense ecological value and consequently have not been identified, listed and protected as heritage. Kunds are not recognised as part of the larger ecosystem, essential from the perspective of maintaining a healthy hydrological balance. This is because of lack of awareness of the traditional water management systems and the possibility of reviving them to help sustain a better quality of life.

Even though the ghats are an important part of the cultural ecology of the region, most of the heritage resources along the river (like ghats) are neglected and in need of restoration.

Table 4.5 No. of Heritage resource along the riverfront

Typology of Resource	Total		Typology of Resource	Total		Typology of Resource	Total
Agra			Gokul			Mathura	
Garden	8		Temple	4		Temple	10
Gateway	3		Ghat	4		Haveli	1
Chattri	2		Fort	1		Dharamshala	5
Ghat	2		Baithak	2		Ghat	14
Tomb	7		Chattri	1		Burj	1
Mill	1		Vrindavan			Fort	1
Institutes	3		Ghat	2		Mound/Tila	3
Mosque	1		Temple	3			
Residence	3						
Temple	2						
Well	1						

Because of lack of awareness, there is very limited community engagement with both protected and unprotected heritage.

Limited administrative protection of heritage assets: Because of lack of awareness and absence of identification of this rich heritage, there is very limited local administrative protection of built heritage, due to which the heritage is disappearing.

Table 4.6 Number of ASI, State protected and unprotected sites

Settlement	ASI Protected	State Protected	Unprotected Sites
Agra			
Agra	55	0	111
Bah	0	1	0
Fatehpur Sikri	1	0	20
Etmadpur	3	0	0
Jagner	1	0	0
Jajau	1	0	0
Kgarol	1	0	0

Settlement	ASI Protected	State Protected	Unprotected Sites
Kakretha	1	0	0
Rasulpur	1	0	0
Rajwara	1	0	0
Mau	1	0	0
Sadabad	0	0	1
Sikandra	6	0	6
Fatehabad	0	0	3
Etah			
Basundhri	1	0	0
Malawan	1	0	0
Noh Khas and Khera Noh	1	0	0
Firozabad			
Tundla	0	1	2
Firozabad	0	0	6
Hathras			
Hathras	2	0	6
Sikandra Rao	0	0	3
Sadabad	0	0	1
Mathura			
Bajna	1	0	0
Baldeo	0	0	14
Barsana	1	1	21
Chamah	1	0	0
Chatta	5	0	2
Chaumuha	0	0	2
Gohari	1	0	0
Gokul	0	0	32
Govardhan	0	5	44
Kosi Kalan	2	0	1
Mahavan	0	3	15
Mathura	16	2	76
Nandgaon	0	2	35
Radhakund	0	0	16
Vrindavan	5	1	85
Bharatpur			
Bayana	9	0	5
Bharatpur	14	13	162
Brahmabad	2	0	0
Deeg	6	0	3
Kaman	2	0	0
Kumher	0	1	4
Malah	1	0	0
Noh	1	0	0
Roopwas	2	0	0

Several archaeological sites are not recognised as culturally significant areas, and in the absence of adequate protection are encroached upon or stay neglected. There are only 2 state protected and 23 ASI Protected archaeological sites identified in the region. There are several more archaeological mounds which are still unprotected such as Ganesh Tila in Mathura, Bardola Tila in Barsana, Girdharpur mound in Mathura, Kankor Tila in Mathura, Saptarishi Tila in Mathura, and Govindpura tila in Mathura.

Table 4.7 List of Protected Archaeological Sites

Site	Settlement	Protection Status
Agra		
52 Bullock Well	Agra	ASI protected
Inscribed tablet in a piece of the old city wall of Agra	Agra	ASI protected
Old Tila and Tasu Tila	Khawaspur	ASI protected
Bharatpur		
Ancient Mound	Noh	ASI protected
Rathakhana	Bharatpur	ASI protected
Ancient Mound	Malah	ASI protected
Mathura		
Mound at Govindnagar	Govindnagar	State Protected
Ancient mound of Sonkh	Barsana	ASI protected
Small mound locally known as Chavar	Kosi Kalan	ASI protected
Palikhera Mound	Mahavan	ASI protected
Ahalyaganj Mound	Mathura	ASI protected
Chamunda Tila	Mathura	ASI protected
Ancient Site	Mathura	ASI protected
Gayatri mound	Mathura	ASI protected
Gopal Khera	Mathura	ASI protected
Kankali tila, Jain and Chaubara Mound	Mathura	ASI protected
Mound marking the Old Fort	Mathura	ASI protected
Portions of Katra Mound	Mathura	ASI protected
Site of ancient Pokhar (Pushkarini)	Mathura	ASI protected
Pillar with Sanskrit inscription dated samvat 1666 in the flanking tower at the Bhanakaur tank	Mathura	State Protected
Ancient sculptures, carvings, images, bas-reliefs, inscriptions, stones and like objects	Mathura	ASI protected
Hathras		
Remains of an old Hindu temple inside the Dayar-am's fort	Hathras	ASI protected
Etah		
Khera Basundara	Basundra	ASI protected
Two Mounds together with a statue	Noh Khas, Khera Noh	ASI protected
Remains of an old temple	Malawan	ASI protected

4.1.3.2 Inadequate Heritage Conservation Management Systems

Neglect of natural heritage

Eutrophication is observed in several kunds due to stagnation of water and incompatible uses around.

Figure 4.4 Hathras: Eutrophication of the water body in historic water tank along the road.	Figure 4.5 Hathras: Eutrophication of the water body in historic water tank along the road.
	

Neglect of intangible heritage

Through primary research and secondary sources there are several crafts identified in the region. In case of Agra marble inlay, zardozi, petha making, carpet making are few crafts identified in the settlement which are still surviving. Few other crafts identified in the settlement from secondary sources have either changed their form of practice or have very few craftsmen. These include leather works and bamboo crafts.In the absence of adequate recognition of the rich craft tradition as a valuable asset, the living and working conditions of craftsmen are very poor, lacking the basic standards of health and hygiene.

Table 4.8 List of settlements with specific areas with crafts

Craft	Area
Agra	
Marble inlay /Pietra Dura	Gokulpura, Taj Ganj
Leather Craft (Selling and packaging)	Taj Gang, Fatehabad Road, Sadar Bazaar
Carpet Work	Villages around Agra - Rasoolabad, Tedhi Baghiya, Gutlashan, Lal Garhi etc.
Zari work	Hing Ki Mandi, Lohamandi
Petha Making	Noori Darwaza (Moti Katra)
Firozabad	
Bangle making	SN Road, Industrial Estate, Agra Road,Humayunpur, Kotla Road, Sheetal Khan Road, By-Pass Makhhanpur, Station Road, Agra Gate, Coal Sliding Road

Craft	Area
Bangle coloring	Bohran Wali Gali, Rehna Road, Industrial Estate, Station Road
Glassware	SN Road, Industrial Estate, Agra Road, Sheetal Khan Road, By-Pass Makhhanpur, Kotla Road, Station Road, Agra Gate, Coal Sliding Road
Bangle Analing	SN Road, Asfabad
Mathura	
Sanjhi Art	Spread out all over the settlement
Poshak making	Spread out all over the settlement
Mukut Making	Spread out all over the settlement
Kanthi Mala	Rajadheraj Bazaar
Marble and alabaster Figure s	Pagal Baba Mandir, Shahji Temple
Brass Murti	Vishram Bazaar
Peda Making	Manipada, Lohi Bazaar
Gokul	
Tulsi Mala	Spread out all over the settlement
Mukut Making	Spread out all over the settlement
Poshak making	Spread out all over the settlement
Govardhan	
Poshak making	Spread out all over the settlement
Mukut Making	Spread out all over the settlement
Tulsi Mala	Spread out all over the settlement
Flower Garland	Spread out all over the settlement
Misri and Chinori	Spread out all over the settlement
Nandgaon	
Peda Making	Spread out all over the settlement
Barsana	
Peda Making	Spread out all over the settlement
Baldeo	
Peda Making	Spread out all over the settlement
Mahavan	
Flower Garland	Spread out all over the settlement
Vrindavan	
Tulsi Mala	Gaura Nagar, Banke Bihari Bazaar, Rajendra Kanthi Mala, Lohi Bazaar, In front of Shah ji temple
Zardosi	Gaura Nagar
Silver Anklets	Radha Niwas Tila, Govind Kund
Poshak Making	Kailash Nagar, Maruti Nagar, Gaura Nagar, Kishore Pura.
Mukut Making	Gautam Para, Chipi Gali
Kulhar	Kumar Pada
Misri and Chinori	Chipi Gali
Brass Polishing	CFS chauraha, Near Shahji Temple
Peda	Nidhivan
Hathras	
Hing Making	Nayaganj

Craft	Area
Brass works	Gola Gali, Tabela Gali
Color Industry	Nayee Nagla Area
Jute embroidery	Purani Tehseel Road

Absence of conservation strategies for unprotected heritage

Many heritage structures are crumbling due to neglect, as there are no incentives built within the urban administrative legislative system for owners of these properties which will help protect and conserve these unprotected heritage structures.

Figure 4.6 Mathura: Dilapidated state of structures on the ghats



Figure 4.7 Agra: Parvez tomb on the riverfront in a ruinous state



There are no risk preparedness plans for heritage protection in the event of any manmade and natural disasters.

Absence of tourism management policies leading to neglect of heritage

The lack of awareness of heritage sites is also due to the lack of interpretation infrastructure for heritage sites.

Public amenities such as drinking water and toilets around many protected sites are also absent. This may have also happened due to rigid interpretation of ban on construction of any physical infrastruture in the vicinity of protected site and thus it is required to allow constrtuction of public amenities within the vicinity of protected sites.

4.1.3.3 Insensitive Urban Development Impacting Heritage Assets Adversely

Loss of heritage due to unplanned development

Vans or sacred groves which worked in tandem with kunds in providing soft surfaces to help recharge the water table have been lost due to developmental pressures. Many of the sacred groves or vans have been encroached and built upon as a result of which most have disappeared and many survive in a fragmented state.

Table 4.9 Forty eight forests of Vraj Mandal[34] including Vans, Upavana (sub forests), Prativanas and Adivana

Sl. No.	Vans (Padma Purana)	Upavanas (Varaha Purana)	Prativanas (Bhavishya Purana)	Adivana (Vishnu Purana)
1	Mahavana	Brahmavana	Rankavan	Mathura
2	Kamyavana	Apsaravan	Varttavan	RadhaKund
3	Madhuvana	Vihvalvan	Karahavan	Nandgaon
4	Talavana	Kadambavan	Kamavan	Gadha
5	Kumudavana	Svarnavan	Anjanavan	Lalita Gram
6	Bhandiravana	Surbhivan	Karnavan	Vrishabhanupura
7	Vrindavana	Premvan	Krishnakshipan van	Gokul
8	Khadirvana	Mayurvan	Nandapreksana Krishnavan	Balbhadravan
9	Lohavana	Manengitavan	Indravan	Govardhan
10	Bhadravana	Sesagaylvana	Shikshavan	Javat
11	Bahulvana	Naradvan	Chandravalivan	Vrindavana
12	Baelvana	Paramanandavan	Lohvan	Sanketvana

Table 4.10 Twelve forests of Vrindavan and their status[35]

Sl. No.	Historic Vans/Sacred Groves	Status	Present Condition
1	Sri Atalvana	Extinct	Residential development has come up in the area
2	Kevarivana	Partially exists	Residential Landuse
3	Viharavana	Extinct	Residential Landuse
4	Gocarnavana	Extinct	Residential Landuse
5	Sri KaliyaDamanavana	Extinct	Residential Landuse
6	Sri Gopalavana	Extinct	Residential Landuse
7	Nikunjvana (SevaKunj)	Partially exists	Residential Landuse
8	Nidhivana	Partially exists	Residential Landuse
9	Radhavana (RadhaBagh)	Partially exists	Green cover is partially present in the form of Rangjika Bagicha, and other open spaces within the temple or ashram compounds
10	Jhulanavana	Partially exists	
11	Sri Gaharvana	Partially exists	
12	Sri Padapavana	Extinct	Residential Landuse

Urban development around the edges of kunds is detrimental for their efficient functioning as water harvesting and ground water recharge facilitation. It is observed that embankments are being constructed around the kunds as part of the ongoing projects of 'beautification' and 'repair' of kunds which is detrimental to the ecology of the region as it is diminishing their role as water harvesting structures. As part of interpretation of these kunds many insensitive developments in the form of Disneyfication theme parks with excessive hard surfaces are being constructed around these sacred and ecologically sensitive sites.

34 http://en.brajdiscovery.org/index.php?title=Vanas_of_Braj

35 Sri Vraja-mandala Parikrama, Gaudiya Vedanata Publications.2007

Urban development and growth trajectories have ensured that the settlements turn their back to the river and the heritage along the river, reducing the riverfront to a backyard, in the process losing out on very valuable assets the local communities can experience.

Figure 4.8 Chiksauli near Barsana: ongoing 'beautification' works of building embankments around kund	Figure 4.9 Chaumuha: Ongoing inappropriate works and development of theme park around the kund
	

Figure 4.10 Vrindavan: Road cutting across the river and original ghat interface	Figure 4.11 Vrindavan: Historic ghats below the existing road level
	

With the river receding or having shifted its course, the interface with the river is also lost. This is evident in settlements like Vrindavan, where the old riverfront with its ghats stands neglected, when it could become a very important public realm within the city. The kunds and vans are the blue and green open spaces of the settlements. But they are not integrated with the open space systems of the settlements. Kunds and groves, most of which are sitting in the heart of settlements, have not been recognised as an important part of the open space system of the settlements and continue to be encroached upon.

Many heritage structures serve as important landmarks in the urban landscape and could serve significantly in improving the imageability of the settlement, but stay unattended.

Many large heritage structures sitting in the heart of settlements, are abandoned and vacant in otherwise burgeoning and bustling urban-scapes.

Figure 4.12 Barsana: Vrishbhanu kund on the outskirts as a public amenity	Figure 4.13 Barsana: Vrishbhanu kund on the outskirts as a public amenity
	

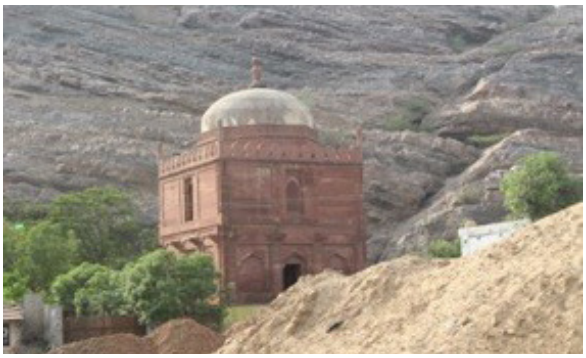
Figure 4.14 Etmadpur: Budhia Ka Taal	Figure 4.15 Bayana: Structures of Mughal Period in Bayana
	

Figure 4.16 Sikandra Rao: Old abandoned tehsil	Figure 4.17 Hathras: Beni Ram ki Bagichi in the settlement
	

Figure 4.18 Chatta: Abandoned colonial structure in the enclosure of the Akbari Sarai	Figure 4.19 Vrindavan: Abandoned structure at Chir Ghat has potential to incorporate amenities and facilitate social infrastructure for both local community and pilgrims.
	

Absence of controls

The diversity of heritage which has given these settlements its distinct urban character is also getting erased due to anonymous urban form and absence of controls and special byelaws which would recognise and respond to the special and unique built form character of these areas. For example, in the absence of any urban design guidelines, there are several new structures coming up in the ghat area, changing the spectacular skyline of the ghats.

Figure 4.20 Hathras: Transformation of the historic edge of the water body	Figure 4.21 Agra: Historic elements being engulfed in urban development
	

Figure 4.22 Mathura: Insensitive infill development along ghats



Figure 4.23 Vrindavan: Development activities along the river front



Figure 4.24 Chatta (left) and Roopwas (right): Rapid commercialization and infill developments compromising the edge character of historic properties and streets lined with vernacular houses in smaller settlements





The physical infrastructure such as transformers are ill located in heritage open spaces or in front of heritage structures undermining the use, aesthetic quality, and appreciation of these spaces and heritage structures. Electrical wires and fittings also deface the heritage facades.

Figure 4.25 Chatta: Electric wires and poles in front of the gateway of Akbari Serai	Figure 4.26 Bayana: ASI protected structures Lodi period Minar, Usha Mandir
	

Loss of heritage due to traffic and transportation issues

The scale of streets in the historic core were for pedestrian use and were not designed for vehicular traffic, as a result of which there is traffic congestion around historic areas, adversely impacting the experience of the user and visitor.

In the absence of traffic management plan, many streets with heritage structures are in danger of being widened leading to loss of heritage structures on either side of the road. Additionally, polluting vehicles impact both the natural and built heritage.

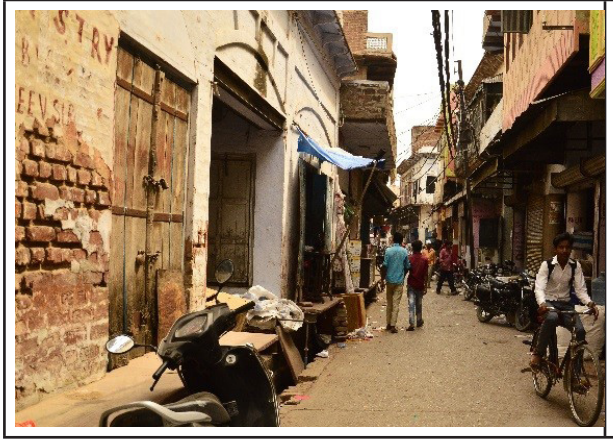
Figure 4.27 Fatehabad: Street lined with historic residences and shops.	Figure 4.28 Mathura: Narrow streets of Chatta Bazaar lined with residential havelis cum shops
	

Figure 4.29 Bharatpur: Historic street with gateway being used for two way vehicular and pedestrian traffic	Figure 4.30 Hathras: Busy market street square with clock tower
	

Many of the heritage sites have no easy access as a result of which they are not visited and consequently fall in a state of disrepair.

There is a total absence of, or lack of adequate parking facilities around significant heritage sites.

There is lack of universal access to most heritage sites.

Figure 4.31 Agra: Dara Shikoh Library in Belanganj	Figure 4.32 Agra: Rauza Diwanji Begam, an ASI protected structure in Tajganj
	

4.1.4 Urban Design Issues

Based on the visual survey of all the major settlements of the region, study of master plans to understand the specific response towards regional, cultural and historic and ecological landscapes and assessment of available satellite data, this section presents the issues at regional level and the issues are related to growth trends and urban sprawl, mega infrastructure projects, degradation of the regional landscape and associated elements of the Braj region, changes in the built-form across old cores,

deterioration of unique image districts and poor image of the regional corridors.

4.1.4.1 Pressure of urbanization and changing form of cities

All the large settlements of the region, especially, Agra, Mathura and Firozabad, have seen exponential growth in terms of population in past twenty years. Annual growth rate of these three settlements has been substantially higher than the national average of urban areas when compared since 1991. During 1991-2001, Agra, Mathura and Firozabad showed an annual growth rate of 3.2%, 3.45% and 4.81% respectively as against the national average of 3.0%. For the period, 2001-2011, three settlements showed an annual average rate of 3.51%, 2.83% and 3.39% respectively as against the national average of 2.4%. For a state dependent on agriculture as a primary economic activity, these growth rates are normal as rural to urban migration is observed in such economies due to shift of labor from primary to secondary and tertiary sector with improvement in agricultural practices. Thus, in general, all settlements of TTZ region are facing the pressure of urbanization.

The pressure has been observed in many forms, be it the ribbon development along highways or conversion of agricultural land into residential real estate along the periphery of the settlements or emergence of slums both within the city, along ecological precincts or at city periphery. The image of such a pressure is quite stark across the cities of TTZ. On one hand, periphery is showing emergence of plotted colonies along with mid-rise to high-rise residential and commercial real estate development and on other hand, about 40-50% of the city lives in slums. (Mathura-49%, Agra-56%, Firozabad-33%, Hathras-44%). Study of available satellite data also supports this observation towards rapid urbanization, wherein it can be easily deciphered that settlements have seen urban sprawl. Apart from natural migration of people from rural to urban areas, another major reason for rapid urbanization and resultant urban sprawl is the execution of mega-infrastructure projects. Three projects that have impacted the region are, widening of National Highway-2 in 2000s, laying of Greater Noida-Agra Expressway and laying of Agra-Lucknow Expressway. Analysis of available satellite data between 1999 and 2014, shows the impact across cities such as expansion of Mathura beyond NH-2 towards Govardhan, real estate development between River and Yamuna Expressway at Mathura-Vrindavan, expansion of Vrindavan towards NH-2, expansion of Firozabad towards the bye-pass and growth of areas between Aligarh road and Yamuna Expressway at Agra. At Vrindavan, other phenomena have been observed wherein the city showed increase of only 7000 people between 2001-2011 but the area of developed land has more than doubled due to emergence of numerous

real estate-based colonies between old core and NH-2.

Outer Ring Road of Agra is almost complete barring bridges at key locations and Lucknow expressway is now operational. It can be envisaged that eastern and southern periphery of Agra along with smaller towns such as Fatehabad and Shikohabad would undergo major change. Another mega-project in the form of Jewar International Airport is going to further fuel urbanization in this region. As these infrastructure projects come independent of the Master Plans of the cities of the region, or, came after the publication of Master Plans, the resultant urban form at the periphery is quite distinct (single use, plotted, large parcel-based development with setback and higher FAR) from the regular fabric of the city and discontinuity in the form and systems between new and old is quite evident.

4.1.4.2 Poor living conditions and loss of character of old settlements

From the largest settlement such as Agra to very small settlement such as Barsana, Hathras or Nandgaon, all show traces of history. These traces belong not only to Mughal or Colonial period but go as far as painted grey period, Kushan and Buddhist period. Every town of TTZ has a contiguous historic core, a living settlement, having distinct urban morphology layered with traces of historic evolution. Many of these historic cores have specific activities, cultural practices, work communities and resultant economy. Through visual surveys and study of Master Plans, it is observed that these historic cores suffer from lack of infrastructure, congestion and thus poor living conditions. Interventions in these historic cores have been point-based (sector specific) without looking at the historic core as a comprehensive entity. There is a lack of any specific attention given to the historicity, associated unique morphology and urbanism of these cores in the development plans of these settlements and thus they have degenerated to a large extent in terms of their unique character and shows signs of neglect.

4.1.4.3 Destruction of the regional landscape and associated elements of Braj Region

The river as primary element in the landscape, is one of the most important images of this region but urbanization pressure and nature of urbanization has reduced the river to a mere drain with little or no water and thus it represents a very gloomy picture. At the same time, lack of any attention to unique riverfronts of Mathura, Vrindavan and Agra is evident. Absence of a qualitatively significant and vibrant also leads to the dilution of cultural, religious and social activities associated with the river.

Figure 4:33 Vrindavan: Degrading water system	Figure 4:34 Mathura: Inaccessible and underutilized Kund
	

Braj Region is characterized by not only architectural and urban elements, but in fact, the regional landscape and its constituting elements-Orchards and Forest (Van, Upvan, Bagichi and Baghs), kunds, mounds etc. have shaped the cities in the past and given them specific and distinct character. These elements are under serious threat as their inter-relationships are either broken or diluted in newer development patterns. This unique regional landscape of Braj or numerous archeological sites find no suitable recommendation or policy directions in the Master Plans (Refer Annexure 6.1). Even the restoration work undertaken at few selected kunds near Mathura is very piece-meal, project oriented and confined to aesthetic treatments without giving due consideration to the local historical and ecological relationships of the kunds. Another important cultural aspect of this region is the 'Yatras', that follows sacred routes of Braj. These are again not respected in the development plans and with destruction of regional landscape features- kunds, vans etc, the significance and experience of yatra is getting diluted.

4.1.4.4 In formalization and changes in building use and form across old cores

Trade related commerce and religious activities have been the lifeline of the old cores of towns in TTZ. With the rise of religious tourism, old cores of larger settlements such as Mathura, Vrindavan, Govardhan, have seen manifold increase in visitors and thus excessive commercialization and production of products including problems associated with vehicular parking. This has been detrimental to the historic fabric both from character and experience perspective. In the absence of any specific provision in the Master Plans (Refer Annexure 6.1) of these settlement, the changes have been haphazard thus leading to loss of built heritage and deterioration of unique image districts.

Figure 4.35 Mathura: Degeneration of Historic core	Figure 4.36 Fatehpur Sikri: Unorganised movement and informal activity
	

Towns of Uttar Pradesh are known for small and household-based industries linked to cultural and metal products. As TTZ restricts the growth of industries, informalisation of work is visible in cities and towns of the region and old cores, having unique morphology, have seen further proliferation of household-based production. This has aggravated changes in the built form of the traditional parts of the settlements.

4.1.4.5 Major Regional Corridors

All roads connecting important towns of the region generally reflect ribbon development constituted by highway related uses, malls, residential townships. All roads should be marked separately depending upon its uses and category. Proper road marking and sinage should be placed at required locations. At many places, road edges are without any surface treatment.

Figure 4.37 Agra: Lack of character at Fatehabad road	Figure 4.38 Vrindavan: Degrading image of regional and urban corridor
	

Figure 4.39 Vrindavan: Poor image of city entrance and regional corridor



All key junctions need improvement depending upon space available and as far as feasible. Pedestrian traffic movement needs to be encouraged in city limits.

Major corridors connecting regional towns such as Govardhan, Mathura, Vrindavan, Gokul etc. have many important villages with archeological and religious sites but visitors are not aware of these sites and they have the potential of adding image and experience to the travel of visitors.

4.2 City Level Issues

4.2.1 Urban Planning Issues

Agra

4.2.1.1 Introduction:

The environment of Agra city has river Yamuna as the major natural resource and the open space and drainage network contribute to protection and enhancement of the environment. This need to be strengthened for improving the enovironment of the city. Air and Water pollution are on an incerasing trend and need to be addressed urgently and effectively.

The total developed area of Agra has increased by about 97% in the period between 2001 to 2018. The population density is estimated to have increased from 135 pph to 150 pph (person per hectare) between 2001 to 2018 (Census of India 2011). Growth in Agra has followed the central core to periphery pattern as can be observed from changes that occurred between 1991 and 2014. Agra's decadal growth rate averages 28%, most of which is concentrated in the core. The municipal area stands at 138.8 sq.km in the current year, 2018 in comparison to 120.57 sq.km as per Census 2011.

4.2.1.2 Urban Development and Land Use Pattern

In the past ten years, land use conversion has been observed for 'agricultural and open scrub land use' to 'built-up and barren land use'. Residential area has doubled in the period between 2001 to 2018. Much of the land which was allocated for recreational use or green belt use have been encroached upon by residential use. The alleys and lanes leading to the inner part of the city have not been developed leaving an incomplete upgraded road network. The city displays unplanned and unregulated growth in all directions with 33% of slum population. Conversion of water bodies to barren land has also been observed which is an area of critical concern. The rate of erosion along River Yamuna is extremely deleterious for the world heritage site of Taj Mahal thus posing serious safety concerns.

A. Lack of Green and Recreational Areas (Parks and Open Spaces) within the city

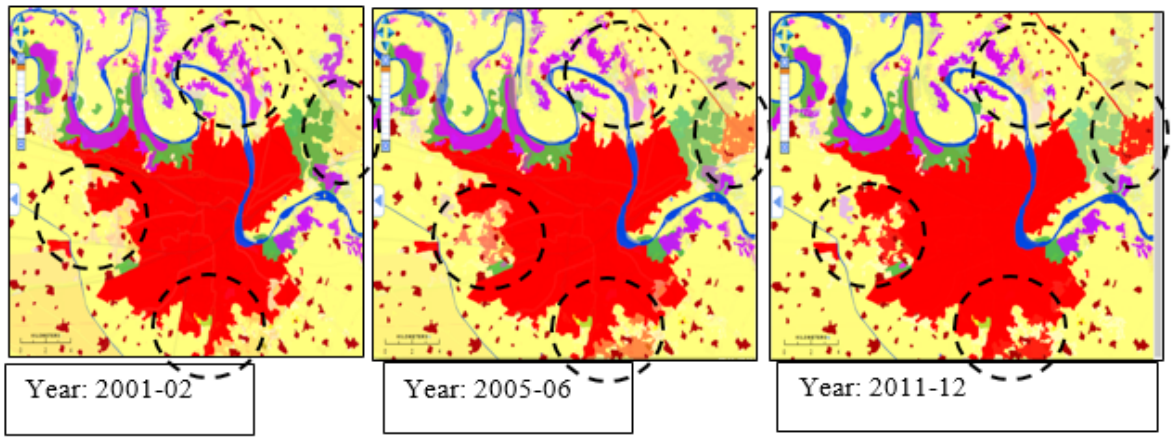
The percentage share of parks and green areas within the city is only 2% which has been a constant since 2001 to the current year, 2018. A major increase about 102% in area has been observed in residential category between 2001 to 2018 most of which is a result of unauthorized encroachment. Much of the land which was allocated for recreational use (parks and open space) or green cover use have been

encroached upon by residential use. 27% of land has been proposed for recreational use in Agra Master Plan 2021 of which only 2.3% of the total area is on ground. The standard area for recreational (parks and open spaces) land use should be about 14-16% as per URDPFI (Urban Development Plans Formulation and Implementation) Guildelines-2014 for a city of Agra's size.

B. Critical Land Use Conversions

As per the ISRO, Bhuvan, LULC, land use / land cover maps, it has been observed that a large part of the land use conversion has transpired between 'agricultural and open scrub land use' and 'built-up and barren land use'. Conversion of water bodies to barren land has also been observed which is an area of critical concern.

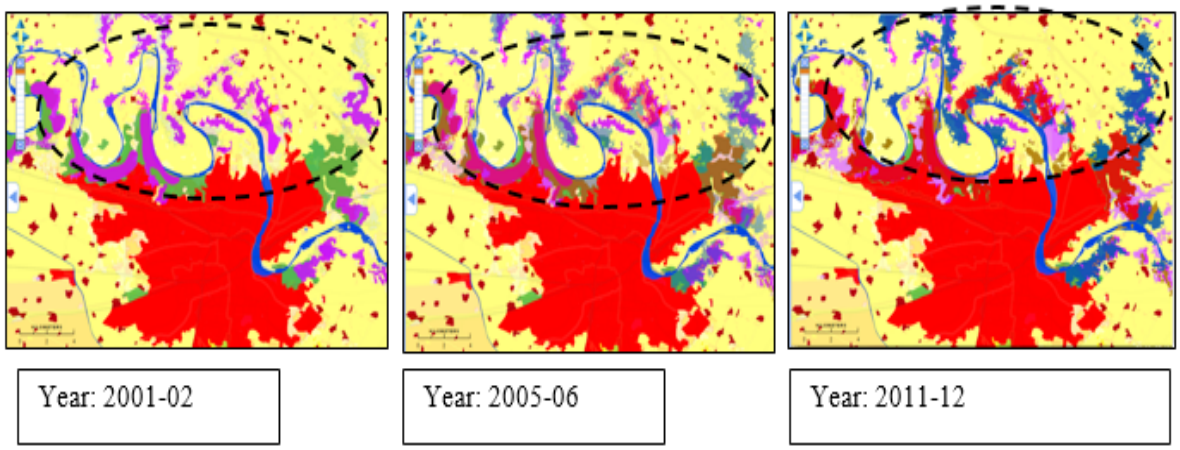
Map 4.20 Change in Land Cover 2001 – 2012 and LU/LC Change (2002-2015)



Source: Bhuvan Website and Land use land cover of Agra tehsil

C. Non-conforming uses along the river bank

Map 4.21 Land Erosion 2001-2012



Source: Bhuvan Website and Land use land cover of Agra tehsil

The decadal study shows that the rate of erosion along River Yamuna in the northern part of the city has been alarmingly high (Refer Map 4). The repercussions of river's

degeneration may have detrimental impact on the industries and the settlements along the river. The rate of erosion along River Yamuna is also extremely deleterious for the world heritage site of Taj Mahal. There is an urgent need to restore and redevelop the region along the northern bank of the river Yamuna. The development along the river should be restricted to non-construction developments and should majorly focus on afforestation and plantations of native trees and support the indigenous flora and fauna.

4.2.1.3 Demography and Settlement Pattern

The population of the city as per Census 2011 is more than 15 lakhs and the estimated population for the city in 2018 is around 18 lakhs. The city is divided into 90 wards. For a city with million plus population that has grown more than 25% in the last thirty years, the infrastructure development has failed to keep pace with the population growth. An estimated projected population for 2050 is 28 lakhs which shows an increase of 9 lakh population in the next 30 years. A projected population of 28 lakhs is likely to trigger a major housing shortage in 2050, if provisions for the growing demand is not planned for today. Almost 33 % of the current population is living in slums with inadequate infrastructural facilities.

A. Housing Shortage

The estimated housing requirement in 2011 was 3.1 Lakh and the shortage was 3.3 lakhs (Refer Table No.4 and Table 5). This shortage will increase with time. However, the new residential colonies are being developed by Agra Development Authority and Avas Vikas Parishad. The peripheral areas are gradually attracting attention due to better planned infrastructure and facilities.

Table 4.11 Housing Shortage and Requirement in Agra 2011

Name of City	Total Population	Total No House-holds	HH size (Person per HH) (=1/2)	Census Houses (residential)	Dilapidated Houses	Slum House-holds	Slum Houses	Housing Requirement for Slum Households (=7-6)	Total population (including institutional and houseless population)	Houseless HH (=9/3)	Estimated Housing Shortage ={(2-4)+5+8+7}	Vacant Houses	Housing Requirement (=11-12)
	1	2	3	4	5	6	7	8	9	10	11	12	13
Agra (M. Corp)	1585704	267945	5.9	228357	3825	89600	68219	21381	1585704	267945	332739	17986	314753

Source: Census of India 2011. (Note: HH = Household, M. Corp = Municipal Corporation)

B. Rapid Growth of Slums in the City

A staggering 33% of Agra's population reside in slums that occupy almost 14% of the city's land area. More than 90% of the slums occupy state owned land out of which

84% of slums have legal land rights and 7% do not. About 51% are notified slums while the remaining 49% are non-notified. 50% housesin slums are pucca with brick wall, PCC flooring whereas the rest 40% people live in jhopris or shacks. Existence of squatters is also prevalent in many parts of the city. They are migrants from nearby villages and towns. There are many unregulated slums with no infrastructure provision and poor economic conditions. These slums are distributed all across the city with the highest density occupying the area along the river in the Trans Yamuna zone.

C. Heavy Pressure on the Core

The core of the city experiences intense development pressure due to its proximity to the prominent tourist attractions, services and jobs.

4.2.1.4 Economic Profile

An alarming 67% non-working population in Agra, is a red flag in the economic development scenario. There is many sick, unregistered/ illegal industries within the city due to the lack of regulation and strict monitoring. The petha industries and the foundries lack hygienic work environments. The commercial areas are congested and lack adequate municipal services. The streets in inner area are narrow and unhygienic, which are being encroached by various handicrafts and small – scale activities like leather work and Petha production.

A. Dominant Small Scale Industry Base

Agra's primary industries are small-scale and house-hold industries like textile, leather, metal work, electrical goods, fans, pipes, casting, leather goods including shoes, etc. located in the old Mughal City particularly, Lohamandi, Rakabganj, Kotwali and Tajganj areas.

B. Increase in Unemployment Rate

Agra has been a centre of traditional handicraft industries like marble, leather, carpet, brassware, artistic carpets and jewellery crafts since the Mughal era. There are about 7,105 Industrial units out of which 323 units were closed down which accounts for 4.55% of the total industries in Agra (Source: Agra District Industrial Centre, 2018). About 636 workers were dependent upon these industries as per the Brief Industrial Profile of Agra 2012. In Agra, 230 non-conforming industries have been closed as per Agra District Industrial Centre, 2018. The 66th round of National Sample Survey Office, shows that Agra was one of the top three cities that saw maximum increase in unemployment rate in the 2000s. The rate increased from 0.2 per cent in 2004-05 to 5.5 per cent in 2009-10.

C. Unregistered/Illegal Industries

There are many unregistered/ illegal industries that are still active within the city. There are many sick industries as well in the core of the city. A critical concern is to ensure alternative means of livelihood and a well-planned transition to environment friendly technology and manufacturing practices for un-registered industries.

D. Sick and Closed Industrial Areas

Sikandra Industrial area has sick and closed tanneries which is either used as unauthorized warehouses or illegal squatters or simply abandoned.

E. Lack of adequate infrastructure facilities

Most of the home based and small scale industries like Peth and snacks manufacturing, shoe, handicrafts industries etc. work in unhygienic conditions within the inner part of the city.

F. Lack of monitoring and non-conforming uses in industrial area

There are 128 active foundry units (as per Agra District Industrial Centre 2018), in the city which are functioning according to environment friendly standards. However, there is a need for regular monitoring of all industries functioning within the city as they lack proper infrastructure facilities and face land encroachment. The industrial estates particularly, the Nunhai Industrial Estate have been encroached by residential uses.

4.2.1.5 Trade and Commerce

There are more than 50,000 shops and commercial establishments registered at Nagar Nigam. Under the Smart City Agra mission, three street vending zones have been identified at i) Fatehabad Road near Vishal Mega Mart, ii) Double Tree by Hilton near 100-foot road Basai Sabji Mandi, and iii) Vibhav Nagar, Flower Mandi near Amar Hotel (Agra MC, 2018).

A. Unregulated Mixed Use Activities in the Inner part of the City

Mixed used activities have emerged in the inner part of the city with shops on the ground floor and residence on upper floors leading to an unplanned and unfettered development which has resulted in congestion and poor working and living conditions. The streets in inner area are narrow and unhygienic, which are being encroached by various handicrafts and small – scale industries with shops like stone inlay, leather work and Petha production. There are few abattoirs in Agra that need to function as per the mandates of TTZ with upgraded infrastructure. However, modern abattoirs found in Kuberpur are following all required mandates, and have provision for adequate

waste disposal system (source: Agra Nagar Nigam 2018)

4.2.1.6 Infrastructure Profile

Both physical infrastructure in terms of water supply, sewerage, storm water drainage and solid waste management and social infrastructure like educational institutions and health institutions are not adequate to meet the required demands of the City and need to be added and upgraded.

A. Physical Infrastructure

Significant infrastructure development projects/schemes such as Lucknow Agra Expressway, Yamuna Expressway, HRIDAY, AMRUT, Smart Cities, etc. are proposed for Agra, which are in progress. Though a lot of growth potentials are expected from the city in the future, currently the service sectors exhibit a poor scenario. The issues have been highlighted below:

Unexplored potential for renewable Source of Power

Electricity supply to the City is provided by Torrent Limited. The residential and commercial areas seldom face major issues related to power supply. Industries face irregular power supply but DG sets are used alternatively as per the guidelines of UPPCB, 2018. Renewable sources of power like solar power have not been explored to the full potential particularly for street lighting.

Lack of Street Lights in some parts of the City

Certain areas in the inner city do not have street lights and at risk of safety and security hazards.

B. Scarcity of Water Supply Services in parts of Agra

Agra has 3 water supply zones with 26 sub zones (Refer Map 3.1 in Vol III). Only 85 % of the area is covered by piped water network. Parts of the precinct zone do not have water supply connections and they are dependent on tankers, tube wells and hand pumps. Areas with water supply connection receive poor quality water. There are two operational water treatment plants in Agra. One in Jeoni Mandi and the other at Sikandra. Hand pumps and tankers meet the water requirement in Sikandra-II, Bodla-II, Shahganj-III, Tajganj-II & III, Trans Yamuna-II & Ghatwasan-II areas as treated water supply facilities are not available. The percentage of water loss due to leaks from pipes and pipes appurtenances range between 9-37 per cent while UFW ranges between 40-45 per cent of the total supply, which is very high. The quality of raw water needs to be improved. Water mains and distribution mains are damaged in many parts and carry very low pressure at tail end i.e. at the household level.

Catchment area of the Zonal Pumping stations is not clearly segregated. Out of 15 blocks in Agra, 11 are in critical condition with respect to water supply.

C. Depleting Ground Water Table

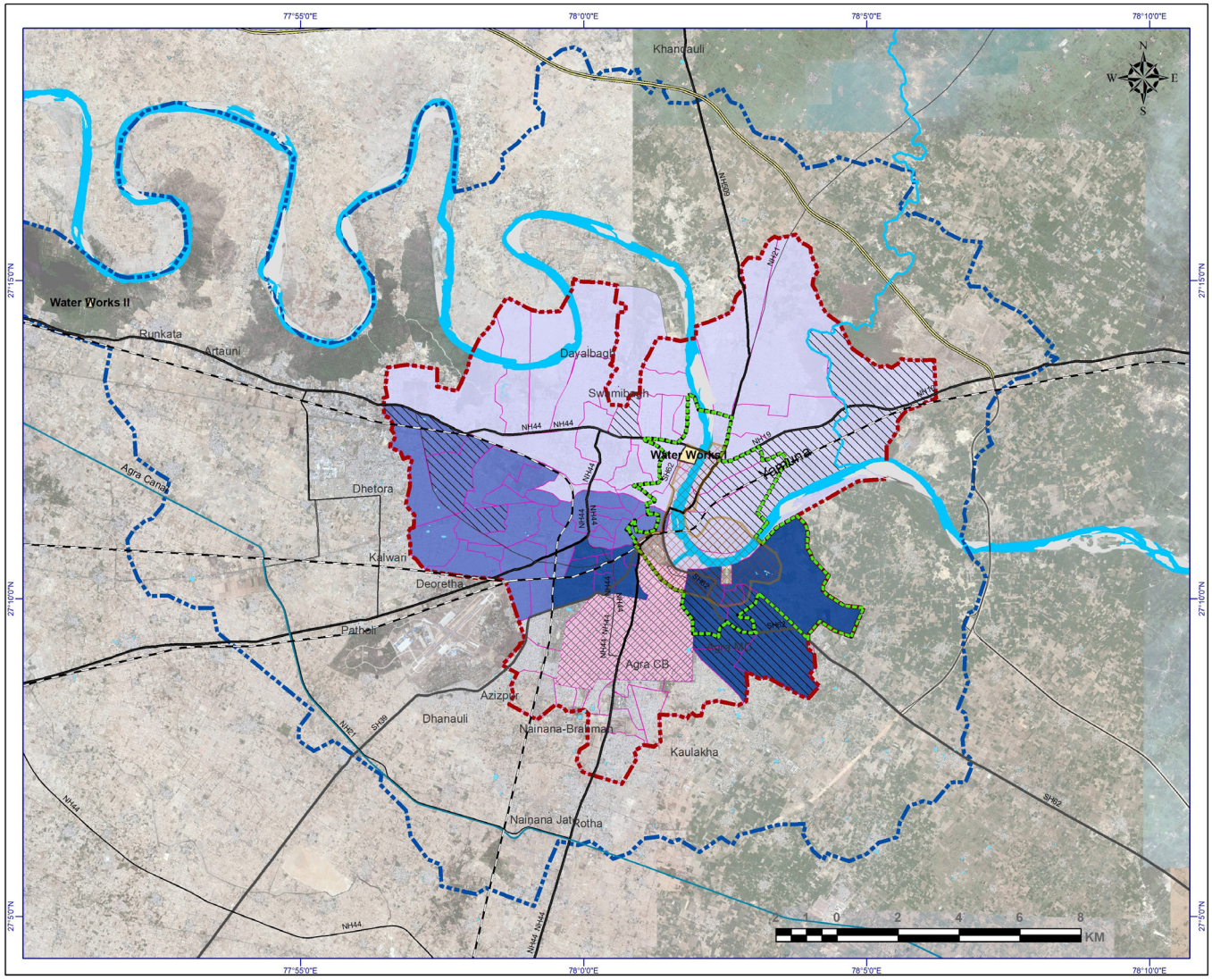
Due to illegal boring for tube wells, installation of submersible pumps in households, deforestation, lack of rain water harvesting measures and concretization of parks and green zones of the city, the ground water table is fast depleting .

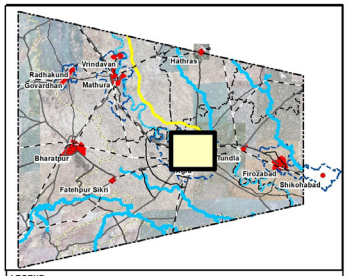
D. Poor Sanitation and Sewerage Treatment Facilities

There is partial sewerage system in the city with a mix of old and new lines. At some places the lines are choked and need to be cleaned. In some parts of the city where sewerage system is not available, houses have septic tanks. Effluent of these septic tanks and sewage of some household's flow into the drains. The Taj east drain is tapped near Kolhai and the entire discharge at that point is taken to STP for treatment (Jal Nigam, Agra. 2018). Agra has total 818.99 Km drains, out of which only 48% are RCC. Structure. Funding is required for upgrading other drains. The tapping of 21 drains has been done (Agra Nagar Nigam 2018).

Poor sanitary conditions exist due to collection of household wastewater in open pits. There is a practice of cleaning of drains and a yearly chart is made for cleaning purpose however treatment of the sewerage and open drans requires strengthening to minimize pollution to the river.

Map 4.22 Water Supply Zones of Agra





LEGEND

- Planning Boundary
- Municipal Boundary
- Precinct Ward Boundary
- Dharohar Boundary
- Agra Wards
- Railway Line
- Express Way
- National Highway
- State highway
- Roads
- River
- Canal

Water Supply Zones

- Zone 1
- Zone 2
- Zone 3
- Zones where water supply network is absent
- Water Works

Source: Jal Nigam Agra, 2010.

Note: The map has been prepared on the basis of primary oservational suvery by SPA Delhi. The data may vary from on ground situation.

Scale: 1:120000

Source: ADA

E. Lack of Proper Storm Water Drainage Facilities

The storm water system of Agra is more than 55 years old. These drains are in severe dilapidated condition, and are choked and encroached upon by local communities. More than often areas without sewerage system, use these drains for discharging sewage waste which flood into the adjacent slum settlements due to its inadequate carrying capacity, causing unhygienic living conditions and water pollution.

F. Inefficient Solid Waste Management System and Absence of Scientific Landfill Site

As per Solid Waste Management Rule 2016, 5 agencies collect Solid Waste by door to door collection method, covering 89.05 % total households in the city. It is estimated that December end entire area will be covered. Also a 2 MTD flower to compost plant is at Rajnagar from which 22 MTD compost is produced. Biomedical waste is handled by an agency under the supervision of Chief Medical Officer and regional officer UPPCB and is also collected for all nursing home, Hospitals and taken to processing plant at Etmadpur. Currently all the city waste is disposed in Kuberpur Landfilling site, producing 20 MTD compost per day.[36] All the waste is added to the Nagar Nigam waste treatment plant without segregation.

G. Gaps in Social Infrastructure Facilities

Proximity to social infrastructure in the precinct zone are sufficient as per the DPRs conducted for the Rajeev Awas Yojna projects. However, there is a need to facilitate more schools and hospitals to meet projected future demands. Skill building opportunities for the local youth and women is an essential need. There are needs for subsidized or free primary and secondary schools in the low income neighbourhoods. Open areas, bird sanctuaries, parks need to be maintained and protected.

The SMART City Agra initiative have infrastructure development proposals that include the provision of Municipal Health Centre, Women Distress Centre, Anganwadi, up-gradation of Municipal Schools, Provision of Quick Response Centre, Smart Police Kiosks, Digital Literacy Centre, etc. Under Amrut Mission, the projects of upgradation and beautification of parks are under way. (Agra Nagar Nigam, 2018).

4.2.1.7 Tourism Profile

Tourism infrastructure which includes accommodation facilities, food and beverage facilities, accompanying facilities and communication facilities are inadequate. Many of the heritage sites of lesser prominence are in dilapidated condition. There is a lack

36 Source: Agra Nagar Nigam, 2018

of inner city tourist circuit.

A. Inefficient maintenance and encroachment of Heritage sites

Many of the heritage sites of lesser prominence are in dilapidated condition. Squatter and slum developments are encroaching unprotected heritage sites. Areas surrounding Mehtab Bagh, Ram Bagh, Itmad Daulah, Chini ka Roza are occupied by slums.

B. Inadequate tourist infrastructure

Inadequate tourist infrastructure in Agra to fulfill requirement of increasing tourist inflow. Tourism infrastructure which includes accommodation facilities, food and beverage facilities, accompanying facilities and communication facilities are inadequate. As per the Ministry of Tourism Agra's, availability of 50-rooms/lakh tourists is substantially lower than the national average of 423 rooms/lakh tourists. However, this could be contributed to the fact that a larger number of visitors to Agra are day tourists and usually seek accommodation in Delhi or Jaipur in absence of proper accommodation facilities available within the city.

C. Absence of inner city Tourist Circuits

There is no inner city tourist circuit that can be identified. Areas east and west of Taj Mahal, along the river, are totally neglected and need intervention. Areas around Mehtab Bagh is growing in a haphazard manner with new slums rapidly emerging in front of the heritage sites.

Mathura - Vrindavan

4.2.1.8 Introduction

Mathura is located approximately 50 kilometers north of Agra, and 145 kilometers south-east of Delhi; about 11 kilometers from the town of Vrindavan, and 22 kilometers from Govardhan. Vrindavan is the twin city to Mathura. Mathura Vrindavan cover a geographic expanse of 3329.4 sq. kms. The population of Mathura is 456706 and the population of Vrindavan city is 71688 as per 2011 Census. A decadal growth rate of 22.53 per cent from 2001 census of India is noted. Males account for 54% and females for 46% of this population.[37]

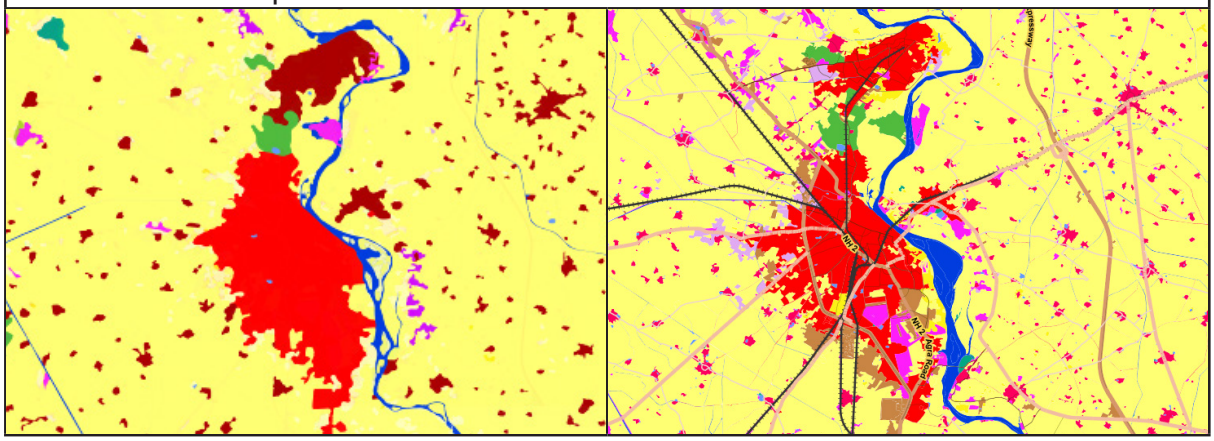
4.2.1.9 Urban Development and Land-use Pattern

The land-use and land cover changes over last few years show that maximum development has taken place within the city limits of both the cities The land-use and land cover changes over the last few years show growth in these two cities that

37 Census 2001 & 2011

has been most prevalent in the city outskirts. It has been also observed that mixed use development has cropped up within the core of the cities.

Map 4.23 The Growth Direction of Mathura-Vrindavan

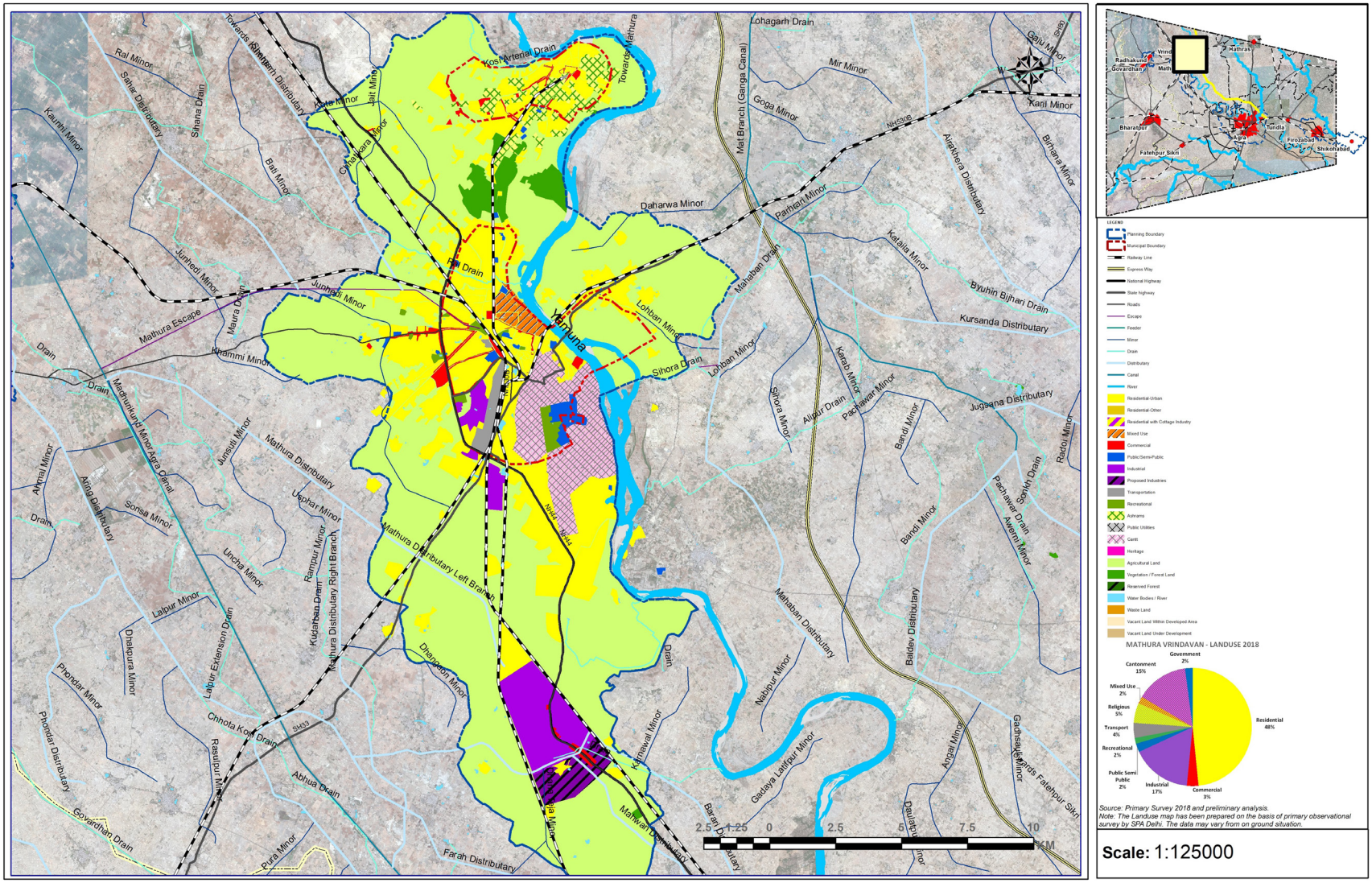


Source: Bhuvan Portal - Land cover of year 2005, 2011

A. Multi-Site and Mixed Land Use Allocation and Non-Conforming Activities

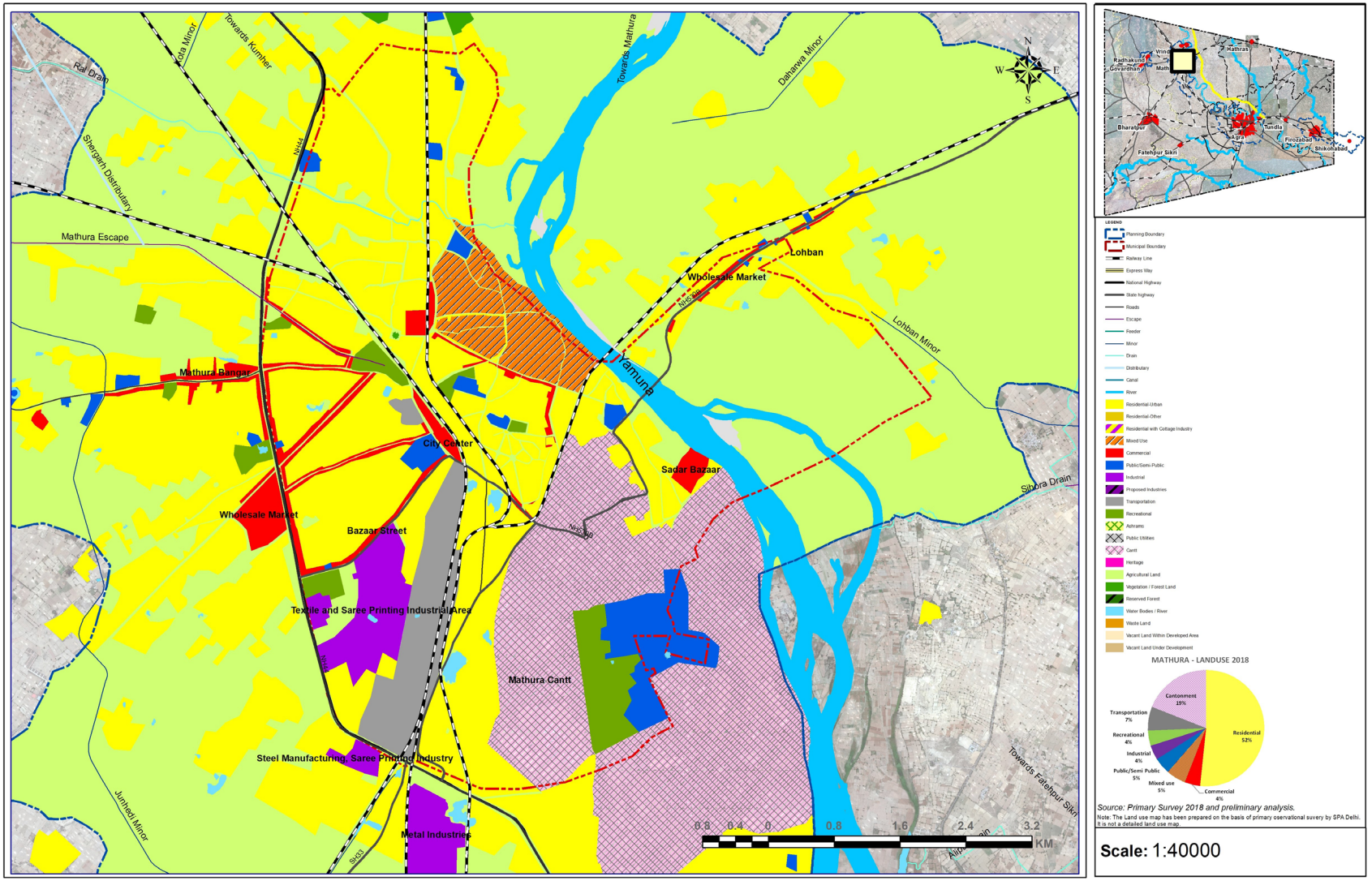
There is substantial lack of recreational space (1.4% as per primary survey 2018) within the city. Public and semi-public areas are considerably less than standard (2% as per Primary Survey 2018) in terms of land use allocation indicating lack of social infrastructure. Mixed Land use is observed in many areas within the city. Commercial activities are not well distributed in the city. The industrial estates exhibit residential development while land allocated for residential use are infringed by commercial and mixed use development particularly along the roadways. Open and green spaces are also encroached by residential or commercial activities.

Map 4.24 Land Use of Mathura Vrindavan Planning Area



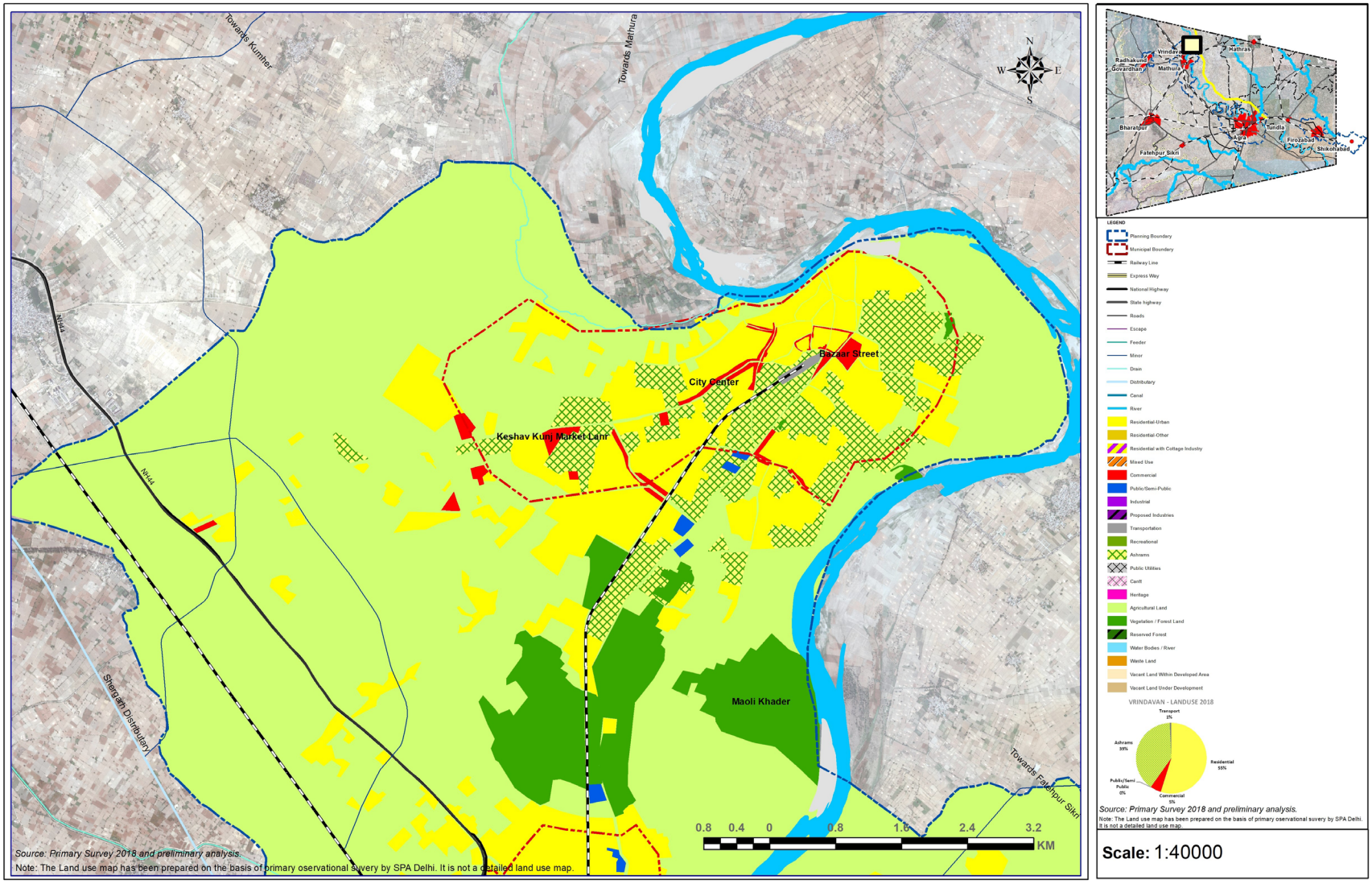
Source: Primary Survey, 2018

Map 4.25 Land Use of Mathura Municipal Area



Source: Primary Survey, 2018

Map 4.26 Land Use of Vrindavan Municipal Area



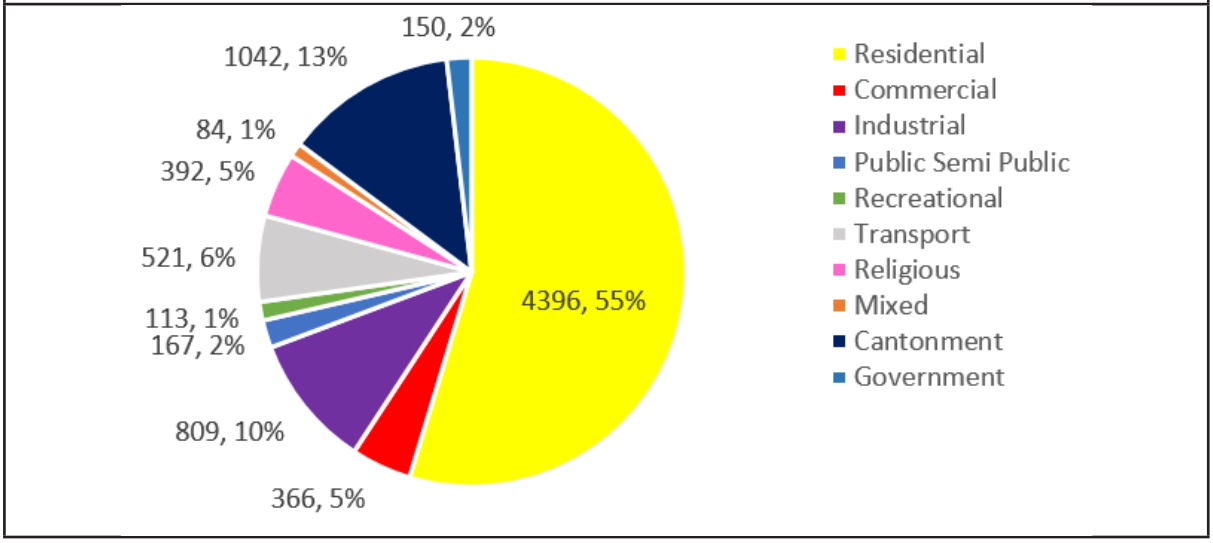
Source: Primary Survey, 2018

Table 4.12 Mathura-Vrindavan Land-use Table

Land Use	Existing Land use 2001 (Ha.)	Existing Land use 2001 (%)	Existing Land use 2018 (Ha.)	Existing Land use 2018 (%)	Proposed Land use 2021 (Ha.)	Proposed Land use 2021 (%)	URDPFI Guidelines
Developed Area							
Residential	2,775	35.12	4396	55	5978.88	43.42	35-40
Commercial	200	2.53	366	5	345.03	2.51	5-7
Industrial	1440	18.23	809	10	1595.76	11.59	4-5
Public Semi Public	963	12.19	167	2	975.36	7.08	10-12
Recreational	263	3.33	113	1.4	1991.68	14.46	10-12
Transport	565	7.15	521	6.4	1160.9	8.43	12-14
Religious	439	5.56	392	5	357.12	2.59	7-10
Mixed	0	0.00	84	1	0	0.00	
Cantonment	1149.44	14.55	1042	13	1149.44	8.35	
Government	105.98	1.34	150	2	216.06	1.57	
Total	7,900	100.00	8,040	100.00	13,770.23	100.00	
Undeveloped Area							
Forest	286	-	Balance	Balance	1071.72	-	Balance
Flood plains, water bodies	1804	-	Balance	Balance	1500.38	-	Balance
Agriculture	10500	-	Balance	Balance	Balance	Balance	Balance

Source: Primary Survey and preliminary Analysis by SPA Delhi 2018. Note: The land use map has been prepared by SPA Delhi to understand the growth pattern of development. The data may not reflect exact on-ground estimates since detailed survey was not possible in the limited time frame.

Figure 4.40 Mathura-Vrindavan Land-use Chart



Source: Primary and Secondary Survey, 2018

B. Unregulated Urban Growth in Core Areas

Areas adjacent to the market center and old core areas exhibit dense cluster housing in close proximity to religious places and River Yamuna thus straining the limited existing infrastructure facilities. This area is under heavy development pressure due to lack of regulated growth. New extensive planned development has been observed

along the borders of the Vrindavan Municipal Corporation Boundary and the fringe areas. Many old, unused, dilapidated structures can be found in these parts of the twin cities which can be put to better use.

C. River Front Development

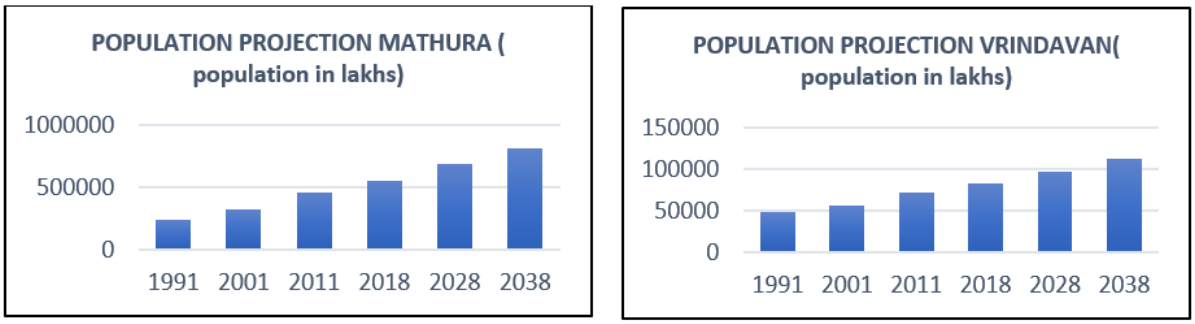
The Ghats of the Yamuna River in Mathura and Vrindavan where evening rituals are held are major pilgrim attractions and invite big crowds every day. Unfortunately, these ghats are not cleaned or maintained adequately. A pressing issue is the burgeoning haphazard, new developments along the Ghats. The water quality is deteriorating at both upstream and downstream locations. However, two projects of the Central Government for pollution abatement of River Yamuna have been taken up in Mathura and Vrindavan on rehabilitation of Sewerage Infrastructure and augmentation / upgradation of STPs. 20 MLD of treated sewerage shall be supplied to Indian Oil Corporation Ltd (IOCL) for reuse. IOCL shall bear the O&M cost of tertiary treatment and also pay fixed charges to purchase the treated sewerage. Monitoring of these projects becomes vital.

4.2.1.10 Demography and Settlement Pattern

Population explosion of about 10 lakhs (Refer Figure 7) in Mathura-Vrindavan over a span of eight years and an alarming increase of 70% in the non-working population is a matter of critical concern. Floating population is also projected (2 lakhs by 2021) to grow rapidly in the coming few years if conditions remain the same. The growing number of slums and jhopris (about 25 % of total households) within the city continues to be a major challenge for urban development and planning.

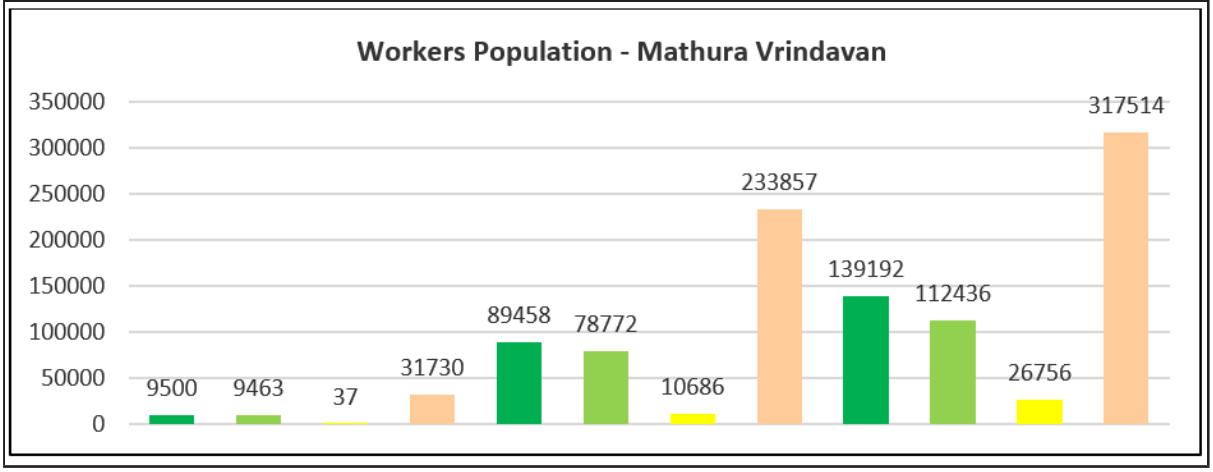
The total working population of Mathura is 1,39,192 which constitutes of only 30.50% of the total Population as per Census 2011. The working population of Vrindavan is 21,358 which is 29.80% of the total population. Main Workers are 24.61% and Marginal Workers are 5.85 % of the total working population in Mathura, while the percentage of Main Workers and Marginal workers in Vrindavan are 24.38% and 5.40% respectively. Main workers include cultivators, agriculture laborers, household industries and other workers.

Figure 4.41 Population Projections of Mathura and Vrindavan, 2018



Source: Census 2001, 2011 and Projections

Figure 4.42 Working Population-Mathura and Vrindavan



Source: Census 2001, 2011 and Projection

Mathura is divided into 45 wards in NPP (Nagar Palika Parishad) and 7 wards in CB (Cantonment Board). Ward Numbers 2 and 30 are the two most densely populated wards. Vrindavan is divided into 25 wards in UA (Urban Agglomeration) and ward Number 24 is the most densely populated ward as per census 2011[38]. According to 2011 census, the total households (HHs) in the city are 59,781 comprising of 3,49,336 populations and the average household size is 6 persons/HH. The HHs in 2001 were 47,980 with a population of 3,02,770 and household size of 6 persons/HH. The increase in number of HHs and a decrease in household size, is likely to cause housing shortage in future[39] if conditions remain the same. The housing shortage statistics is as follows:

Table 4.13 Housing Statistics of Mathura

Year	1991	2001	2011	2018	2028	2038
Population	283668	380007	528394	632265	780652	929039
HH size considered	6	6	6	6	6	5

38 Census 2001 and 2011; Indian Institute of Social Studies 2013

39 Ray,2014; Census 2011 and Housing Calculations, 2018

Year	1991	2001	2011	2018	2028	2038
Households	47278	63335	88066	105377	130109	185808
Households reqd.	NA	16057	24731	17312	24731	55699

Source: Data from Census and Master Plan, 2021

A. Exponential rise of Non-Working Population

A disquieting figure of 70% of the population in Mathura-Vrindavan comprises of Non-Working Population. Such a large non-working population is a negative indicator for economic development.

B. Proliferating Floating Population

The normal day time floating population based on entries by Uttar Pradesh Department of Tourism and local police was approximately 1 lakh per day in 2001. This number rose to 1.50 lakhs in 2011 and is projected to be 2 lakhs/day in 2021. In festive seasons, the floating population may exceed 5-10 lakhs.

C. Burgeoning Slums in the City

Considering the census 2011 data, it is assumed that 15% of the Mathura city households belongs to either EWS (Economically Weaker Sections) or LIG (Low Income Group) population of which around 9% constitutes of BPL (Below Poverty Line) population who live in slums. The slums have mushroomed across the city. More than 15% of the population do not have adequate water facility, 50% of the houses in slums are pucca with brick wall and PCC (Plain Cement Concrete) flooring while remaining are jhopris (houses with temporary structure). Poor sanitary conditions prevail in these slums due to clogged drains, poor quality of water supply wastewater collection in open pits. These slums also lack sufficient toilet facilities, which results in open defecation.[40]

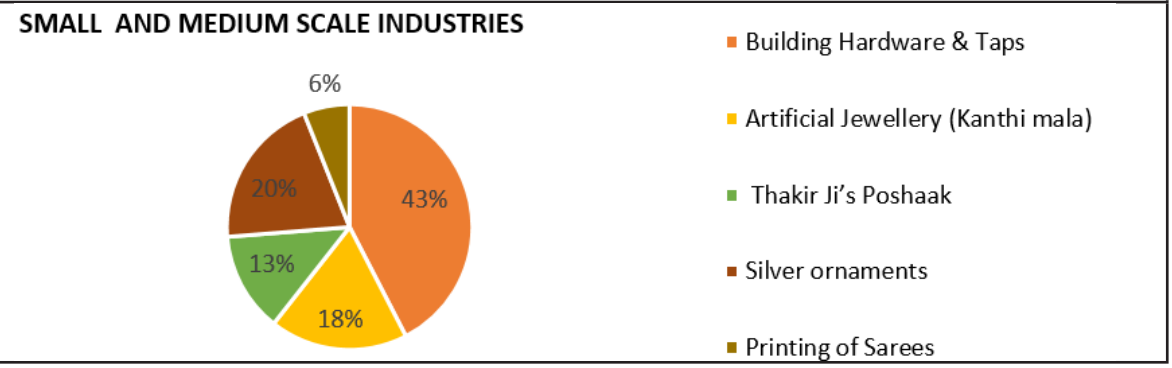
4.2.1.11 Economy Generators

A. Industrial Sector

The UPSIDC (Uttar Pradesh State Industrial Development Corporation) has set up an industrial estate in Mathura along NH 2. One of the major economy generators of Uttar Pradesh are Mathura Industries. Technologically advanced, Mathura Refinery, owned by Indian Oil Corporation is one of the biggest oil refineries in Asia. Other small and medium scale industries in the city comprise of building hardware and taps, artificial jewelry manufacturing, Thakurji's Poshak (Idol wear), Silver Ornament manufacturing and saree printing (Refer Figure 29).

40 Census 2011 and RAY, 2014

Figure 4.43 Scale of Industries in Mathura



Source: UPSIDC Mathura 2014

i. Dominant Oil Refinery Base

Since, Mathura's inclusion in the Taj Trapezium Zone (TTZ), industries dependent on generators or coal have been banned and relocated to Kosi Kalan, Chatta and Nandgaon and to other states with better infrastructure. However, 822.92 ha. of land area has been allotted for industrial growth in the Master Plan, of which the oil refinery holds the major share. Therefore, besides the existing oil refinery, there is the risk of new refineries launching in South Mathura industrial estate, which may be a serious concern since Mathura refinery is one the biggest source of pollution in the TTZ Area[41]. The problem can be vulnerable due to the absence of nonpolluting waste management systems in these industrial hubs.

ii. Inadequate Infrastructure for Small and Medium Scale Industries

Textile printing industry which includes Sari printing and fabric dyeing is a prominent industry in Mathura. Dye and color manufacturing industries are sources of water contamination. Color manufacturing in both the organized sector and unorganized sector practice unhygienic, outdated processes. Silver ornament manufacturing industries are also major economy generators in the city and the region. Other industries in the city are units manufacturing water taps, decorative items and household items. Mathura is also a big center for production of cotton based products[42].These small and medium sized industries lack adequate infrastructural facilities and advanced technological support to manage contamination and pollution.

Unavailability of uninterrupted power supply at affordable rates, lack of upgraded technology, absence of well formulated State Industrial Policy are prominent issues[43].

B. Trade and Commerce Sector

Religious tourism and small scale household industries are prominent contributors to

41 Master plan, 2021
42 MSME Profile, Mathura 2014 & DIC, Mathura
43 Primary and Secondary on field Survey, 2018

the economic base of Mathura and Vrindavan but these commercial activities are not well distributed exerting development pressure to the core city. Mixed used activities prevail in the inner city with shops on the ground floor and residence on upper floors. Wholesale trading centers are also common establishments in the city core. These unregulated growth patterns trigger congestion and unhygienic conditions particularly in the core 44 ha land[44].

i. Inadequate incentives for Local Cottage Industries

The main economy generating cottage industries in Mathura are sari printing, and manufacturing of temple jewelry and garments, artificial jewelry, copper utensils, stone engraving, statues, paintings, sweets and offerings. Mathura also has a large number of milk trading centers and is known for its milk products like peda and barfi. However, these industries lack financial and promotional incentives.

Table 4.14 Occupational Structure of Mathura

Occupational Structure	2001 (in %)	2011 (in %)
Primary	1.43	5.70
Secondary	6.45	5.29
Tertiary	92.11	89.01

Source: Census 2001, 2011

ii. Non-conforming Activities within the City Core Areas

Non – conforming economy generators such as printing presses and metal curio industries which are subject to bulk orders from other states are widespread in the city's core. These activities cause inner city water and air contamination[45].

iii. Large number of Informal Sector or Vendors

There is an increasing number of informal sector especially hawkers and street vendors in the city. However, registration of street vendors is currently on and designated street vending zone plan is under process under the Street Vending Act (Nagar Nigam Vrindavan 2018).

4.2.1.12 Tourism

Mathura-Vrindavan are noted pilgrim cities of India and popular religious tourism hubs. City of Mathura has been chosen as one of the prime destinations for Heritage City Development and Augmentation Yojana (HRIDAY) scheme of Government of India. Since 2015 City of Vrindavan claims a spot as the most popular attraction in the Braj Region among foreigners and the number of foreign visitors visiting Mathura remains consistent throughout the year. Though the tourist influx in the Braj region is increasing every consecutive year, it is still way behind the top 15 popular tourist

44 Master Plan,2021 and Land Use Analysis, 2018

45 Primary and Secondary Sources, 2018

destinations in India which indicates Mathura-Vrindavan need to enhance their tourist attracting quotient.

A. Inadequate focus on Heritage Conservation and Planning

Mathura- Vrindavan nearly have 325 religious and heritage sites and Kunds, out of which only 20 are ASI protected. indicating lack of obligation towards heritage conservation and protection. There are many unexplored sites which can be developed and promoted as tourist attractions. However, Rehabilitation of the Banke Bihari Temple in Vrindavan talks about redevelopment of parking areas, treatment of drains and streets, development of community plaza, improving tourist infrastructure and formation of urban design guidelines, is a promising project (World Bank 2018). More such projects need to be taken up in the cities but with an emphasis towards heritage conservation and aesthetics.

B. Deficient Tourist Infrastructure

Lack of safety and security of tourists, underdeveloped public transport system, overcrowding of popular tourist centers and lack of sufficient infrastructure are major set-backs in promoting tourism in this region. Poor health, lack of hygiene and improper sanitation in the region especially in the rural parts of the Mathura pose as deterrents for tourist interest and activities. (Refer Table 5 and Figure 30).

Table 4.15 Tourist Footfall in Mathura

Year	Domestic	Foreign	Total	Growth
2013	6600000	24700	6624700	
2014	6620500	24950	6645450	0.31
2015	6626000	25000	6651000	0.08
2016	6630000	25100	6655100	0.06
2017	7226700	26605	7253305	8.99
2018	7248093	26683.76	7274777	0.30
2028	7509804	27484.28	7537288	3.00
2038	7735101	28308.82	7763410	3.00

Source: Census 2011 and Department of Tourism, Uttar Pradesh, 2018

C. Limited Tourist Accommodation Facilities

The existing accommodation facilities including 140 hotels and 200 Dharamshalas, have 14,500 rooms approximately. As per projections based on census 2011 data, the required number of accommodations for 77,63,410 tourists is 31,055 rooms. Therefore, there is a current shortage of 16,555 rooms as per the current requirements. This will increase by 2038[46].

46 Calculations based on UP Tourism assumption of 400 rooms/ lakh tourists

4.2.1.13 Urban Services and Infrastructure

A. Insufficient Water Supply System

The source of water supply to the city is both surface and underground water. River Yamuna is the major source of surface water. However, surface water supply is limited; Mathura depends upon the underground sources to a large extent in order to meet the daily domestic, commercial and industrial needs. Underground sources are utilized through 73 bore wells of different capacities that are able to supply 25 MLD of water. At present the surface water production is 100 MLD at Gokul Barrage, located about 15 Kms downstream from Mathura, whereas the NPP (Nagar Palika Parishad) is able to supply only 10 MLD out of the total production due to insufficient collection and distribution system.

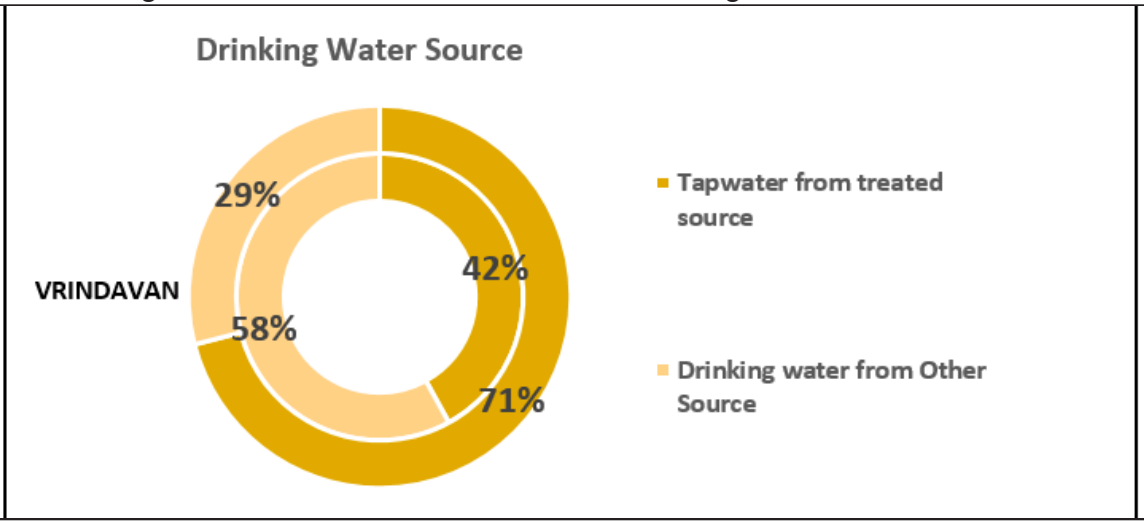
Table 4.16 Mathura and Vrindavan Drinking Water Source

	Total Number of Households	Tap water from treated source	Drinking water from Other Source
Mathura	55,086	42	58
Vrindavan	10,397	71	29

Table 4.17 Water Supply Demand in Mathura and Vrindavan

	1991	2001	2011	2018	2028	2038
Population	283668	380007	528394	632265	780652	929039
Water Demand (135 lpd)	38.3	51.3	71.3	85.4	105.4	125.4

Figure 4.44 Mathura and Vrindavan Drinking Water Source Chart



Source: Mathura Jal Nigam, CDP 2006 and Author

Due to shortage of funds, the city water supply network has not been able to tap the full potential of the Barrage. The number of individual tap connections existing in the city are around 22,000 (domestic, commercial, industrial, etc.) and these connections are not metered. There is huge dependency on ground water through hand pumps

and tube wells. Particularly, the slums completely depend on ground water. Piped water supply connections are primarily available in the Cantonment area of the city. As per estimated calculation for the year 2038, 1 plant of 125 MLD water treatment plant is required considering 135 lpcd (litres per capita per day) demand for water supply. Land requirement for the same is 2.4 Ha[47]

B. Sewerage and Drainage

The city lacks an efficient sewerage system. Open drain sewer network carries the waste water to Sewerage Treatment Plants (STP) for treatment and disposal (Refer Table 4.18). The inner city septic tanks and sewer networks are defunct due to poor maintenance. Untreated sewer flows in to the road side open drains and gets discharged into the Yamuna River causing serious water pollution. Three STPs, in Mathura and the other two at Vrindavan road area are able to treat sewer of 58 MLD. In fact, the STPs in Mathura are almost non-operational in nature. There are no separate drains for storm water, thus exerting excessive pressure on the existing sewer network during rainy seasons. Thousands of devotees take bath in the river on an average day, which increases by over 1.5 lakhs during festivals and special occasions. The bathing sites are not providing with appropriate sewage disposal systems. The water quality is really bad with a high BOD level. The sewage disposal in the Urban agglomeration relies completely on septic tanks and open drains only. Approximately 70% of the inner city have inadequate sewerage system in Mathura and 10% in Vrindavan.

The septic tanks in the Cantonment area are regulated better. Pumping stations and sewage treatment plants are sufficient only for a part of the sewage generated. The total wastewater disposed in Yamuna River from Mathura UA is about 26.5 MLD which contributes to a pollution load of about 5000 kg/day of BOD to the river[48].

However, construction of community and public toilets are in progress. The cities will become open defecation free by 2018 (Nagar Nigam Vrindavan 2018).

Table 4.18 Mathura and Vrindavan Sewage Statistics

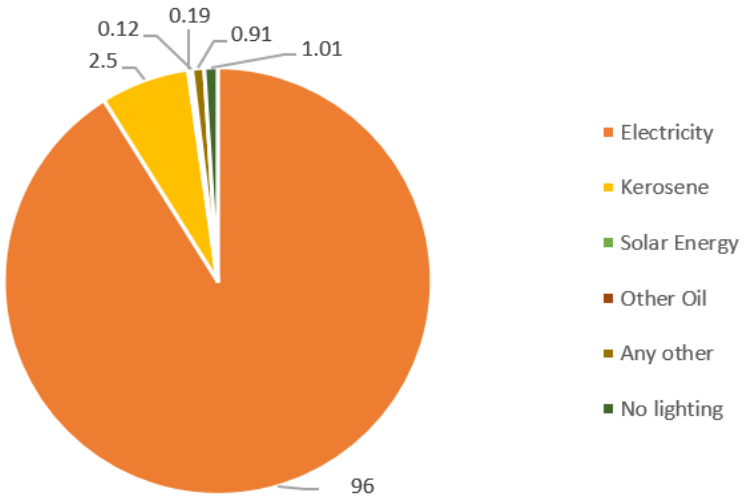
	TOTAL SEWAGE	TREATMENT CAPACITY	DISPOSAL METHOD
Mathura	40 MLD	90.25 MLD	Disposed in Yamuna
Vrindavan	6.33 MLD	4.5 MLD	Disposal on land

Source: City Sanitation Study

47 Report on status of water supply, wastewater generation and treatment in Class I cities and Class II towns in India, 2009 and Mathura Jal Board, 2018

48 Report on status of water supply, wastewater generation and treatment in Class I cities and Class II towns in India, 2009 and Mathura Jal Board,2018

Figure 4.45 Sources of Power Supply



Source: Census 2011

Around 60% of the city devoid of street lights. Of the 40% area served, only 10% of the area receives adequate street lighting. This leads to public inconvenience, security and law and order problems[49].

C. Sanitation and Solid Waste Management (SWM) Crisis

The Solid Waste Management (SWM) system along with drainage is the most poorly delivered service of Mathura NPP, due to the lack of adequate infrastructure facilities and inefficient day to day planning and management. Only 40% (54%) of the total waste (145 MT) generated per day is collected for disposal on a daily basis due to lack of limited infrastructure and manpower resources. Often, due to the inefficient SWM handling system, the wastes get trashed into the drains. There are more than 200 dairies in the city which contribute to large quantities of cow dung waste, being directly disposed of into open drains and nallahs. Domestic waste is the major source of waste generation in the city. Residential and commercial wastes are not collected and segregated as recyclable and non-recyclable waste, at source. In the absence of appropriate landfill at accessible distance, the waste is dumped on open sites. The city lacks provision of dumpsters and trash bins leading to garbage accumulation on the roadside. Even the prominent tourist hubs and heritage sites have unsightly heaps of smelly trash scattered on their premises.

Firozabad

Firozabad, a fast growing Industrial and Commercial City, is the headquarter of the western districts of the Indian state of Uttar Pradesh. Firozabad City became a Nagar

49 Primary and Secondary Sources, 2018

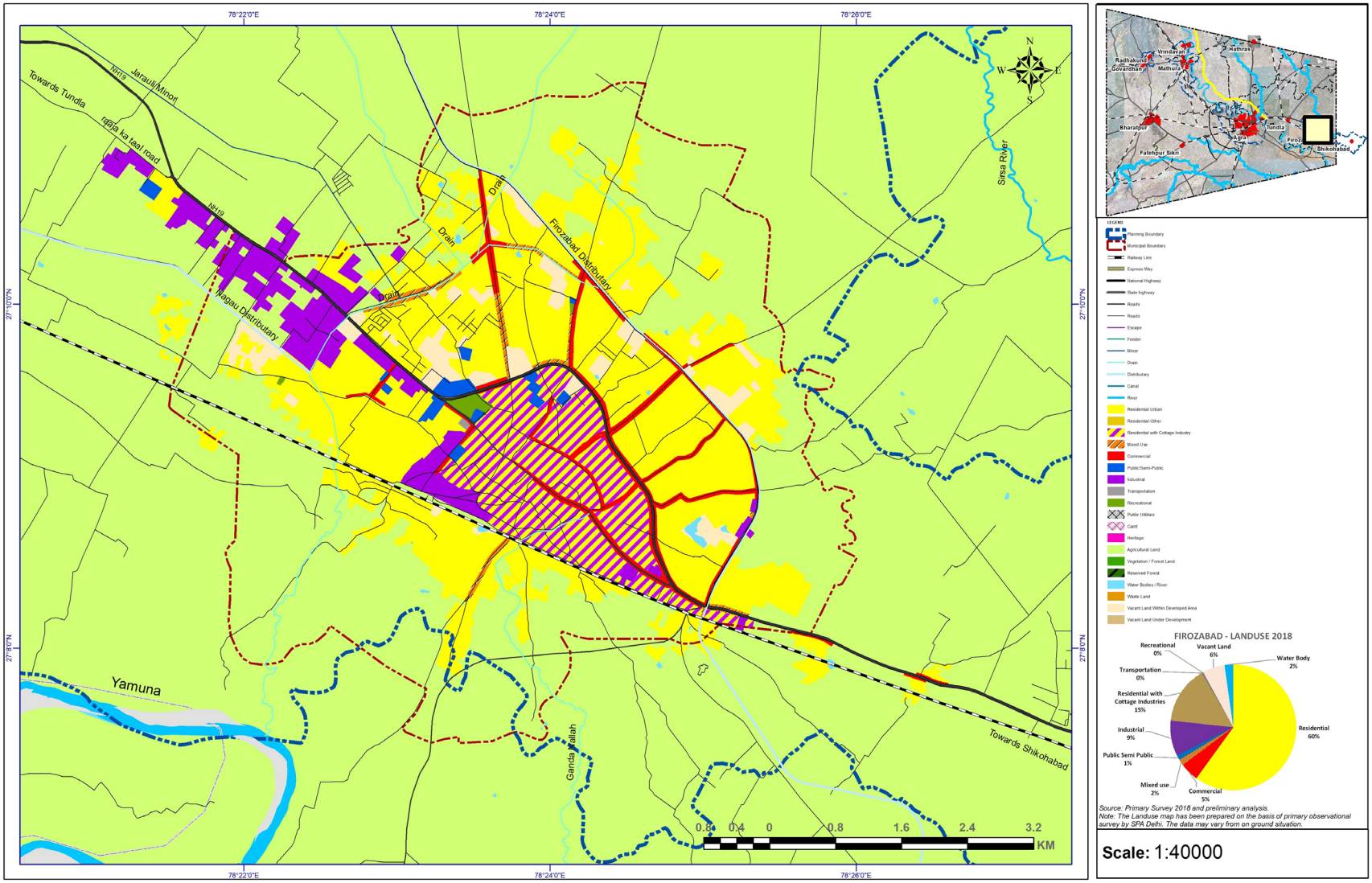
Nigam in 2014. The city is famous for its glass glassware and bangle industries. Total area of Firozabad City is 34.90 sq. km[50]. The district is part of Agra division and lies along NH2 and has a population of 6,04,214 persons[51].

4.2.1.14 Urban Development and Landuse Pattern

The growth pattern of the two cities of Firozabad and Shikhohabad indicates that the cities are expanding along the expressway (both cities have one common legal document i.e. the Master Plan, therefore analysis for landuse cannot be done in separation). The growth is stunted in the south western direction due to the presence of the river. Projections suggest the merging of Firozabad and Shikhohabad in the next fifty years if the current trends prevail (Refer Map 4.27 and Map No. 4.28)[52].

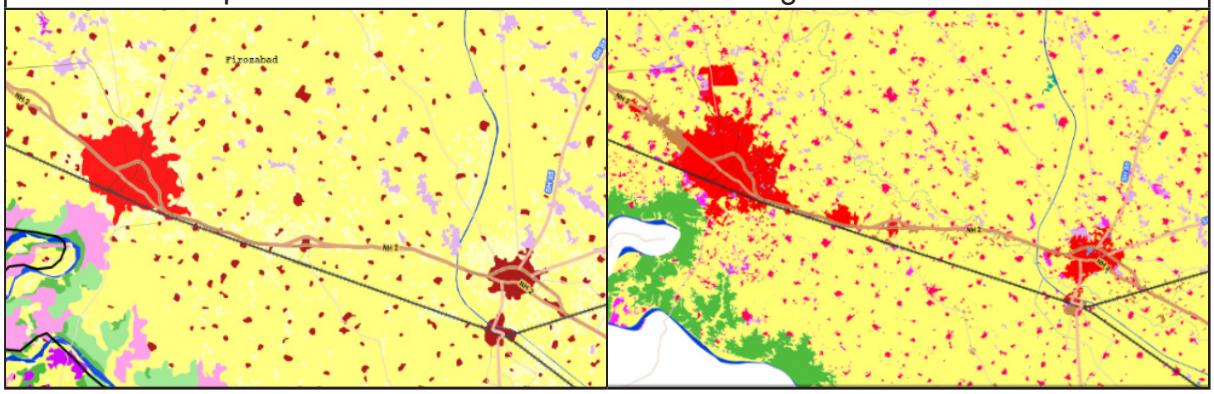
50 Master Plan of Firozabad-Shikhohabad
51 Census 2001, 2011
52 Primary and Secondary Surveys 2018; Master Plan of Firozabad 2023

Map 4.27 Land Use Map for Firozabad



Source: Primary Survey, 2018

Map 4.28 Land Use and Land Cover Change 2005 and 2011



Source: Bhuvan Portal - Land cover of year 2005, 2011

Firozabad is known for its glass based industries manufacturing glass bangles, glass beads, glass rods, glass tubes/shell, glass wares and glass blocks. Most of these industries run on gas fueled DG sets[53]. The land next to the industries are occupied by mixed residential developments, not recommended for standard quality of life as per livability indexes. Since Firozabad is a part of Taj Trapezium Zone, polluting industries are prohibited in the city. As a result, new and existing glass industries have shifted base to Shikhohabad, which is fast blooming into an industrial hub. Main commercial areas in the city have a congested high density, mixed use character, with bangle-making household industries[54].

A. Land-use Allocation and Master Plan Zoning

As per census of India 2011, total area of Firozabad (NPP) is 21.35 sq km. The twin cities have a Master Plan developed for 2031. All Master Plans prepared in 2001 and 2010, gives a perspective that there has been a decrease in the industrial, transportation and commerce sectors, while there has been an increase in the public and semi-public sectors.

Table 4.19 Land Use Distribution of Firozabad - Shikhohabad

	Land Use Plan 2001		Land Use Plan 2010		Land Use Plan 2018		URDPFI
	Area (Ha)	Percentage (%)	Area (Ha)	Percentage (%)	Area (Ha)	Percentage (%)	
Residential	925	52	1377.53	65.15	1826	65	43-48
Industrial	370	21	37.95	1.79	506	18	7-9
Trade and Commerce	83	5	290.05	13.72	125	4.4	
Public-Semi Public	42	2.3	122.62	5.8	53	2	6-8

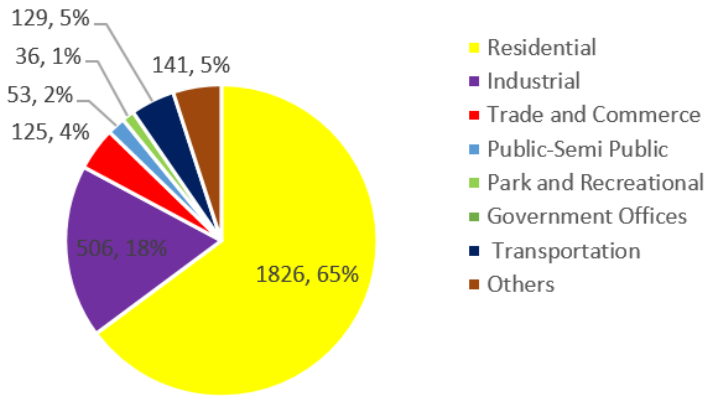
53 Parliament of India, Rajya Sabha Department-Related Parliamentary Standing Committee On Science & Technology, Environment & Forests Two Hundred Sixty Second Report On Effects of Pollution On Taj, July 2015

54 Primary and Secondary Surveys, 2018

	Land Use Plan 2001		Land Use Plan 2010		Land Use Plan 2018		URDPFI
	Area (Ha)	Percentage (%)	Area (Ha)	Percentage (%)	Area (Ha)	Percentage (%)	
Park and Recreational	100	5.6	92.73	4.39	36	1.2	12-14
Government Offices	30	1.6	162.69	7.69	NIL	NIL	NIL
Transporta-tion	223	12.5	10.75	0.51	129	5	10-12
Others	14.36	1	20.19	0.95	141	5	-
Total Proposed Area	1787	100	2114.51	100	2813	100	-

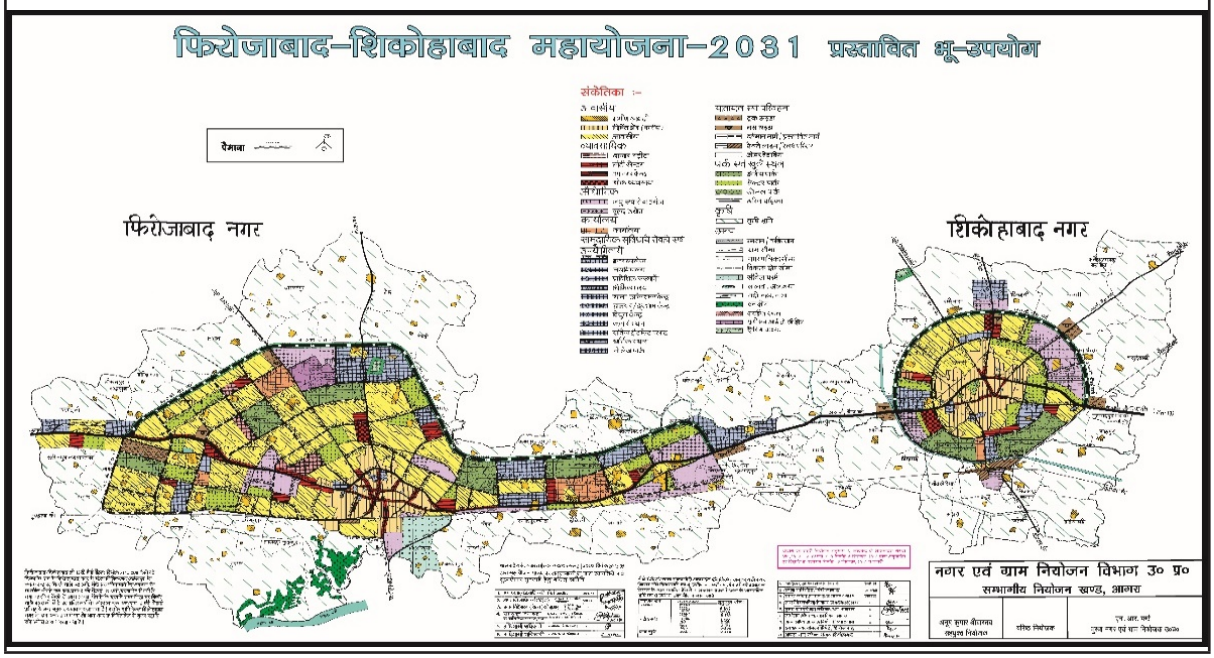
Source: Primary Survey and preliminary Analysis by SPA Delhi 2018. Note: The land use map has been prepared by SPA Delhi to understand the growth pattern of development. The data may not reflect exact on-ground estimates since detailed survey was not possible in the limited time frame.

Figure 4.46 Firozabad - Shikhohabad 2018 Land use (through primary survey)



Source: Primary Survey and preliminary Analysis by SPA Delhi 2018.

Figure 4.47 Proposed Land-use Firozabad-Shikhohabad



The expected growth of Firozabad is towards the North along Jalesar Road, Kotla

Road and Saanti Road. No development is proposed along the Railway line[55]. in the South. The core area of Firozabad has high density mixed use development, primarily of Residential and Cottage Industries (Glass Industries). This part of the City is congested and all households practicing glass manufacturing live in extreme unhygienic conditions and the pollution resulting from the glass manufacturing processes has hazardous impact on the health of the workers due to the exposure to extremely high temperatures and irrespirable airborne particulates that leads to chronic lung diseases[56].

Figure 4.48 Adverse Working Conditions Of The Firozabad Glass Factory Workers



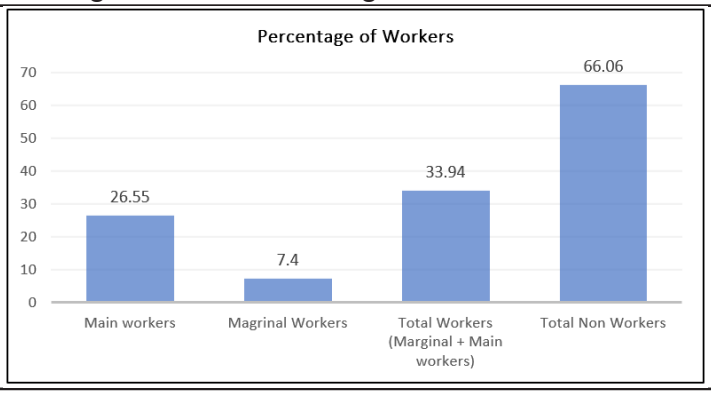
Source: Primary Survey 2018

The current land-use doesn't conform to the Proposed Land-use of 2031. Current residential areas cover 61 % of the land use which is higher than the proposed Land-use and URDPFI guidelines. New Industrial Zones will be set-up as per the proposed Master Plan.

4.2.1.15 Demography and Settlement Pattern

There are 99,833 households in the city with an average household size of 6.05 pph. The literacy rate of Firozabad is 66.32 % which is lower than the rate of Firozabad District which is 71.9%. The gap in male-female literacy rate is 13.2 %.

Figure 4.49 Percentage of Workers, 2017



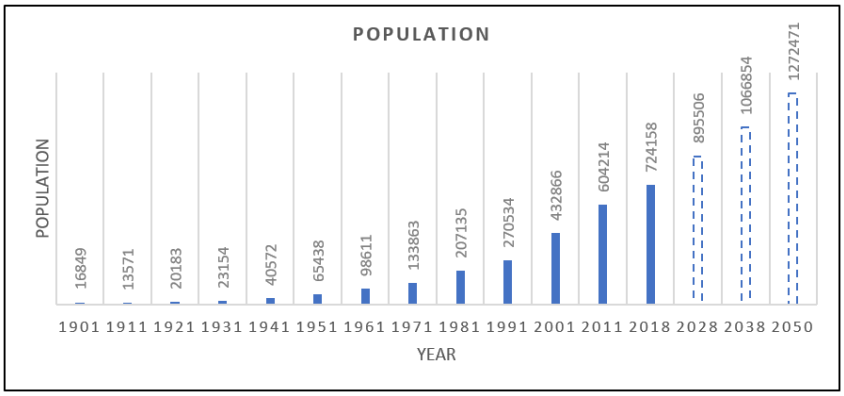
Source: Census 2001, 2011 and calculations

55 FIROZABAD_-SHIKOHABAD_MAHAYOJNA-2031.

56 Primary and Secondary Surveys 2018

The sex ratio of Firozabad (NPP) is 893 which is lower than the state average of 912. Total working population of Firozabad (NPP) is about 2,05,092 which is 33.94 % of the total population. Main Workers are 26.55 % and marginal workers are 7.4 %. Total number of Marginal Workers comprises of cultivators (3,989), agricultural laborers (10,683), household industry workers (30,333) and other workers (1,60,087). Remaining percentage of 66.06% are the non-working population[57].

Figure 4.50 Population Projections – Firozabad



Source: Census 2001, 2011 and projections

4.2.1.16 Economic Opportunities

A. Dominant Glass Industry Base

Firozabad is an Industrial Town and the primary Industry here is the Glass Industry. The breakup of various types of Industries in the District is given in Table No. 12. However, as per the Brief Industrial Profile of District Firozabad 2014 there are some 10120 units while The District Industrial Center Firozabad claims that there are 1309 units currently running in Firozabad. All the polluting industries are following the norms of air and water pollution. Few active industries in Firozabad do not take or consider any health and safety measures nor do they have any waste management systems in place. The pollution generated by the industries located in the core area are affecting the health and wellness of the neighboring residents. The air quality index of Raja-Ka-Tal (industrial Area), Tilak Nagar (residential area) and DIC (Mixed use) are below required standards[58]. Therefore, appropriate action against the industries who are not following the Act, should be taken (District Industries Centre Firozabad 2018).

57 Census 2001 and 2011
58 CSIR-NEERI report 2016

Table 4.20 Type of Industries in Firozabad

Sl No.	Type of Industry	No. of Units	Employment	Percentage (%)
1	Agro Based	110	880	1
2	Readymade Garments & Embroidery	53	270	1
3	Wood/Wooden based furniture	276	890	3
4	Paper & Paper based products	37	232	0
5	Leather Based	5	45	0
6	Chemical/Chemical Based	11	95	0
7	Rubber, Plastic & Petro Based	6	43	0
8	Mineral Based	653	5227	7
9	Metal Based (Steel Fab)	137	995	1
10	Engineering Units	120	935	1
11	Electrical machinery and transport equipment	7	65	0
12	Repairing & Servicing	3384	15997	33
13	Glass & Glassware	5246	40126	52
14	Misc.	75	1000	1
	Total	10120	66800	

Source: Brief Industrial Profile of District FIROZABAD 2014 and MoEF categorization of Industries 2016

Figure 4.51 Industries in Firozabad



Figure 4.52 Encroachment of shops along road



Source: Primary Survey 2018

B. Uncoordinated Development of Commercial Areas

Major commercial areas are a reflection of uncoordinated mixed use developments with household bangle-making industries. Congestion and unhealthy living conditions are prevalent in these areas[59]. Encroachment on roads and footpaths are widespread causing traffic jams and raising safety concerns.

4.2.1.17 Urban Services and Infrastructure

A. Partial Water Supply Coverage

In the city, total number of water supply connections are 40,741, which is only 39% of the total connections required for water supply[60]. The total water demand in the city is 93.80 MLD and the water supplied into the city is 57.44 MLD which indicates the remaining demand is met by ground water sources, through 125 tube wells and power pumps and 1110 hand pumps located in various parts of the city[61]. About 15% of the water being supplied is NRW (non-revenue water) (Refer Map No.3.3FS4 in Volume III).

B. Insufficient Sewerage and Drainage Network

Total sewage generated at Firozabad is 45.95 MLD. At present only 20% (147 km) area is covered by the sewer network. The remaining 563 km is yet to be covered[62]. At present, there is no waste water treatment facility in the city. A new Sewer Treatment Plant is required in the nearest future (Refer Map No.3.3FS5 in Volume III).

C. Inadequate Solid Waste Management System

Total Solid Waste Generated in the city is 725.06 MT and about 40 to 50% of this waste is collected by Nagar Nigam. Door to door collection of Solid Waste is not present. In the absence of a designated landfill site for waste disposal or composting, open dumping is practiced in most parts of the City at many places all over the city.

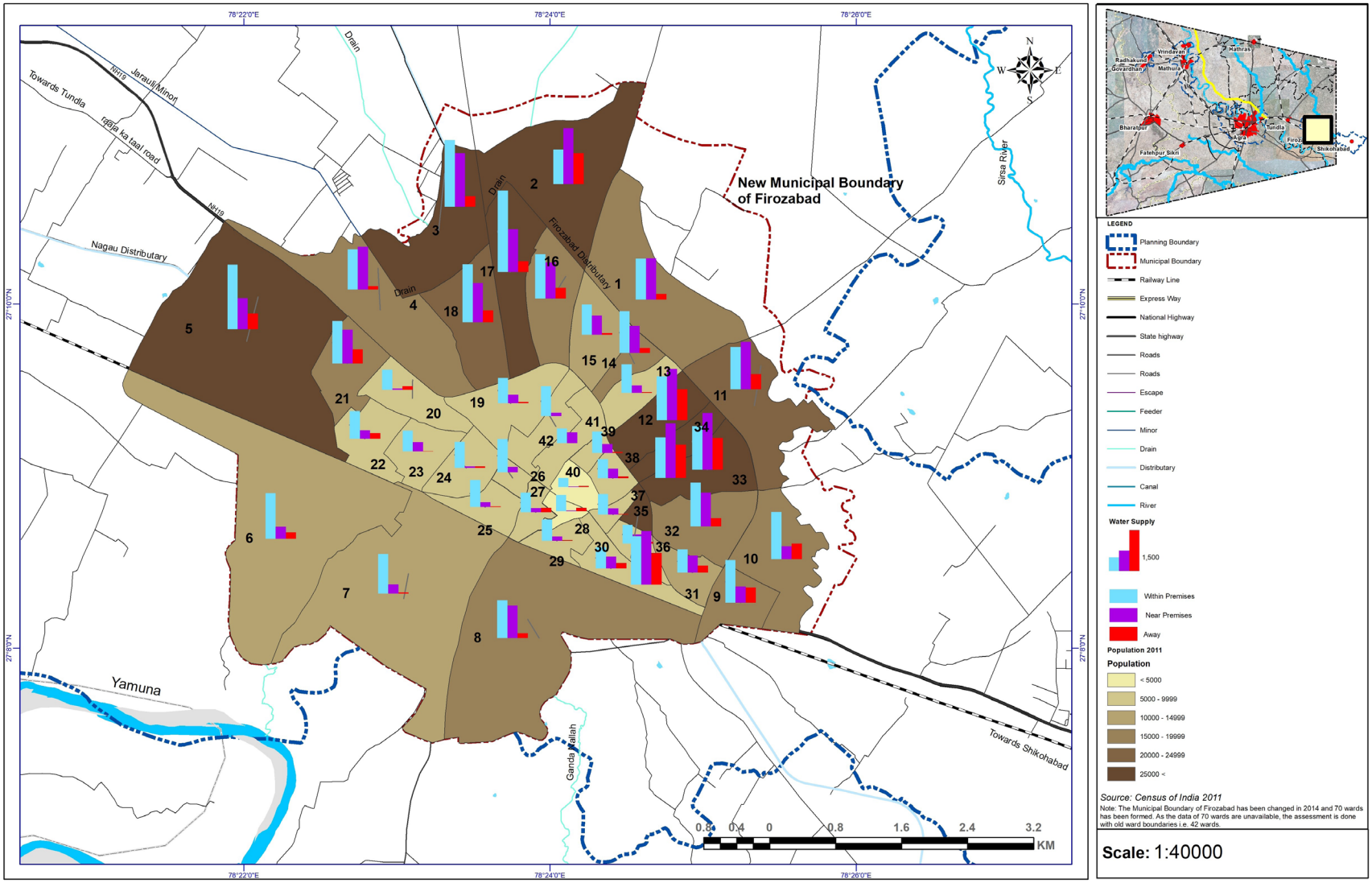
D. Dearth of Recreational Spaces and Parks

As per master Plan 2031, 14% of Parks and recreational areas have been proposed in the city outskirts, whereas there is a need for green areas within the core areas of the city. About 6% of the vacant land is available in the city core which may be allocated for parks and recreational spaces. However, all vacant plots are treated as dumping sites instead of converting them into recreational parks.

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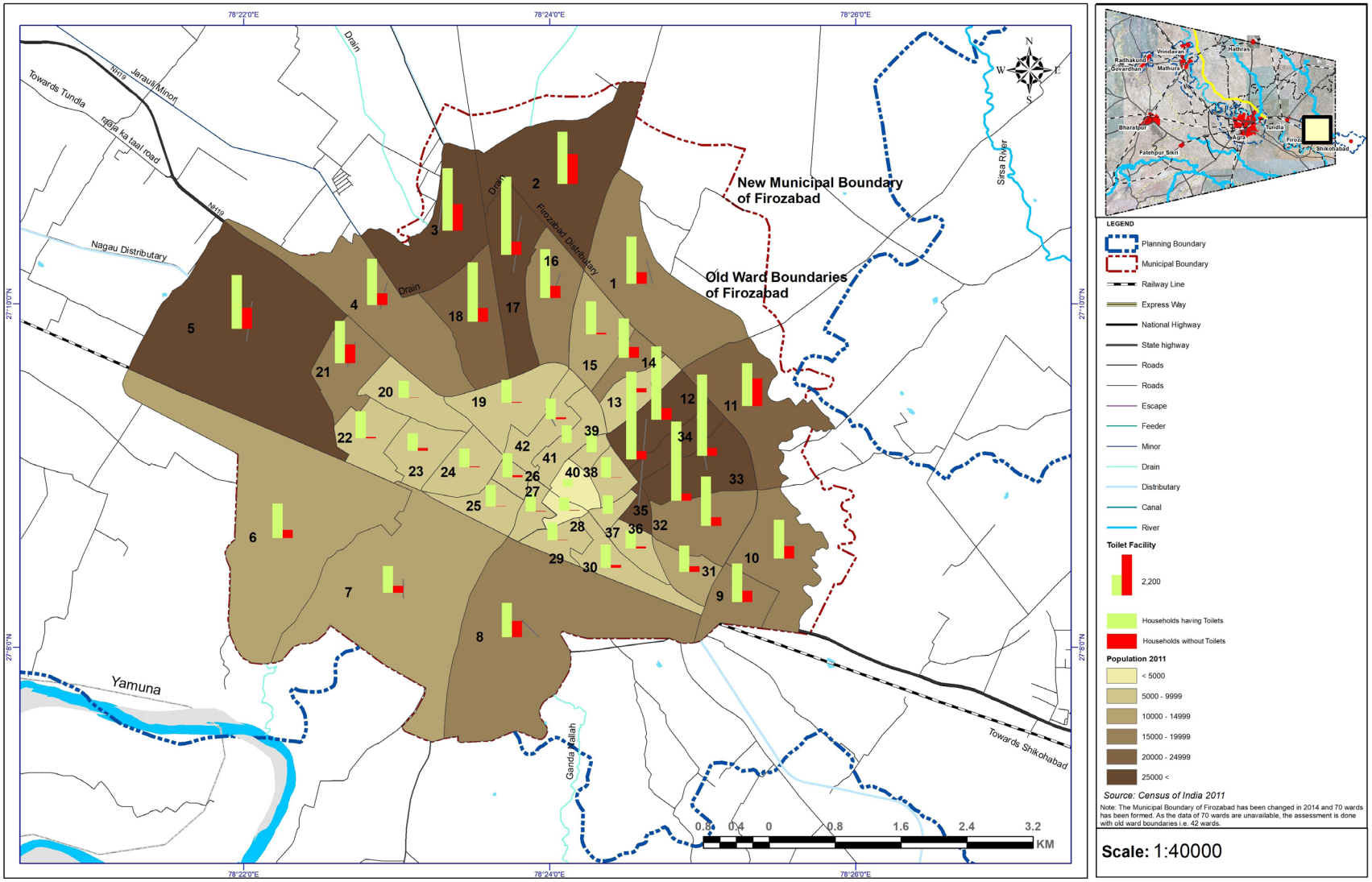
59 Primary and Secondary Survey 2018
60 City Sanitation Plan 2016, Firozabad
61 City Sanitation Plan 2016, Firozabad
62 City Sanitation Plan 2016, Firozabad

Map 4.29 Ward Wise Water Supply Distrtibution in Firozazbad



Source: Primary Survey, 2018

Map 4.30 Ward Wise Toilet Facility Distribution in Firozabad



Source: Primary Survey, 2018

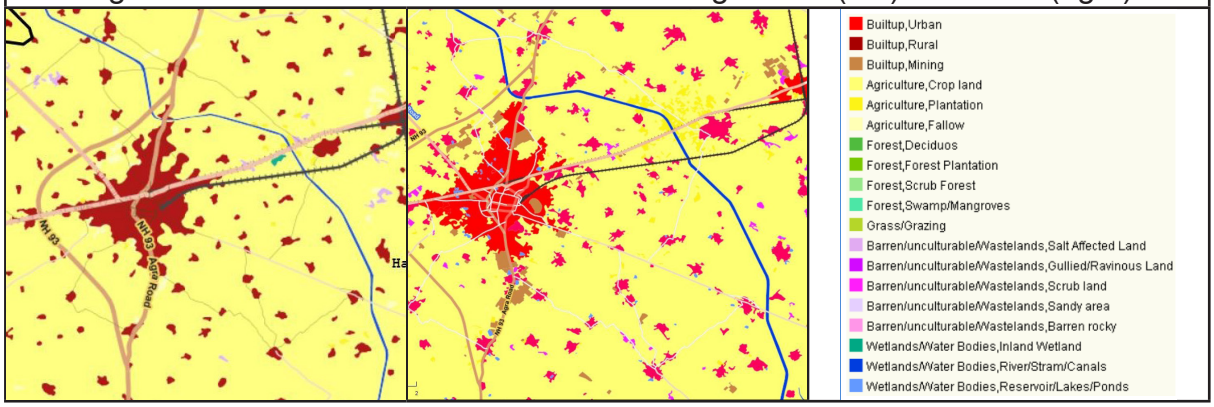
Hathras

Hathras is an ancient city associated with the epic Mahabharata and Hindu theology. It is a municipal board in the newly named Mahamayanagar District (previously Hathras district), in the Indian state of Uttar Pradesh. It is the headquarters of the district that was created in 1997, by incorporating parts of: Aligarh, Mathura, Agra Districts, and Khair Tehsil. It also forms a part of Aligarh Division[63]. Hathras lies within the Braj region in Central or Middle Doab at 27.6°N 78.05°E. It has an average elevation of 178 meters (584 feet) and is situated on Agra, Aligarh and Mathura, and Bareilly Highways crossing. Variations in temperature are extreme.

4.2.1.18 Urban Development and Land Use Pattern

Hathras was an industrial hub during the British Raj. Cotton mills knives manufacturing, asafetida or "Hing" production, and Desi Ghee products were its primary industries. Currently, the latter two continue to thrive. Hathras is now notable for holi and Gulal ready-made garments manufacturing, chemicals, carpets, artificial Moonga-Moti pearls, brass artware and hardware, edible oil, metal handicrafts and beverages[64].

Figure 4.53 Land Use and Land Cover Change 2005 (left) and 2011 (right)



Source: Bhuvan Portal - Land cover of year 2005, 2011

There are remnants of its historic past in the form of 'Baghichis' (small gardens) which are popular places for rendezvous. A typical feature of almost every bagichi in Hathras is the akhara or the wrestling ring where juveniles and adults practice various forms of wrestling. Owing to its historical and cultural background, the City has numerous temples. Besides them a temple-cum-research complex Mangalaytan has been developed on the Aligarh-Agra Highway. The Mangalaytan complex is one of the largest Jain religious centers of its kind in the country and also houses the Mangalayatan University.

63 District Census Handbook, Mahamayanagar, 2011
64 Brief Industrial Profile of District Hathras 2011

A. Unregulated Land Use

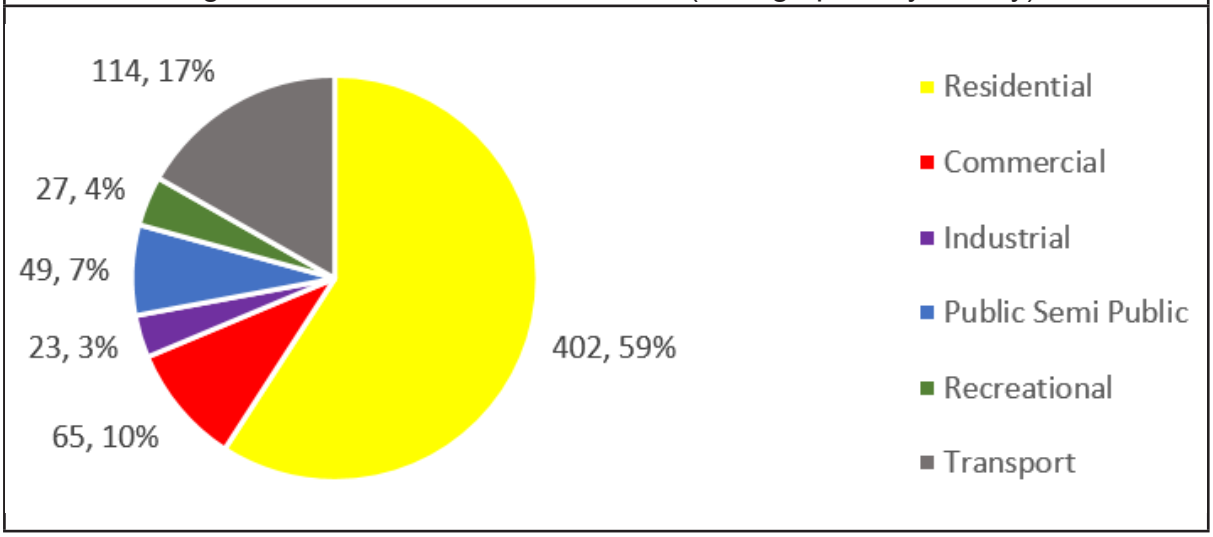
Commercial areas exhibit a great degree of unregulated development. Land allocated for residential use is encroached by non – conforming development. Mixed use development is observed in commercial areas. The land allocated for open spaces is consumed by residential development. Residential development is also seen in industrial estate areas.

Table 4.21 Existing and Projected Pollution of Hathras

Land Use	Existing Land use 2018 (Ha.)	Existing Land use 2018 (%)	Proposed Land use 2023 (Ha.)	Proposed Land use 2023 (%)	URDPFI Guidelines
Developed Area					
Residential	402	59	1860.82	51	43-48
Commercial	65	10	92.27	3	4-6
Industrial	23	3	256.13	7	7-9
Public Semi Public	49	7	316.80	9	6-8
Recreational	27	4	499.78	14	12-14
Transport	114	17	402.69	11	10-12
Government	NIL	NIL	211.93	6	
Total	680	100	3640.42	100	
Undeveloped Area					
Agriculture	NA	Balance	NA	Balance	Balance
Water Bodies	NA	Balance	NA	Balance	Balance

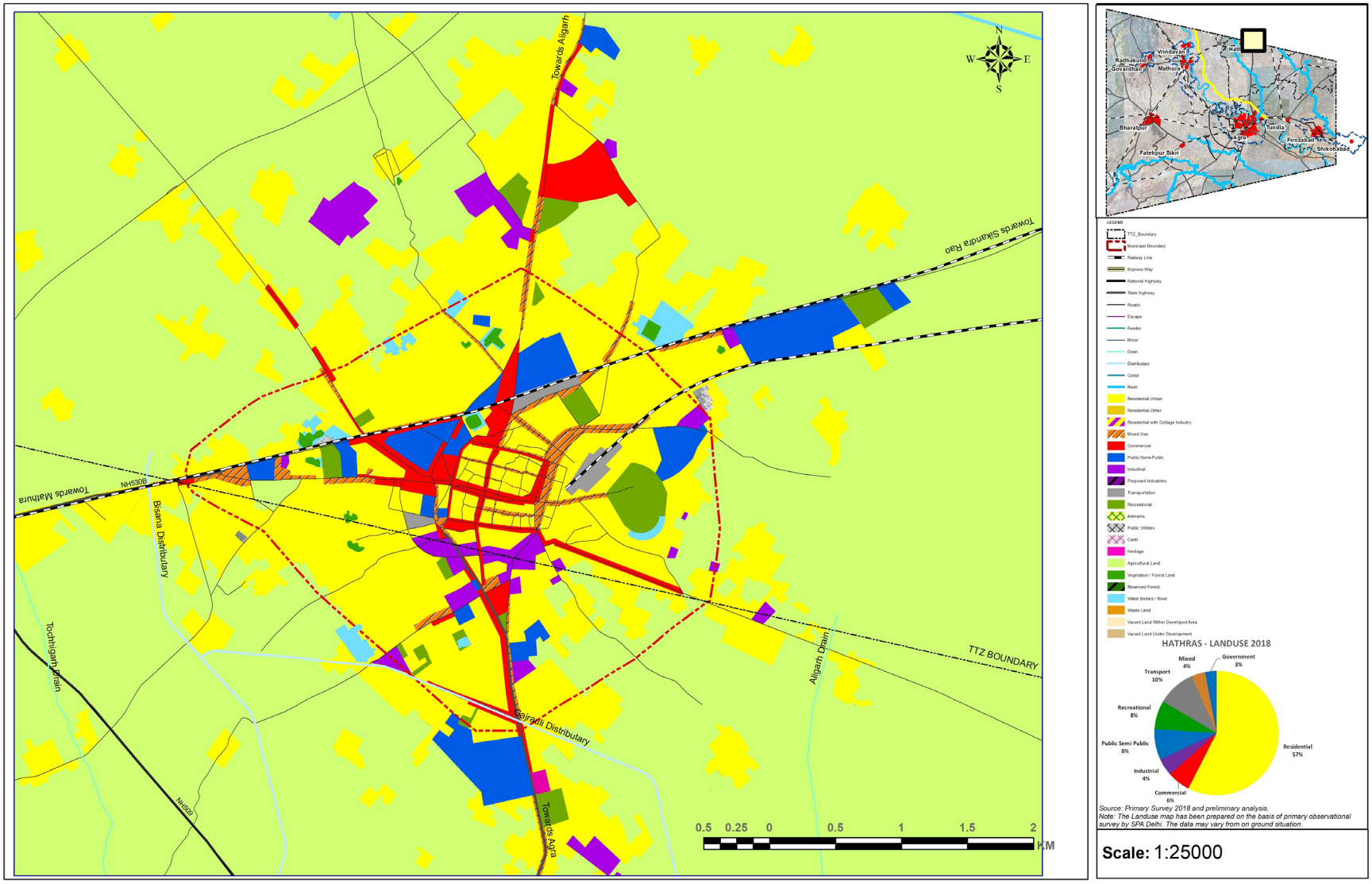
Source: Primary Survey and preliminary Analysis by SPA Delhi 2018. Note: The land use map has been prepared by SPA Delhi to understand the growth pattern of development. The data may not reflect exact on-ground estimates since detailed survey was not possible in the limited time frame.

Figure 4.54 Hathras 2018 Land use (through primary survey)



Source: Primary Survey and preliminary Analysis by SPA Delhi 2018.

Map 4.31 Land Use of Hathras

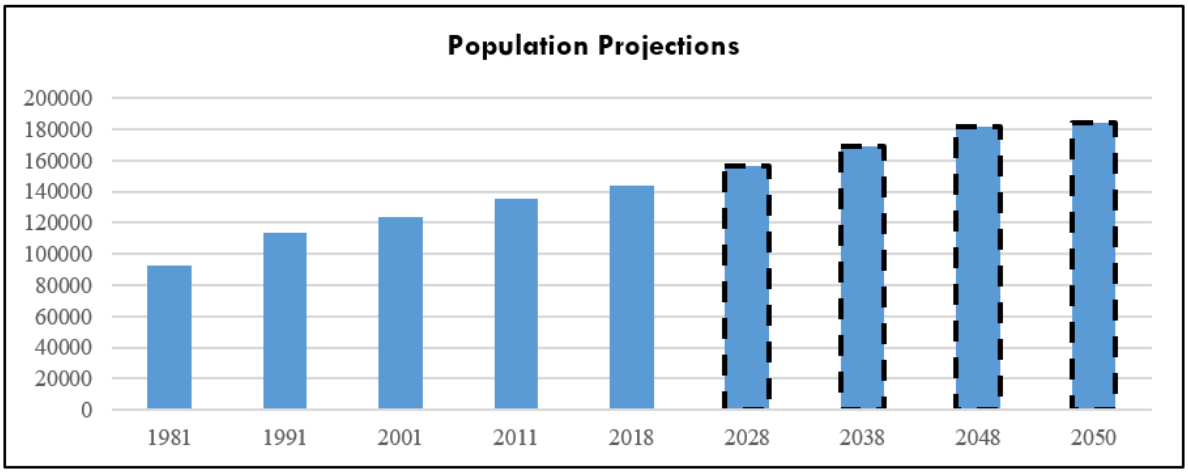


Source: Primary Survey, 2018

4.2.1.19 Demography and Settlement Pattern

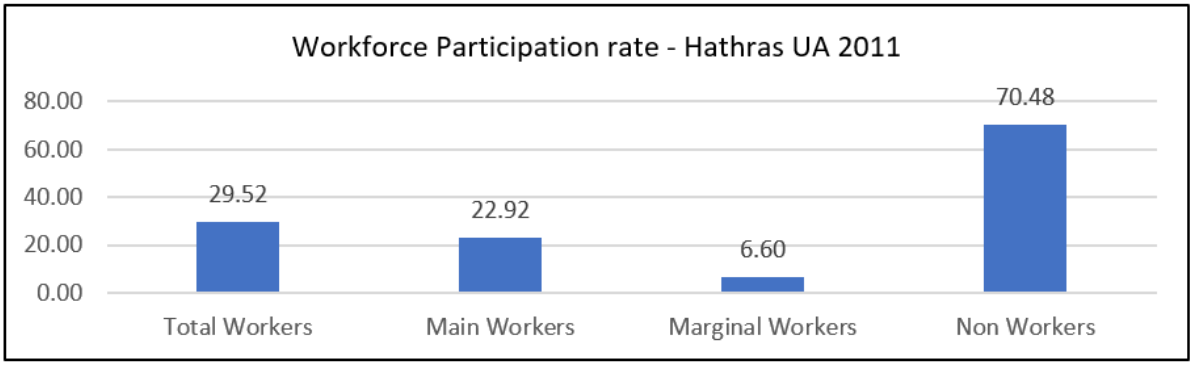
As per 2011 census, Hathras urban agglomeration had a population of 1,61,289 lakhs; of which 86,028 lakhs are males and 75,261 lakhs are females. The literacy rate is 78.05 percent[65]. The total worker's population of Hathras is 47,502 which accounts to 29.52% of the total Population. The percentage of non-working population is 70.48%. The category of workers identified in the Census are as follows: Cultivators, Agricultural laborers, household Industry laborers and others.

Figure 4.55 Population Projections



Source: Census 2001, 2011 and projections

Figure 4.56 Workforce Participation Rate



Source: Census 2001, 2011 and Calculations

Many Illegal housing colonies are emerging in the outskirts of the city due to lack of formal housing supply. With the increase in population to 7.25 lakhs in 2051, nearly 1.2 lakhs houses will be required to fulfill the current shortage in housing[66].

4.2.1.20 Economic Opportunities

A. Dominant Color Manufacturing Industry base

Since the formation of Taj Trapezium Zone, the workforce under the secondary sector

65 District Census Handbook, Mahamayanagar, 2011

66 Census 2011, Primary Survey and Housing Calculation 2018

has decreased significantly. Chemical and chemical based industries, oil-based industries and brick kilns are still illegally operating, even though they are banned as per TTZ mandates. Dye and color manufacturing industries are major sources of pollution. Color manufacturing in both the organized sector and the unorganized sector are a practice unhygienic process. There are many unregistered industrial establishments in the city and many workers from the city and the region are dependent on them. Unavailability of uninterrupted power supply at competitive rates, poor transportation systems, lack of smart technology, and absence of well formulated State Industrial Policies are some areas of concern in the industrial sector[67].

Table 4.22 Occupational structure of Hathras

Occupational Structure (%)	1971	2001	2011
Primary	8.51	6.12	5
Secondary	27.93	7.2	8
Tertiary	63.56	86.68	87

Source: Census of India 2011; District Industrial Centre 2013, Hathras

4.2.1.21 Conservation and revival of heritage sites

The city is known for its Baghs and Baghichis which have been encroached upon by other activities. There is a need to revive these lush green and open spaces. Conservation and revival of the prominent temples would improve the tourism sector in the city.

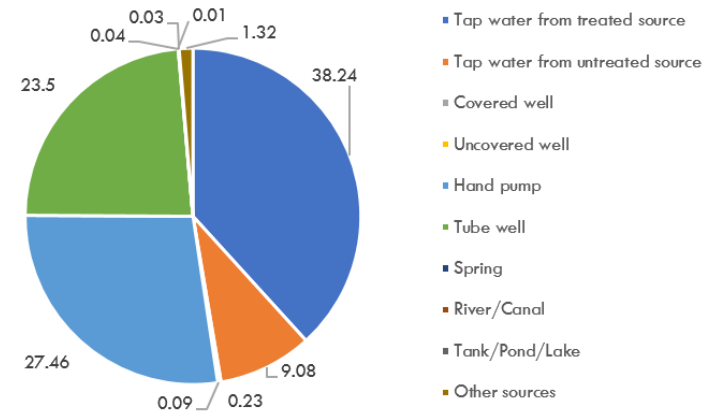
4.2.1.22 Urban Services and Infrastructure

A. Insufficient Water Supply Network

Current water supply coverage is not sufficient to fulfil the demand of the existing population. Ground water is the only dependable source of water supply in the city. The primary means of obtaining drinking water from ground water sources are “tap water from treated source”, “hand pump” and “tube well”. Since the water supply network has only 38% coverage, tap the residents rely heavily on hand pumps, tube wells and other such ground water sources for water supply. This has resulted in considerable decrease in ground water levels in past few years. As per estimated calculation for the year 2050, 13 MLD water treatment plant is required considering 70 lpcd. Supply of water. Land requirement for the same is 0.2 Ha.

67 Primary and Secondary Surveys, 2018

Figure 4.57 Sources of drinking water (in %)



Source: Institute of Social Science, 2011

Table 4.23 Projected Water Demand

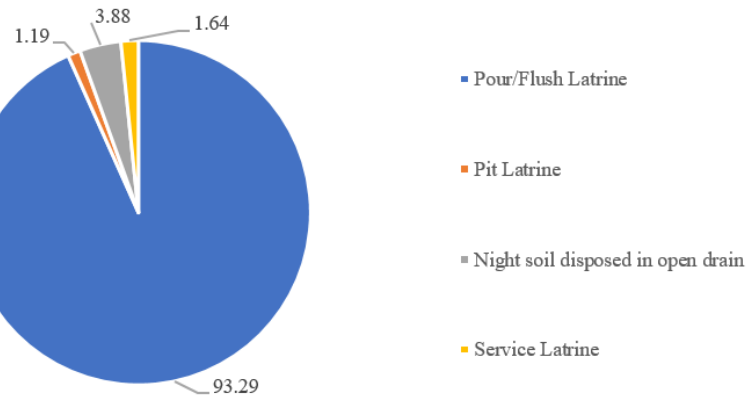
Year	1981	1991	2001	2011	2018	2028	2038	2048	2050
Capacity	6.5	8	8.6	9.5	10	11	11.8	12.7	12.8

Source: UDPFI Guidelines and Calculations 2018

B. Inadequate Sewerage and Drainage Systems

According to Census Data 2011, 81% of the households have latrine facilities within the premises, whereas 19% of the households are dependent upon public latrines and open defecation.

Figure 4.58 Latrines within the premises (in %)



Source: Institute of Social Science, 2011

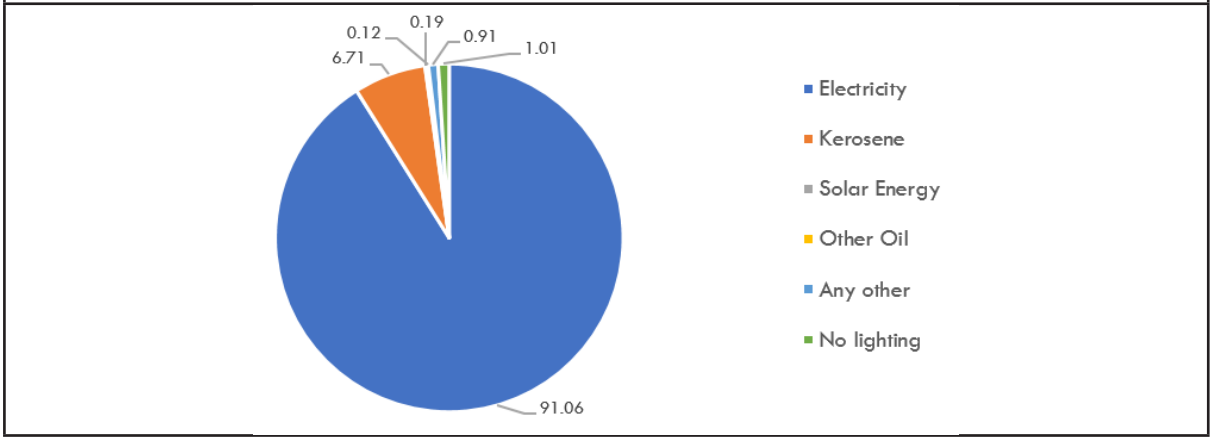
The drainage system is both open and closed. Sufficient facility of pour/flush latrine is provided. There are sewage pumping stations and one sewage farm, but the city lacks adequate sewage treatment plants. Disposal of garbage and waste in open nallahs and drainage system results in clogging of drains. Solid Waste, also gets disposed-off in the open drains.

C. Irregular Power Supply

The City of Hathras receives power supply from the State Electricity Board. Although

the number of connections are sufficient, electricity supply is irregular due to power cuts and power failures. Therefore, there is a need to encourage alternative sources of energy such as solar power plants and other renewable energy sources.

Figure 4.59 Sources of power supply (in %)



Source: Institute of Social Science, 2011

Figure 4.60 Issues Regarding Infrastructure



D. Inadequate Solid Waste Management System

There is no segregation of waste and garbage does not get collected on a regular basis. It is dumped on the roadside or on vacant land. Absence of landfill site and insufficient capacity of the dumping ground makes solid waste management a challenging task in Hathras. This condition has led to unhygienic conditions in the city.

E. Dearth of Open and Recreational Areas

The built to open ratio is less than the required standards, since the land allocated for parks and recreation gets encroached by other uses and activities.

Bharatpur

City of Bharatpur is a municipal corporation in the Braj region of the Indian state of Rajasthan. Bharatpur Municipal Corporation is divided into 50 wards. With its fortified structure, Bharatpur was once considered impregnable and invincible. The city is located 58 km west of Agra and 38 km from Mathura. It is also the administrative

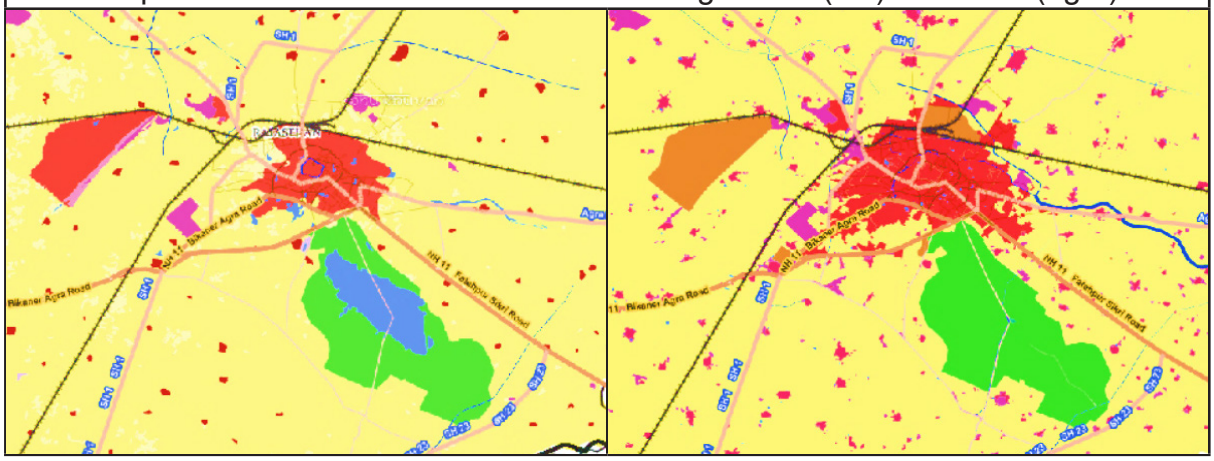
headquarters of Bharatpur District and the headquarters of Bharatpur Division of Rajasthan State. The city has an average elevation of 183 meters (600 ft) and is also known as “Lohagarh” and the “Eastern Gateway to Rajasthan”[68]. It is famous for the Keoladeo National Park (A UNESCO’s World Heritage Site). Bharatpur lies on the Golden Tourism Triangle of Delhi–Jaipur–Agra and hence attracts a large footfall of national and international tourists every year.

4.2.1.23 Urban Development and Land Use

The economy of Bharatpur district is dependent extensively on agriculture and its products. The main crops grown here are wheat, mustard, millet and potatoes. There are many Oil mills in Bharatpur since mustard is harvested in large quantities here and in the surrounding regions. Bharatpur is also famous for its Sweets and Milk Production. In some areas of Bharatpur District like - Hindaun & Karauli stone quarrying is also practiced. Many forts located close to Bharatpur like The Red Fort in Delhi, Agra Fort, and Fatehpur Sikari were built using local Bharatpur stone.

Tourism is also a major economy generator in Bharatpur due to Keoladeo National Park and other significant Hindu Temples. Good road and railway connectivity with Agra, Jaipur, Sawai-Madhopur and other tourist significant destinations make it an attractive and accessible location and facilitates Tourism prospects[69].

Map 4.32 Land Use and Land Cover Change 2005 (left) and 2011 (right)



Source: Bhuvan Portal - Land cover of year 2005, 2011

The above maps indicate that Bharatpur experienced growth in all directions, particularly towards southwest, south and north direction, that along the Bikaner-Agra road and Fatehpur Sikri Road. As per Master Plan 2023, the city will continue to expand in all directions except towards the Keoladeo National Park. There are traces of salty and water-logged areas in the south which makes the land unsuitable

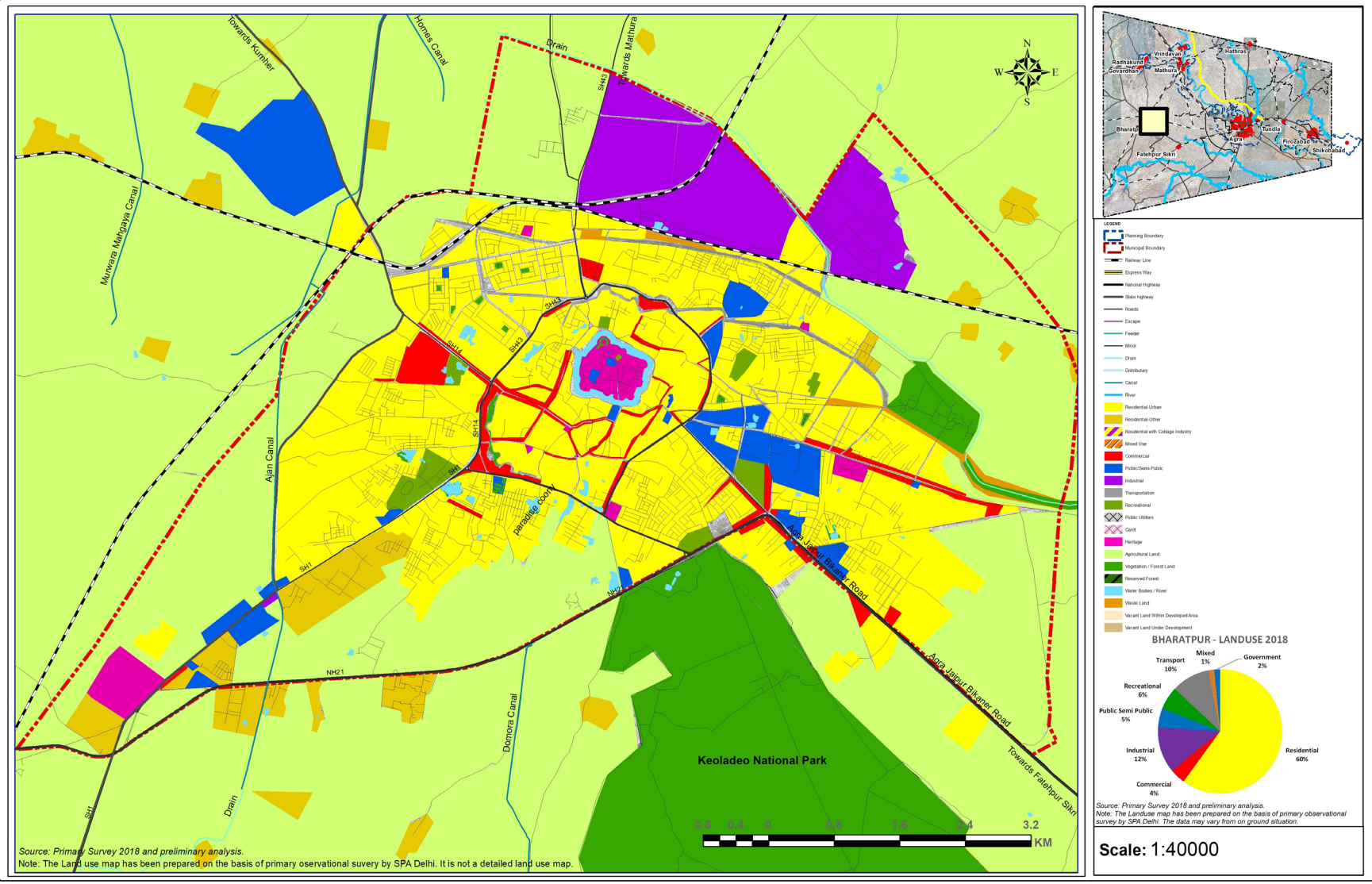
68 Lohagarh Fort, 2017

69 Web portal of Bharatpur, www.bharatpur.rajasthan.gov.in

for construction. Yet there are non-conforming structures built on vacant lands and landfilled waterbodies. Braj Industrial Estate in the north which majorly constitutes of Oil mills is an important pull factor for northern expansion[70].The core area of the city is occupied by dense, unorganized, unregulated and unplanned residential and mixed use development with narrow streets and limited infrastructure.

70 Master Plan of Bharatpur 2023

Map 4.33 Land Use Map of Bharatpur



Source: Primary Survey, 2018

Figure 4.61 Land Use Distribution for Bharatpur, 2018

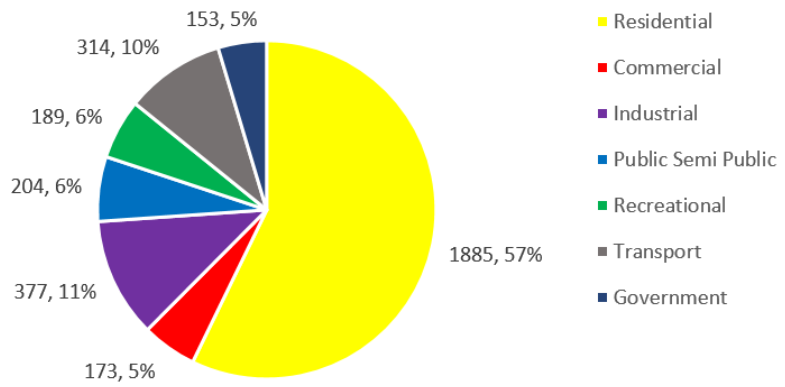


Table 4.24 Land use Distribution of Bharatpur

Landuse	Existing Land use 2018 (Ha.)	Existing Land use 2018 (%)	Proposed Land use 2023 (Ha.)	Proposed Land use 2023 (%)	URDPFI Guidelines
Developed Area					
Residential	1885	57.2	2190.8512	46.24	43-48
Commercial	173	5.2	250.1664	5.28	4-6
Industrial	377	11.4	236.4262	4.99	7-9
Public Semi Public	204	6.2	491.8044	10.38	6-8
Recreational	189	5.7	506.4922	10.69	12-14
Transport	314	9.5	930.0694	19.63	10-12
Government	153	4.7	77.2294	1.63	
Total Devel-oped Area	3295	100.0	4738	100	

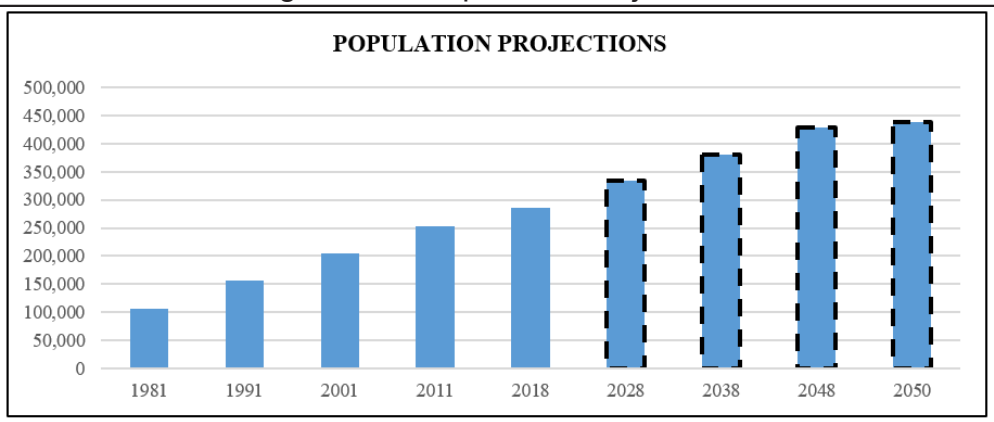
Source: Primary Survey and preliminary Analysis by SPA Delhi 2018. Note: The land use map has been prepared by SPA Delhi to understand the growth pattern of development. The data may not reflect exact on-ground estimates since detailed survey was not possible in the limited time frame.

4.2.1.24 Demography and Settlement Pattern

As per the 2011 Indian census, Bharatpur district had a population of 2,548,462 with 1,355,726 males and 1,192,736 females. Bharatpur has an average literacy rate of 82.13%, higher than the national average of 74.04%; with male literacy of 90.41% and female literacy of 72.80%[71].

71 Census 2001, 2011

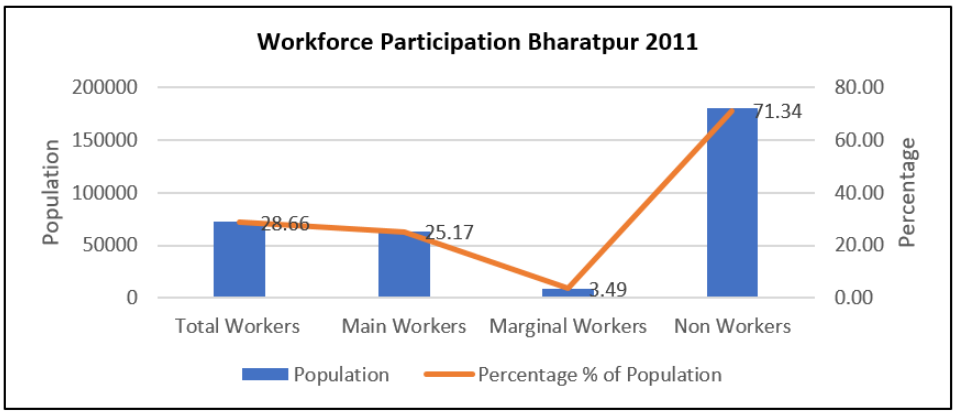
Figure 4.62 Population Projections



Source: Census 2001, 2011 and Projections

The total working population is only 28.66% of total population, out of which 25.17% are main workers and 3.49% are marginal workers. About 71.34% are non-working population.

Figure 4.63 Workforce Participation in Bharatpur



Source: Census of India 2011

The walled city and the immediate core area of the city are dense, unorganized and exhibit organic residential and mixed use development.

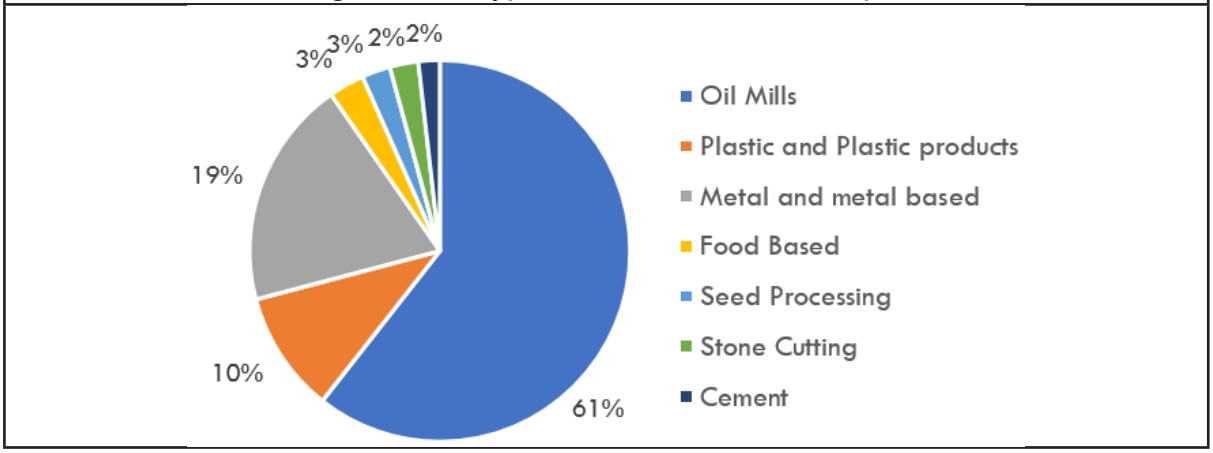
4.2.1.25 Economic Opportunities

A. Dominant Agriculture and Oil Mills

The main economy generator in Bharatpur is agriculture. Wheat, mustard, cotton, red-chilies and potatoes are widely grown in this region. There are more than 100 mustard oil mills which constitute of 61% of the industries in Bharatpur. These mills may contribute to the pollution in the region if not using processes conforming to the TTZ mandates. But as per Department of Horticulture and Food Processing, Bharatpur, all industries are compiled with environmental pollution norms. Stone and stone cutting industries are widespread in the city and may contribute to air pollution from particulate matter and dust. Plastic and metal works industries are other prominent industries in

Bharatpur Closure of prominent industrial units due to the TTZ ban on non-conforming industries has led to the fall in the number of secondary sector workforce.

Figure 4.64 Type of Industries in Bharatpur



Source: District Industrial Centre 2013, Bharatpur

According to the categorization given by the pollution control board, many of the industries active in Bharatpur come under the red category, thus, raising environmental concerns[72].

Table 4.25 Occupational Structure of Bharatpur

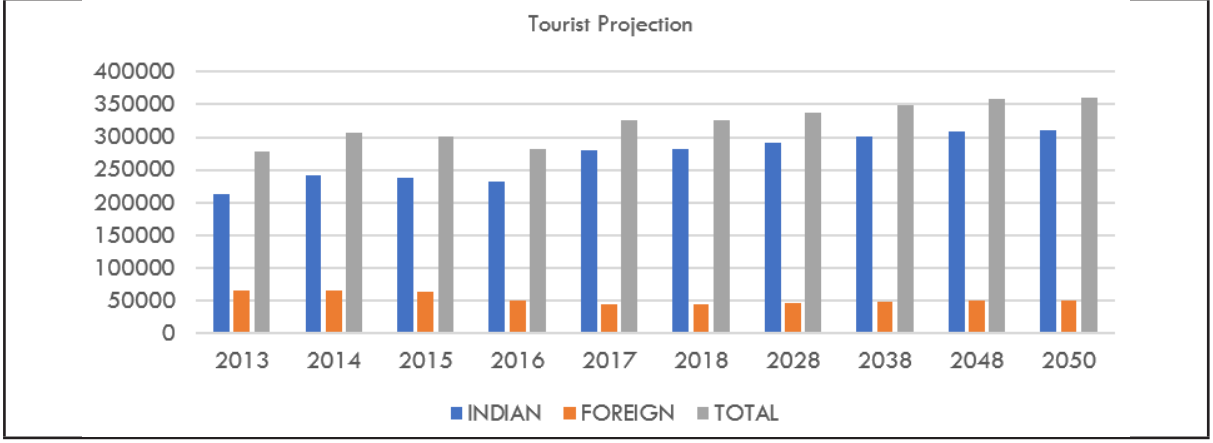
Occupational Structure	1971 (in %)	2001 (in %)	2011 (in %)
Primary	11	4.75	5.5
Secondary	28.08	30.5	27
Tertiary	61	64.75	67.5

Source: Bharatpur Master Plan 2023, Census 2011, District Industrial Centre 2013, Bharatpur

B. Strong Tourism Potential

Bharatpur has a potential to be developed as a prime tourist destination, but the existing infrastructure particularly the number of existing accommodation facilities are inadequate to meet the needs of the tourist inflow.

Figure 4.65 Tourist Projections for Bharatpur



Source: Secondary Data and Tourism Projections 2018

72 Primary and Secondary Surveys, 2018

Keoladeo Ghana Bird Sanctuary which is a UNESCO World Heritage Site needs maintenance and protection. Also, Bharatpur Fort is an attractive tourist site in the city. The current status of accommodation suggests that the number of available beds are 2,301. As per the projections, the requirement is of around 1,980 beds. This suggests that the infrastructure and services need to be upgraded to meet higher projected tourist footfall.

Table 4.26 Type of accomodation facilties

Type Of Accommodation	No. Of Rooms	No. Of Beds
Hotels	84	2206
PGHs	9	95
Total	93	2301

Table 4.27 Projected accommodation facilities

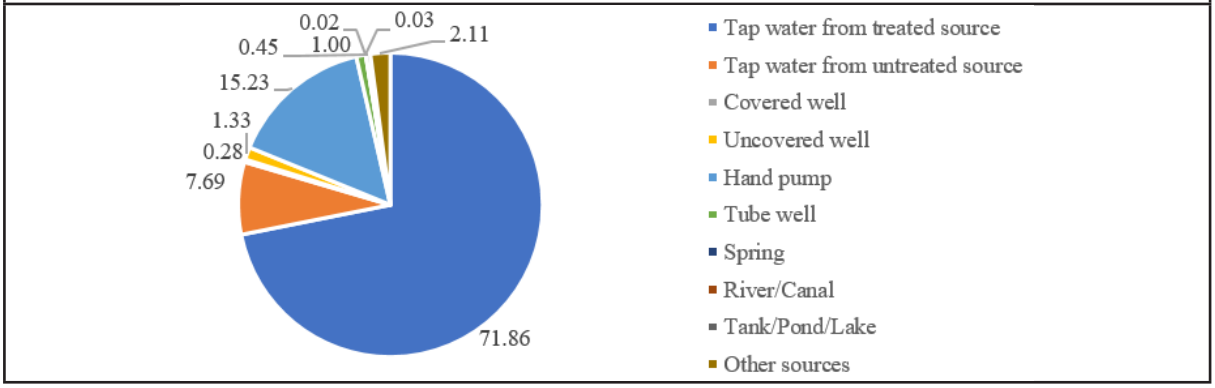
Projected Tourist Inflow 2038	Tourist Per Day	No. Of beds required at a time (Avg Stay = 2 Days)
360901	989	1978

4.2.1.26 Urban Services and Infrastructure

A. Insufficient Water Supply System

The current water supply coverage is insufficient to fulfil the existing demand of the residing population. The on ground water supply system mainly comprises of asbestos cement pipes. The government of Rajasthan has planned to supply water to the water deficit parts of Bharatpur district through Chambal River Project. This project had been proposed for supplying drinking water to urban and rural areas of Alwar district but now the Rajasthan government plans to include Dholpur and Bharatpur districts in the proposed network[73]. As shown in figure 48 tap water from treated source is the main source (about 72%) of water supply in the city. The other prominent sources are “hand pump” and “tap water from untreated source”[74].

Figure 4.66 Sources of drinking water



Source: Institute of Social Science, 2011

73 http://www.pdcor.com/watersupply.htm

74 Primary and Secondary Survey 2018

As per projections for the year 2050, 59 MLD water treatment plant is required considering 135 lpcd. Land requirement for the same is 1 Ha.

Table 4.28 Projectetd drinking water requirements

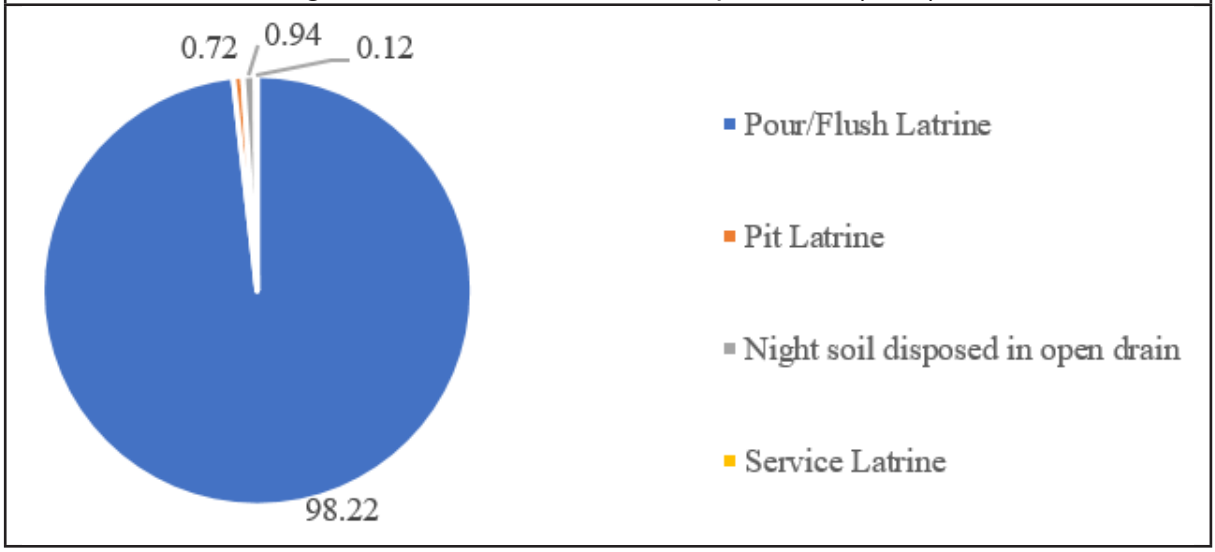
Year	1981	1991	2001	2011	2018	2028	2038	2048	2050
Capacity	14.2	21.2	27.6	34.1	38.6	45.0	51.5	57.9	59.2

Source: URDPFI Guidelines Vol I-2014 and projections 2018

B. Inadequate Sewerage and Drainage System

The existing sewerage network covers only 18% of the residing population. As per Census 2011, 78% households are equipped with latrine facilities within the premises while 22% households are dependent upon public latrines and open defecation. The sewerage system majorly constitutes of septic tanks.

Figure 4.67 Latrines within the premises (in %)



Source: Institute of Social Science, 2011

The city lacks planned sewerage and drainage network for sewage disposal and depends widely on open drains that tend to overflow during rainy seasons due to inadequate carrying capacity. The overflowing water floods the roads and causes inconvenience to the transportation system The overflown sewage mixes with garbage dumped in the open causing odious unhygienic conditions[75]. Under the AMRUT scheme by the Govt. of India, a sewerage line of 116.33 km and one STP of capacity 5 MLD is under construction near Ikran village adjacent to existing STP which can serve a total of 16,185 property connections.

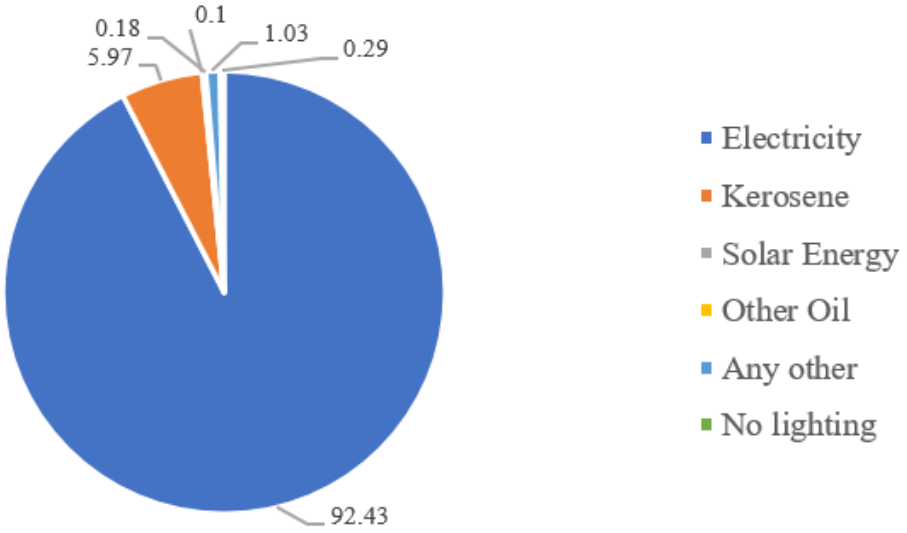
C. Irregular Power Supply System

The City of Bharatpur receives its power supply from Vidyut Vitaran Nigam Limited". Although the connections are sufficient in number, electricity supply is irregular due to power cuts and power failures. There is a need to harness the potential of renewable

75 Primary and Secondary Survey 2018

energy sources like solar energy as an alternative option.

Figure 4.68 Power Supply (in %)



D. Inefficient Solid Waste Management System

There is no planned solid waste management system in place. Garbage segregation is not practiced and garbage collection is not done on a daily basis. Waste is dumped on the roadside or on abandoned vacant land leading to unhygienic filthy conditions. Absence of landfill sites, insufficient capacity of the dumping ground is a major challenge for solid waste management.

E. Lack of Open and Recreational areas

The built to open ratio is less than the recommended UDPFI guidelines for a City of Bharatpur's size. Land allocated for open and recreational use is encroached by other non-conforming uses and activities. Currently, works for development and beautification of parks and open spaces is being carried on under the AMRUT scheme[76].

Tundla

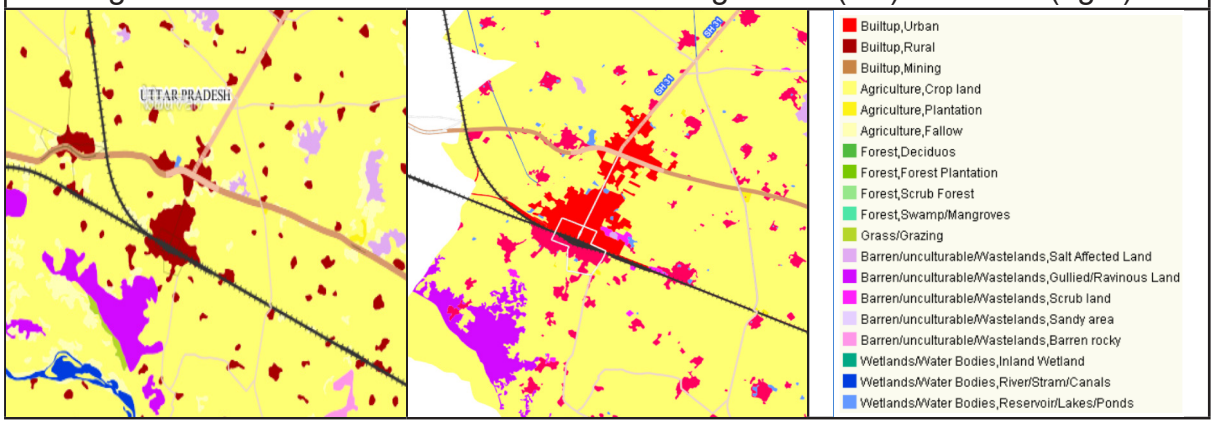
Tundla is a British Heritage City and a municipal board in Firozabad District in Uttar Pradesh. It is located 24 km away from Agra city. It is a major railway junction in the eastern railways system of India. This city is projected to grow in the coming years because of its locational value. It is a link between Firozabad on eastern side (17 kms) and Agra on the western side.

Tundla is a reminiscent of 19th Century British Colonial Era. High walled English architecture, stately barracks, 19th Century Catholic Church, Old Jain Temple, British Kothis (Bungalows) surrounded by sprawling lawns are remnants of a Tundla which was once a prominent center of British administration. The colonial era buildings have

76 AMRUT Report, 2018

been converted into railway quarters.

Figure 4.69 Land Use and Land Cover Change 2005 (left) and 2011 (right)



Source: Bhuvan Portal - Land cover of year 2005, 2011

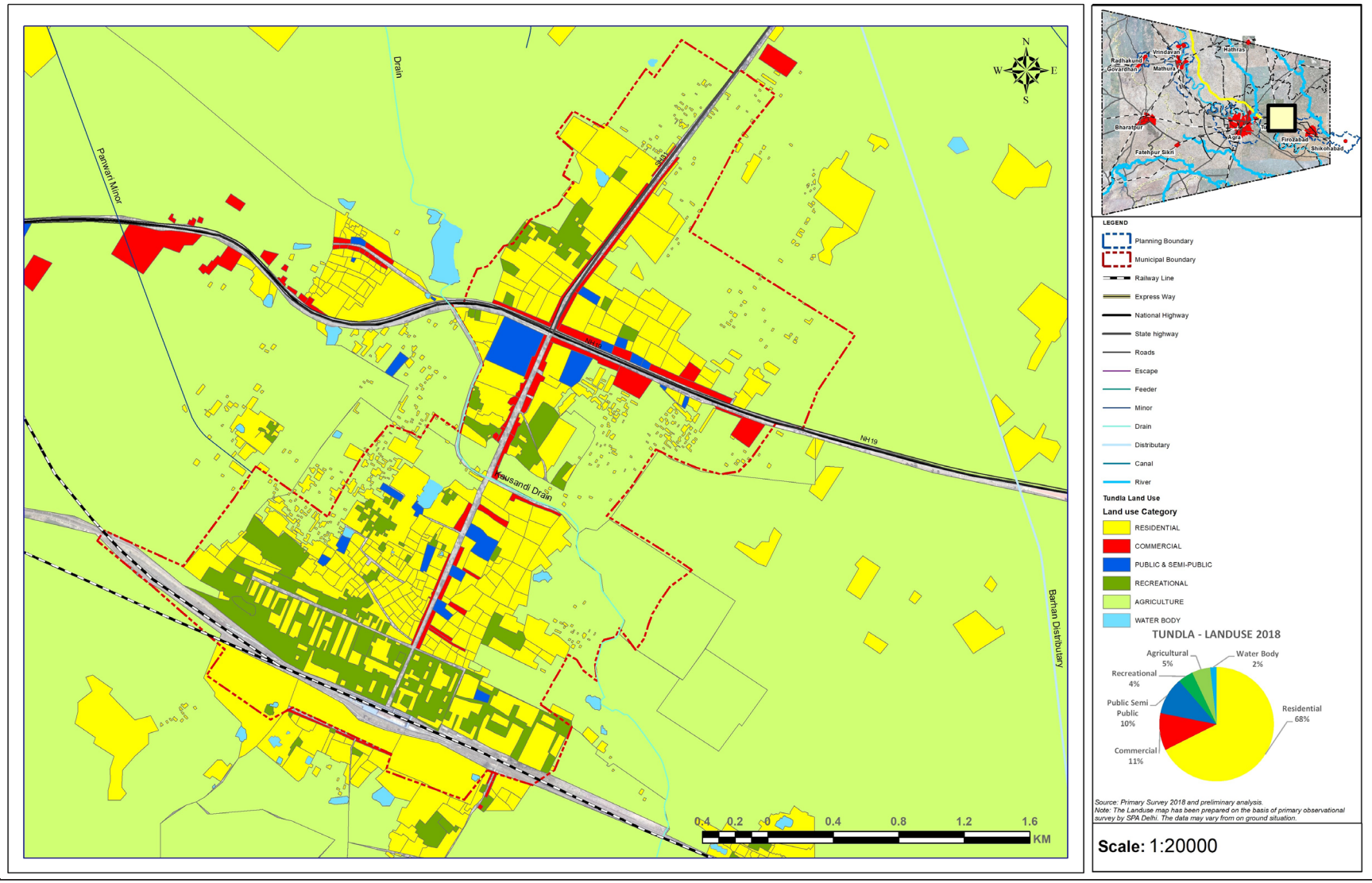
The maps above indicate that the city is growing in all directions, except the southern part along the Railway line and the junction. Within a five-year period between 2005 and 2011, after Tundla became a Nagar Panchayat, the city experienced rapid growth. The growth has been attributed to a new Mandi that came up within the city and a new expressway to the north which strengthened Tundla's the connectivity with other parts of the country. Currently, the growth pattern is most evident along the expressway[77]. Unplanned new development and growth can be seen in and around the city. Inadequate physical infrastructure and management can be well observed within the city.

4.2.1.27 Urban Development & Land Use

Despite being a renowned railway junction, growth in Tundla is unplanned and unregulated (Refer to Table No.24 and Figure No.29 in this Volume and Map No.3.3T1 in Volume III). At present, the city does not have a Master Plan. The land-use analysis of 2018 shows that the city is driven by the residential sector and the demand for more housing facilities is consuming the open spaces, agricultural land and the water bodies of the city thus indicating lack of regulated development[78].

77 Tundla Nagar Panchayat and Primary Surveys 2018
78 Land Use Survey 2018 and URDPFI Guidelines Vol I-2014

Map 4.34 Land Use Distrtibution of Tundla



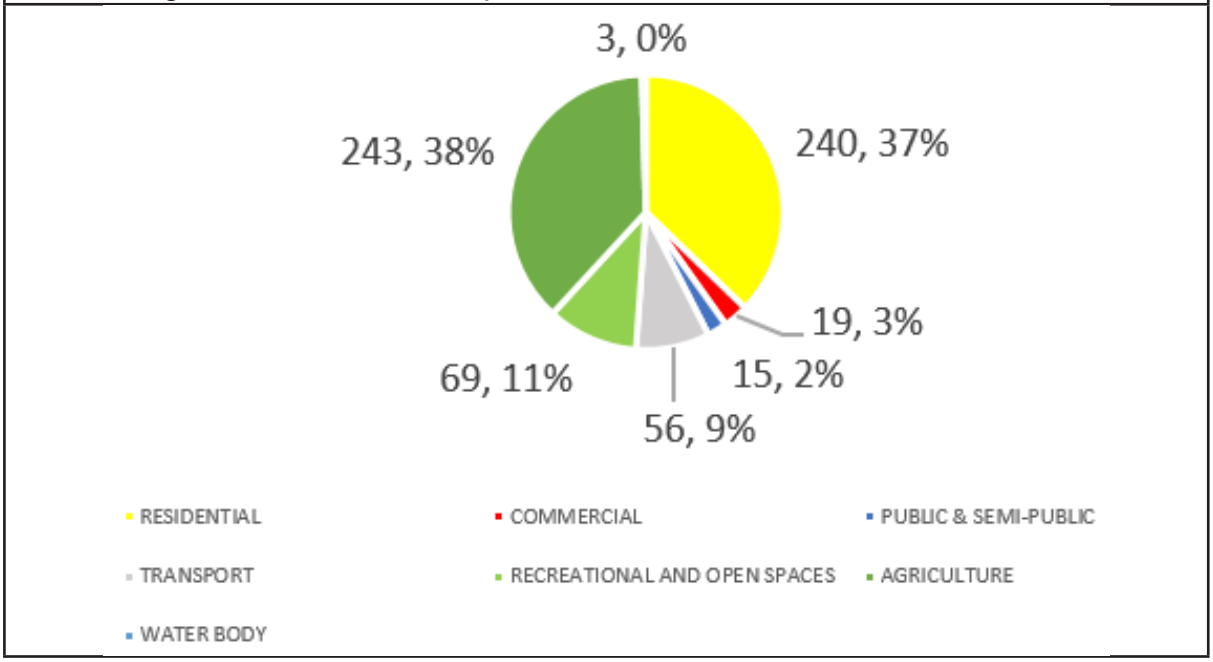
Source: Primary Survey, 2018

Table 4.29 Land Use DIstribution of Tundla Municipal Area

Land Use 2018	Area HA	% of land use	As Per URDPFI Guidelines (%)
Residential	240	37	45-50
Commercial	19	3	2-3
Industrial	NIL	NIL	
Public & Semi-Public	15	2.3	6-8
Transport	56	9	
Recreational And Open Spaces	69	11	12-14
Agriculture	243	38	Balance
Water Body	3	0.4	Balance
Total Area	644.32	100.00	

Source: Primary Survey and preliminary Analysis by SPA Delhi 2018. Note: The land use map has been prepared by SPA Delhi to understand the growth pattern of development. The data may not reflect exact on-ground estimates since detailed survey was not possible in the limited time frame.

Figure 4.70 Landuse map & Land Use Distribution of Tundla, 2018



Source: Land Use Survey 2018 and URDPFI Guidelines Vol I-2014

4.2.1.28 Demography and Settlement Pattern

Tundla is a Nagar Palika Parishad (NPP) in District Firozabad. The total population of Tundla Urban Agglomeration is 64,906 as per Census 2011 which includes Tundla Nagar Palika Parishad, Tundla Railway Colony and Tundla Kham area with populations 50,423, 7,404 and 7,079 respectively. The literacy rate of Tundla is 86.4%, as per the Census 2011 which is higher compared to 71.9% of Firozabad district literacy rate[79].

79 Census 2001, 2011

Figure 4.71 Population Projections

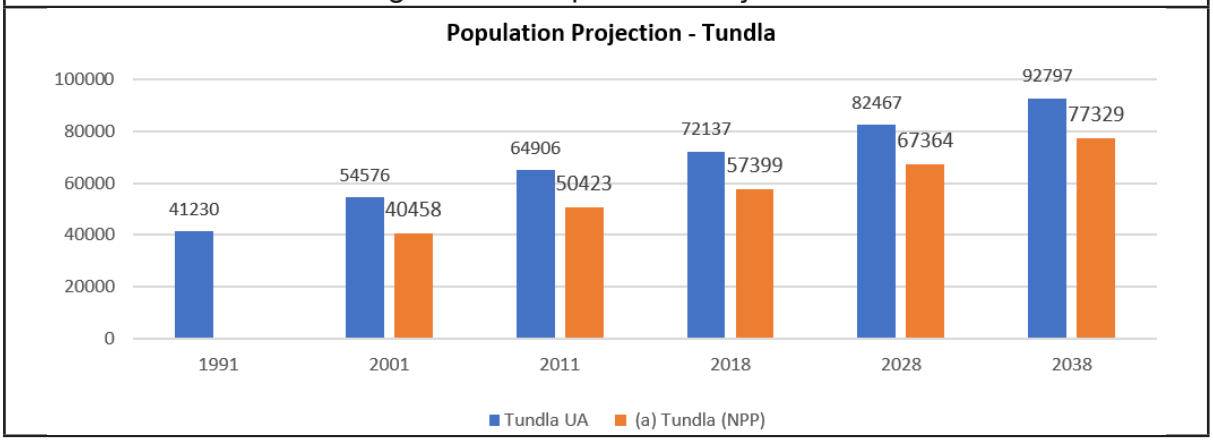
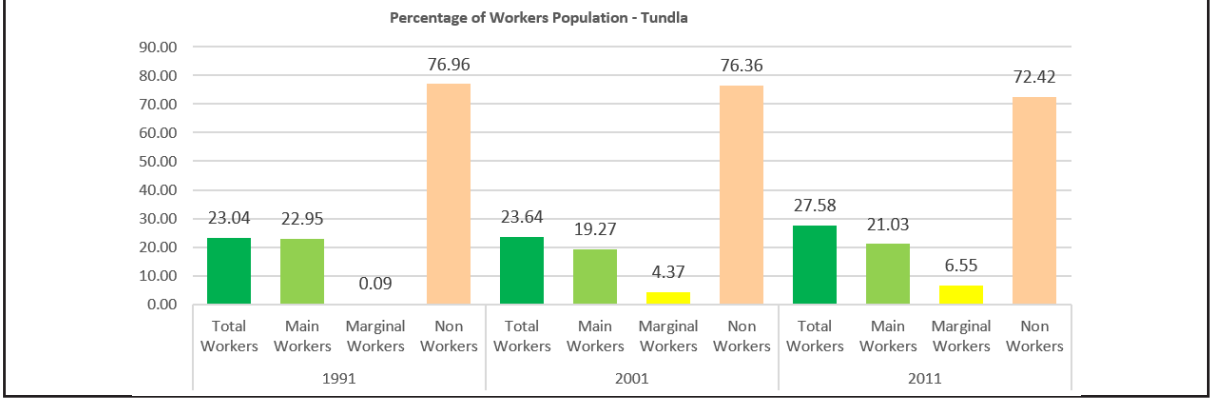


Figure 4.72 Working Population in Tundla



Source Fig 15 and Fig 16: Census 2001, 2011 and Population Projections

The total working population of Tundla NPP is 13,719 which accounts for 27.21% of the total Population as per Census 2011. Main Workers are 20.58% and Marginal Workers are 6.63 % of the Total Working Population. Main workers include Cultivators, Agriculture Laborer, Household Industries and Others. The remaining 72.79% of population is Non-Working Population[80]. Tundla is divided into 25 wards excluding Tundla Railway Colony (CT) and Tundla Kham (CT). Ward Number 10, 14 & 15 are the most densely populated wards with a Population density of > 400 pph along the Railway Station Road. Tundla is situated on Agra-Firozabad Highway which has potential for commercial activities like hotels and restaurants. Tundla has three heritage significant sites which do not generate tourism revenue[81].

4.2.1.29 Economic Opportunities

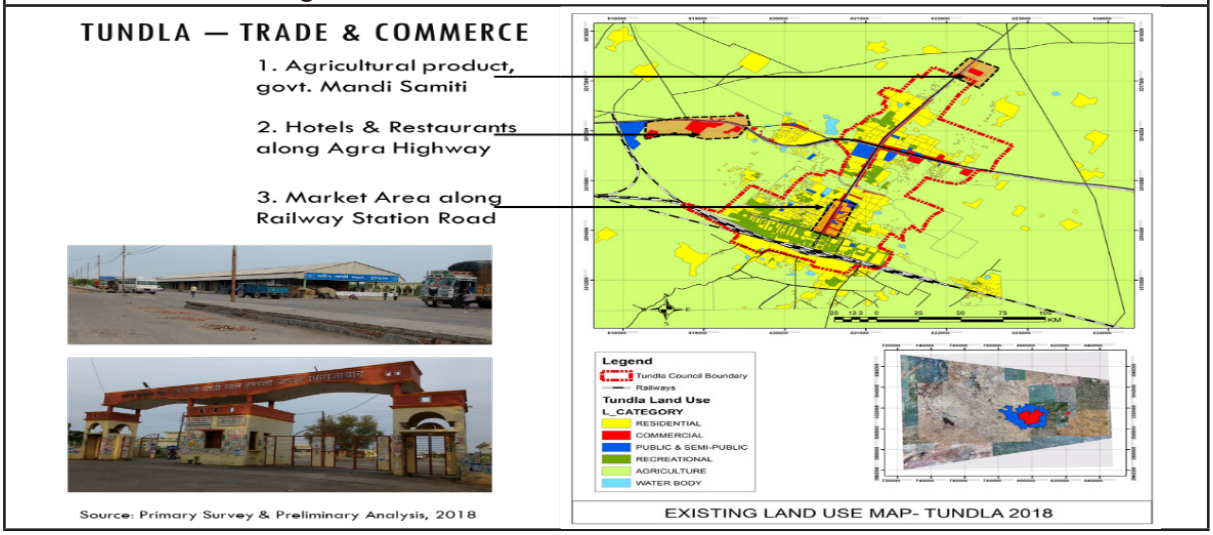
Railways is the main revenue generating and employment generating service sector in Tundla. Besides, railways, Tundla has a potential to develop a hotel industry along the expressway due to its proximity to Agra. Tundla's colonial architecture may be explored for tourism prospects.

80 Census 2001 and 2011
81 Primary Survey analysis.

A. Trade and Commerce

About 2.265 sq.km of commercial area in Tundla NPP is in sync with URDPFI Guideline 2014. However, the new government agriculture based Mandi Samiti developed along Tundla Awagarh road is inaccessible[82]. Commercial development particularly development of Hotels and Restaurants are rapidly growing along the Agra Highway. This growth needs to be regulated and monitored to prevent unorganized growth in future. Commercial market in front of the Railway Station has planning and developmental issues leading to congestion[83].

Figure 4.73 Tundla trade and commerce issues



B. Tourism Prospects

Company Bagh and Railway Colony Bungalows are unprotected heritage sites in Tundla. Tundla Church is State protected monument with no monitoring plans. As per primary survey, the tourist inflow is negligible[84].

Table 4.30 List of Heritage structures in Tundla as follows

Site	Tangible/ Intangible	Protection status	Typology of tangible asset	Sub Typology 1	Historical (period)	Ownership
Tundla Church	Tangible	State Protected	Religious	Church	19th C	Public
Company Bagh	Tangible	Unprotected	Social Infrastructure	Garden	19th C	Public
Residences in Railway Colony	Tangible	Unprotected	Residential	Residence	19th C	Private

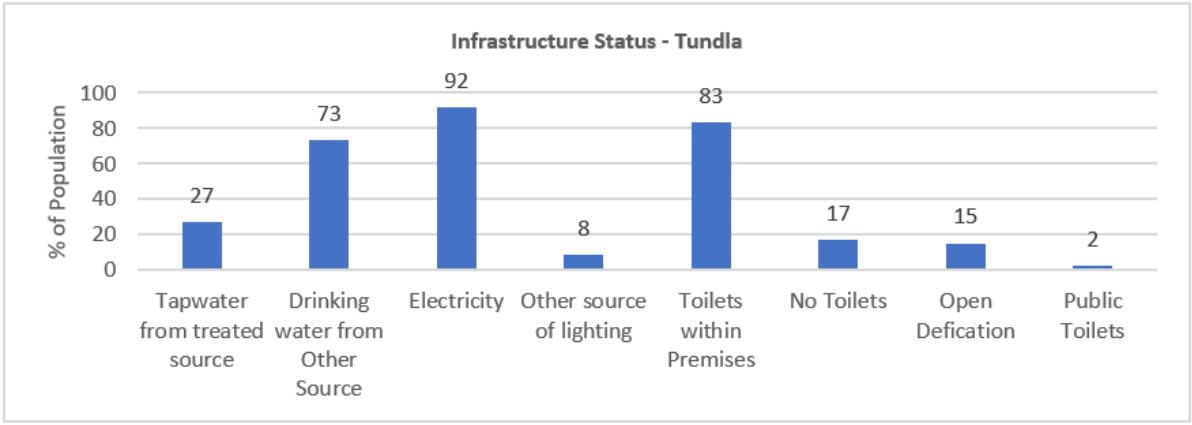
Source: Primary and Secondary Surveys 2018

82 Primary Survey 2018 and URDPFI Guidelines 2014
83 Primary and Secondary Surveys 2018
84 Primary Land Use Survey 2018 and Secondary Survey 2018

4.2.1.30 Urban Services and Infrastructure:

Tundla has inadequate infrastructure facilities. There is deficit of basic water supply facilities, toilet facilities, street light facilities and sewage and drainage facilities. Open defecation is still practiced in the city and heaps garbage dumps are seen all across the city.

Figure 4.74 Showing Status of Infrastructure in Tundla

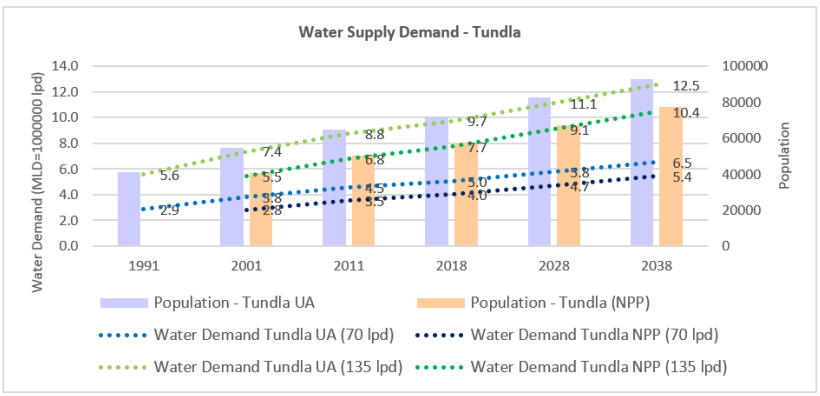


Source: Indian Institute of Social Studies 2017

A. Insufficient Water Supply

As per census 2011, only 27% of Households have drinking water supply from Nagar Palika Parishad. 73% of Households use other sources of drinking water such as well, hand-pump, tube-well, Borehole, spring, River, Canal, Tank, Pond, and Lake etc[85]. As per URDPFI Guidelines 2014, cities provided with piped water supply with existing/ contemplated sewerage system require maximum 135 lpcd water supply. Based on above guidelines, the required water supply for present and projected population is given below. As per the estimated calculation for 2018, 10 MLD WTP is required if 135 lpcd water supply is provided in Tundla. The land required for installing 10 MLD Water Treatment Plant is 0.19 hectares, as per the guidelines.

Figure 4.75 Water Supply Demand for Tundla



Source: URDPFI Guidelines 2014 and projection calculations 2018

85 Census 2011

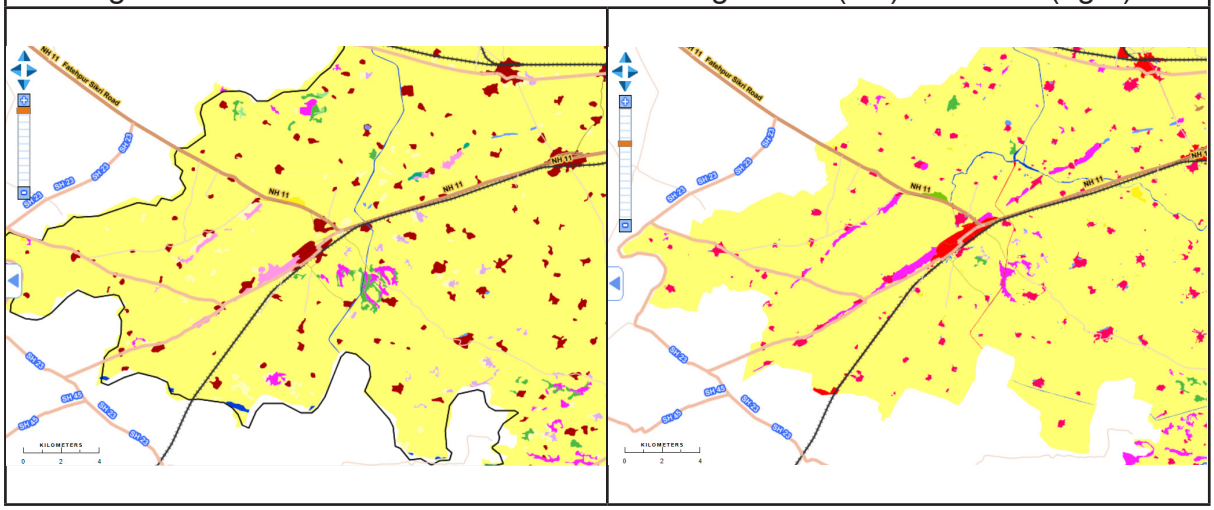
B. Irregular Power Supply

As per Census 2011, around 92 % of total population has electricity supply connections but it is irregular and infrequent. Therefore, majority of the population depends on pollution causing sources like diesel generators, coal etc. 8% of population depends upon other sources like Kerosene, Solar energy, oil, etc.

Fatehpur Sikri

The medieval city of Fatehpur Sikri houses the Fathepur Sikri Palace City which is a UNESCO designated world heritage site widely visited by domestic and international tourists. Located about 120 miles south of New Delhi, the capital of India, Fatehpur Sikri is a city frozen in time: a place where Mughal architecture can be seen intact, as in the sixteenth century. The city's imperial complex serves as its focal point. Urban tourism is a vital revenue generating sector in Fatehpur Sikri and its significance is likely to increase in the near future. However, the area surrounding the palace city complex, lacks adequate infrastructure facilities, greenery, and recreational areas.

Figure 4.76 Land Use and Land Cover Change 2005 (left) and 2011 (right)



Source: Bhuvan Portal - Land cover of year 2005, 2011

The maps above indicate that the city's growth is directed towards the south western part along the expressway. Fatehpur Sikri received the status of an urban center in the period between 2005-2011. Tourist footfall in the City is massive and continually increasing due to its close proximity to Agra. However, there is a dearth in the number of hotels and accommodation facilities in the city. The walled city has no planned development with new mixed use developments mushrooming rapidly. Small-scale carpet making industries are concentrated all around the city. Absence of adequate physical infrastructure, dependency on ground water and polluting industries are the

main issues of the city[86].

4.2.1.31 Unregulated Urban Development & Land Use

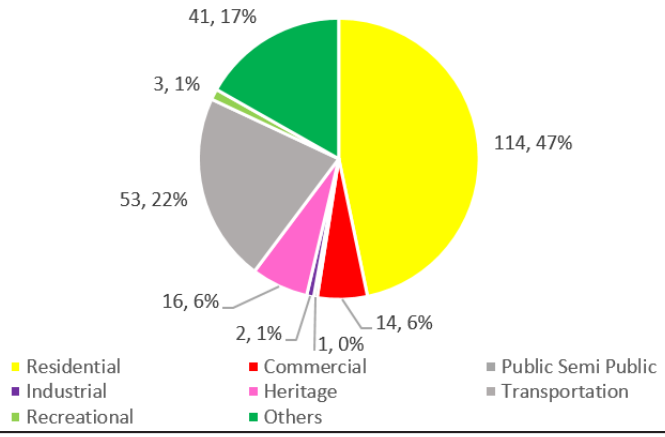
The 2018 land use analysis shows that it is predominantly a protected heritage site with unregulated and unplanned development emerging around the site[87]. (Refer to Table No.26 and Figure No.54 in this Volume and Map No. 3.3.FS1 in Volume III)

Table 4.31 Land Use Analysis 2018

Land Use	Area (Ha)	%	Land use for small cities as Per URDPFI Guidelines
Residential	114	47	45-50
Commercial	14	6	2-3
Public Semi Public	1	0	6-8
Industrial	2	1	8-10
Heritage	16	7	Balance
Transportation	53	22	10-12
Recreational	3	1	12-14
Others	41	17	
Total Area (Ha)	244	100	100

Source: Primary Survey and preliminary Analysis by SPA Delhi 2018. Note: The land use map has been prepared by SPA Delhi to understand the growth pattern of development. The data may not reflect exact on-ground estimates since detailed survey was not possible in the limited time frame.

Figure 4.77 Existing Landuse Distribution of Fatehpur Sikri

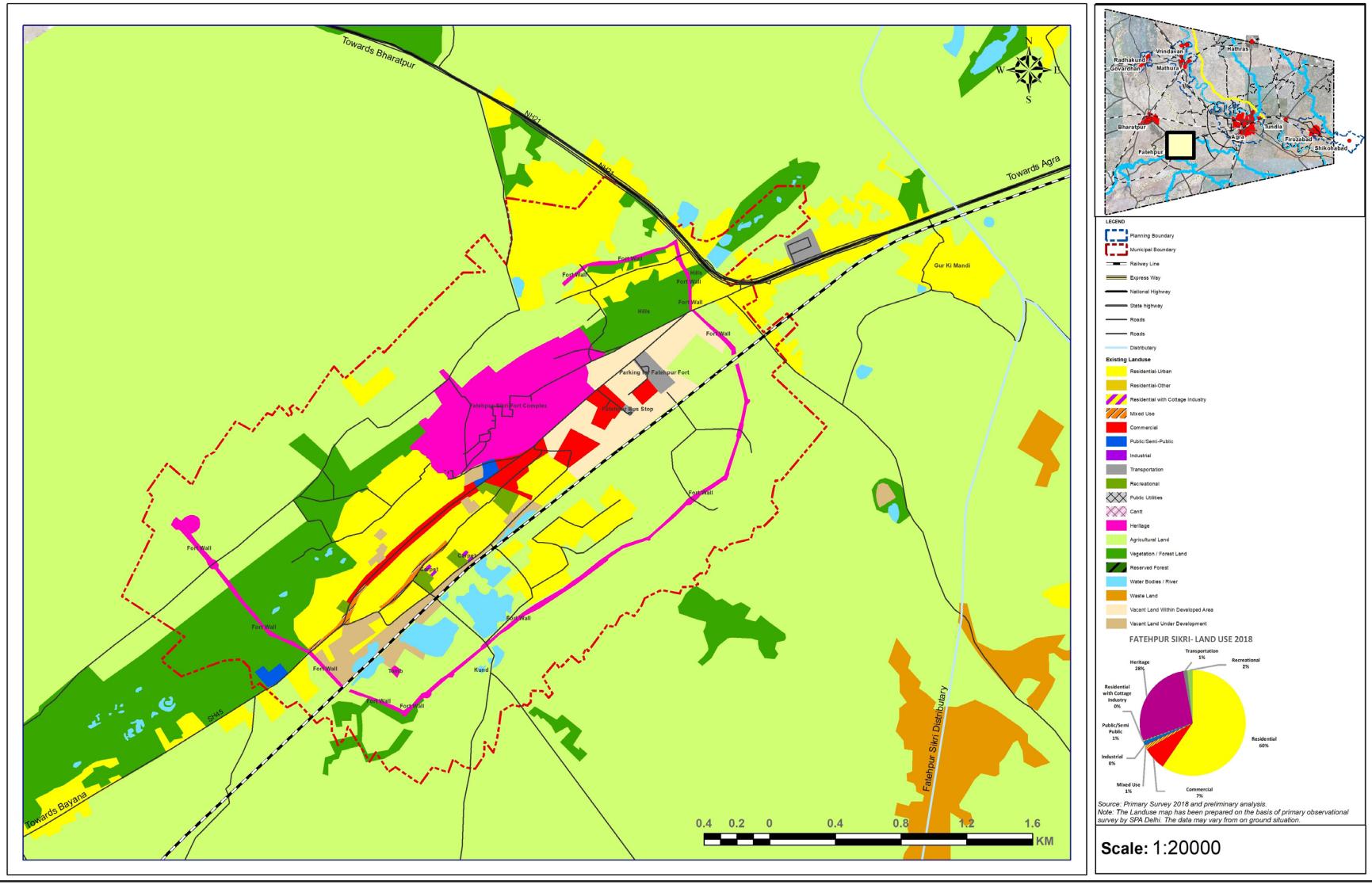


Source: Primary Survey 2018

86 Primary Surveys 2018

87 URDPFI Guidelines 2014 and Primary Survey 2018

Map 4.35 Land Use Map of Fatehpur Sikri



Source: Primary Survey, 2018

Figure 4.78 Development around Heritage Monuments without buffer zone damaging the heritage sites.



Figure 4.79 Weaving Household Industries



Figure 4.80 Waste water from leather Industry and Dye Industry

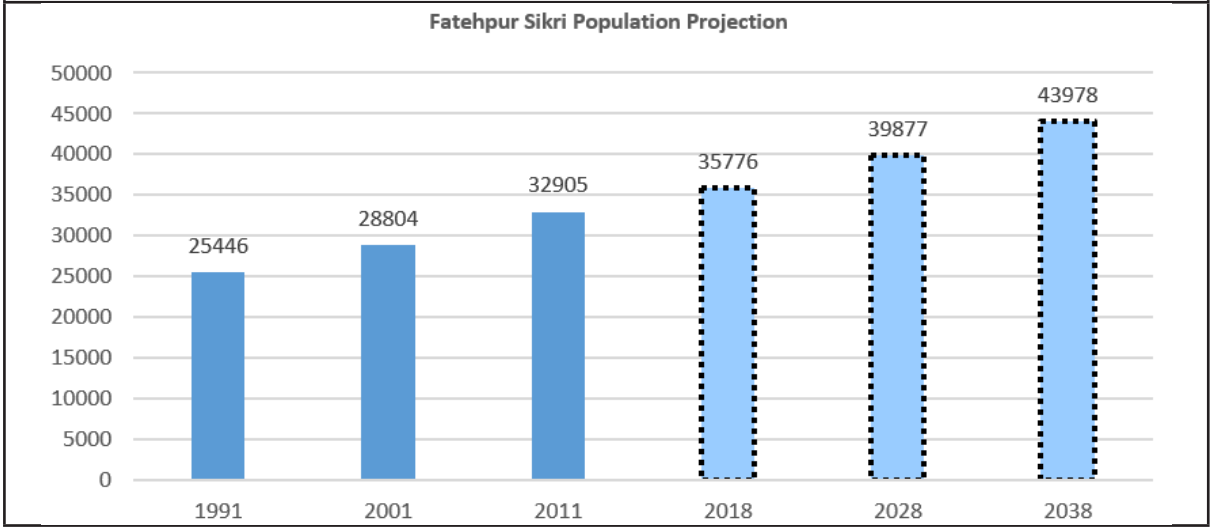


Source: Primary Surveys 2018

4.2.1.32 Demography and Settlement Pattern

Fatehpur Sikri is a Nagar Palika Parishad (NPP) in Agra district with a total population of 32,905 as per Census 2011. It is the ancient fortified walled city situated 40km west from Agra founded by the Emperor Akbar in 1571 as Capital of the Mughal Empire. There are around 57 heritage sites in the city which includes monuments, gateways, pilgrim destinations, gardens, and markets. Fatehpur Sikri has a huge potential to be developed as a Heritage City. The projected population for 2018 is 35,776 lakhs. The literacy rate of the city is 62.1%, as per the Census 2011 which is lower than the 71.6% literacy rate of Agra. Sex ratio of Fatehpur Sikri is 892 as per Census 2011 which is lower than the national average sex ratio[88].

Figure 4.81 Population Projections



Source: Census 2001, 2011 and Population Projections

The total working population of this city is 13,719 which is 30.64 % of total the Population as per Census 2011. Main Workers constitute 22.15 % and Marginal Workers constitute 8.49 % of the total Workers Population. Main workers include Cultivators, Agriculture Laborers, Household Industries like carpet weaving and Other Workers. Remaining 69.36 % of the population is non-working.

Fatehpur Sikri is divided into 25 wards. Ward numbers 1, 3, 8, 16, 18 have high population density as per Census 2011.

4.2.1.33 Economic Opportunities

A. Dominant Carpet Weaving Industry

The Household industries of Carpet weaving of export quality are widespread in the city. These industries have potential to contribute in to the economic growth of the city and generate considerable employment opportunities in the region. The carpet

88 Census 2001 and 2011

weaving industry is an intangible cultural heritage in itself, because this craft has been passed on through generations since the Mughal period. Unfortunately, there is no skill building opportunities or promotional facilities that are being offered to this ancient handicraft industry and there are chances of losing it to globalization and technological advancement in carpet weaving. The carpet industry is surviving weaving in unmaintained, unhygienic working condition without adequate waste disposal system in place[89]. The industrial waste is directly disposed into the open drains without treatment.

B. Trade and Commerce

The unprotected craft bazaar of small household products is a part of the living heritage sites but lack recognition, planning and protection.

C. Inadequate Tourism Infrastructure and Connectivity

According to a 2015 research conducted by surveying tourist perspective:

- Around 70% Tourists visit Fatehpur Sikri from Agra
- Tourists recommended stronger connectivity between Fatehpur Sikri and Agra. The public transport system has to increase to connect tourist places.
- Tourists recommended upgraded tourist infrastructure in Fatehpur Sikri[90].
- Around 45% of tourist travel by chartered buses,
- 25% of tourists travel by train and
- 30% of tourists travel by private.
- Around 40% tourists were unsatisfied with the transportation services.
- 40% of tourists indicated that many entrances to the Empirical Complex are not open to public[91].

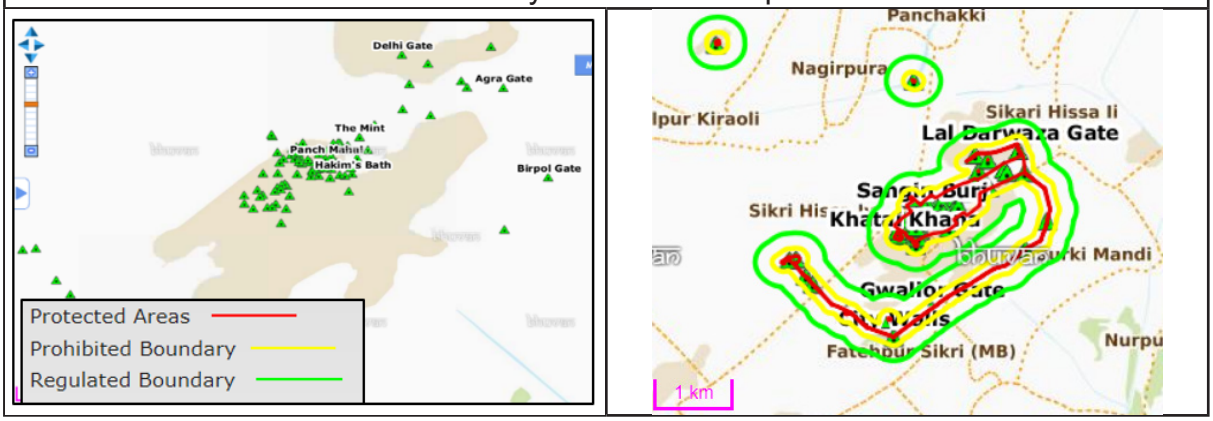
As per the estimated calculation and projections, the tourist inflow rate is gradually decreasing based on trend. The domestic tourist inflow rate is increasing but international tourist inflow rate is decreasing which is a serious concern for this tourism dependent city.

89 Primary and Secondary Surveys 2018

90 Fatehpur Sikri: A Utopian Approach to Urban Planning and Design; Rajinder S. Jutla, Southwest Missouri State University, USA

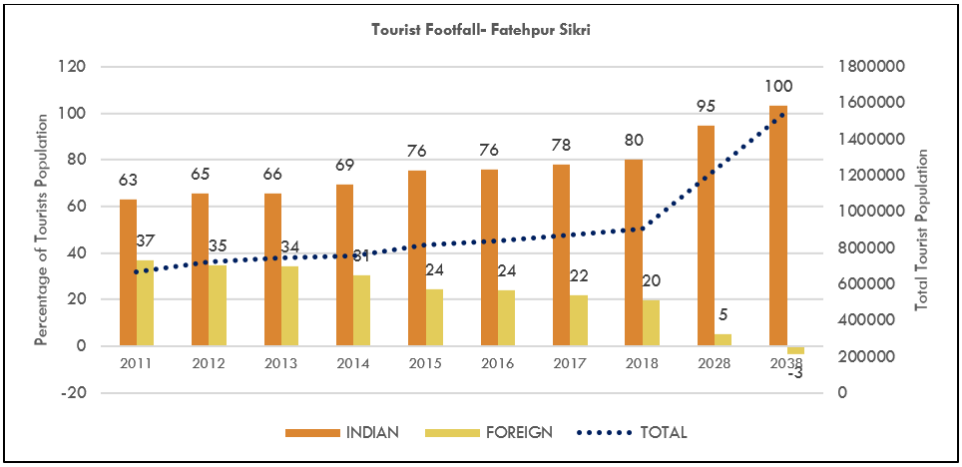
91 Fatehpur Sikri: A Utopian Approach to Urban Planning and Design; Rajinder S. Jutla, Southwest Missouri State University, USA

Map 4.35 Gates and location of heritage sites in Fatehpur Sikri and the internal circuit taken by tourist in Fatehpur Sikri



Source: Bhuvan Website 2018

Figure 4.82 Tourist Footfall in Fatehpur Sikri

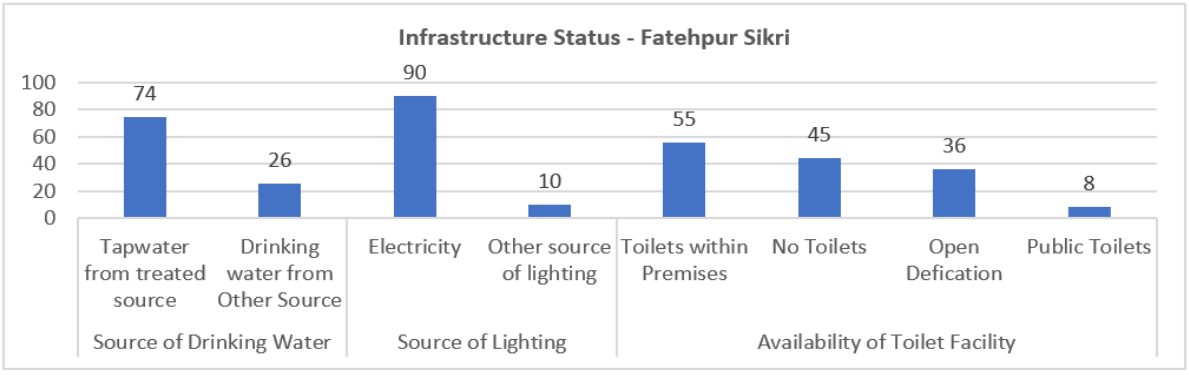


Source: Uttar Pradesh Tourism Department 2018

4.2.1.34 Inadequate Urban Services and Infrastructure

Infrastructure statistics of Fatehpur Sikri shows unavailability of treated drinking water, irregular electricity supply and lack of toilet facilities in the city.

Figure 4.83 Status of Infrastructure in Fatehpur Sikri (in percentage)



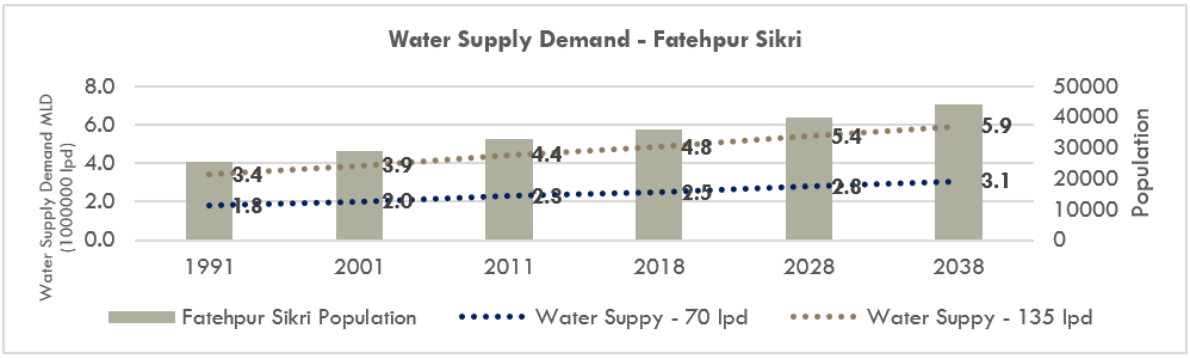
Source: Indian Institute of Social Sciences 2017

A. Dearth of Potable Water Supply

The quality of drinking water is very poor in Fatehpur Sikri therefore, potable water

is collected from “Gurki Mandi” with the help of tankers. As per census 2011, around 74 % of Households have drinking water supply from Nagar Palika Parishad. 26 % of Households use other sources of drinking water such as well, hand-pump, Tube-well, Borehole, spring, River, Canal, Tank, Pond, and Lake etc. As per URDPFI Guidelines 2014, Cities provided with piped water supply with existing/contemplated sewerage system require a maximum of 135 lpcd water supply. Based on above guidelines, the required water supply for present and projected population is given below. As per the estimated calculation for 2018, 135 lpcd water supply is required to be provided. The land required for installing 5 MLD Water Treatment Plant is 0.1 hectares, as per the guidelines.

Figure 4.84 Projected water demand and supply



Source: URDPFI Guidelines and Preliminary analysis.

B. Inefficient Sewerage and Drainage

As per primary survey observation, an open drainage system is present in the city. Development encroaching drainage system create maintenance and blockage issues. In the absence of adequate garbage disposal system, garbage is trashed into open drains which result in clogging and sewage spilling creating unhygienic living conditions. As per 2011 census, 55% of households have toilets within premises. 45% of HH do not have toilets within premises out of which 36 % households defecate on open land and 8 % households use Public Toilets.

Figure 4.85 A major sewage line is passing through walled city along railway station



C. Irregular Power Supply

As per Census 2011, around 90 % of total population have electricity connections but have poor irregular supply thus increasing the dependency on pollution contributing non-renewable fuels like Kerosene and diesel. 10% of the population depends on other sources like Kerosene, diesel, etc.

D. Absence of Solid Waste Management System

Within the city there is complete lack of solid waste management. Waste is dumped all over the place. Lakes are dying due to dumping of solid waste into the water bodies.

Figure 4.86 Lakes turning into dumping ground



Source: Primary Survey 2018

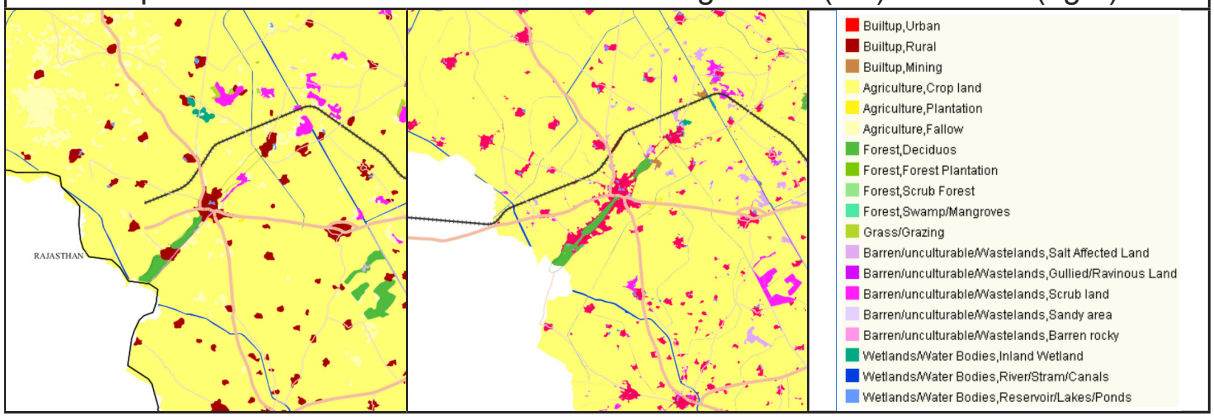
E. Dearth of Open and Recreational Areas

There is a huge gap in the percentage share of recreational activities within the city. Only 0.5 % of land is allocated for recreational purpose which is less than the recommended standard by UPDFI.

Govardhan

Govardhan and Radhakund towns have rich cultural and religious significance in India. Both cities are Nagar Panchayats in Mathura District, Mathura-Vrindavan Part G zone. It is a key pilgrimage center situated 23 Km west of Mathura and 20 KM west of Vrindavan. The focal point of Govardhan city is the Govardhan Hill.

Map 4.36 Land Use and Land Cover Change 2005 (left) and 2011 (right)



Source: Bhuvan Portal - Land cover of year 2005, 2011

The maps above indicate that the city is experiencing growth in the north eastern part and the southern part along the Govardhan hill route (the parikrama pathway). In the period between 2005 and 2011, Govardhan and Radhakund gained the status of urban center and have been growing steadily since. Being a key pilgrimage destination, Govardhan invites steadily increasing tourist footfall all throughout the year. Therefore, private realtors are encroaching the farmland and green open spaces around the Govardhan hill to build luxury condominiums, Dharamshalas and gated residential communities. The existing settlements are expanding into the green cover and the groves are being replaced by agricultural fields or housing leading to unplanned urban growth. Existing, unprotected and unmaintained Kunds (21 in number) and heritage are fast deteriorating due to negligence and waste dumps.

4.2.1.35 Urban Development & Land Use

The Core area of the city is heavily congested, dilapidated and lacking of necessary infrastructure facilities . Lack of open spaces and narrow lanes are making the growing settlements inhabitable. Private realtors are encroaching into green spaces to build Dharamshalas and luxury condominiums and gated residential developments.

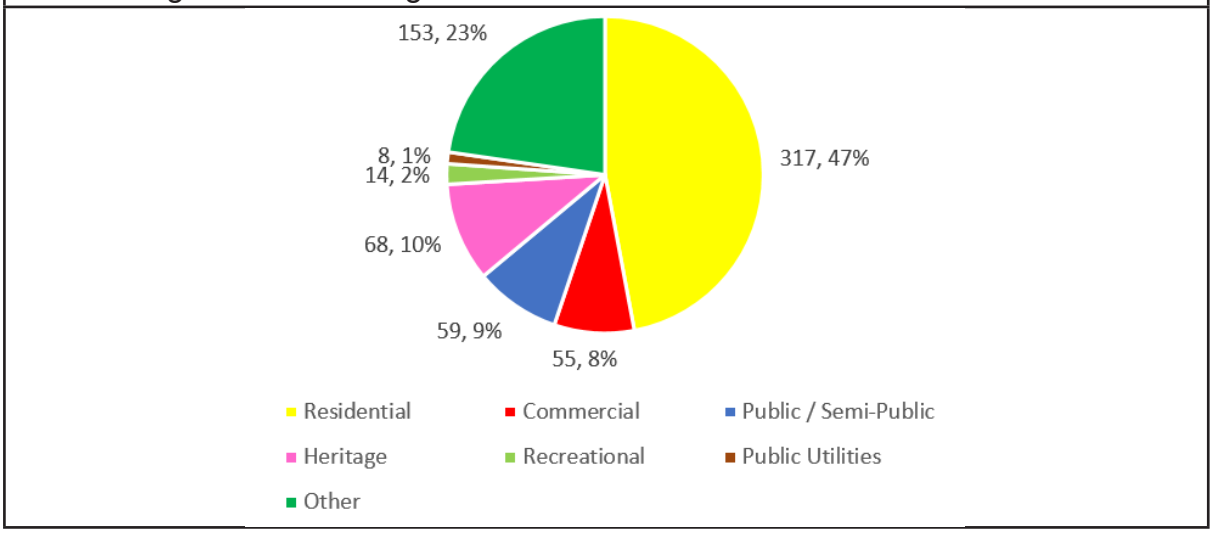
Table 4.32 Landuse of Govardhan and Radhakund, 2018

Land Use 2018	Area in Ha	%
Residential	317	47
Commercial	55	8
Industrial	NIL	NIL
Public / Semi-Public	59	9
Transport	NA	NA
Heritage	68	10
Recreational	14	2

Land Use 2018	Area in Ha	%
Public Utilities	8	1.1
Other	153	23
Total Developed Area	674	100

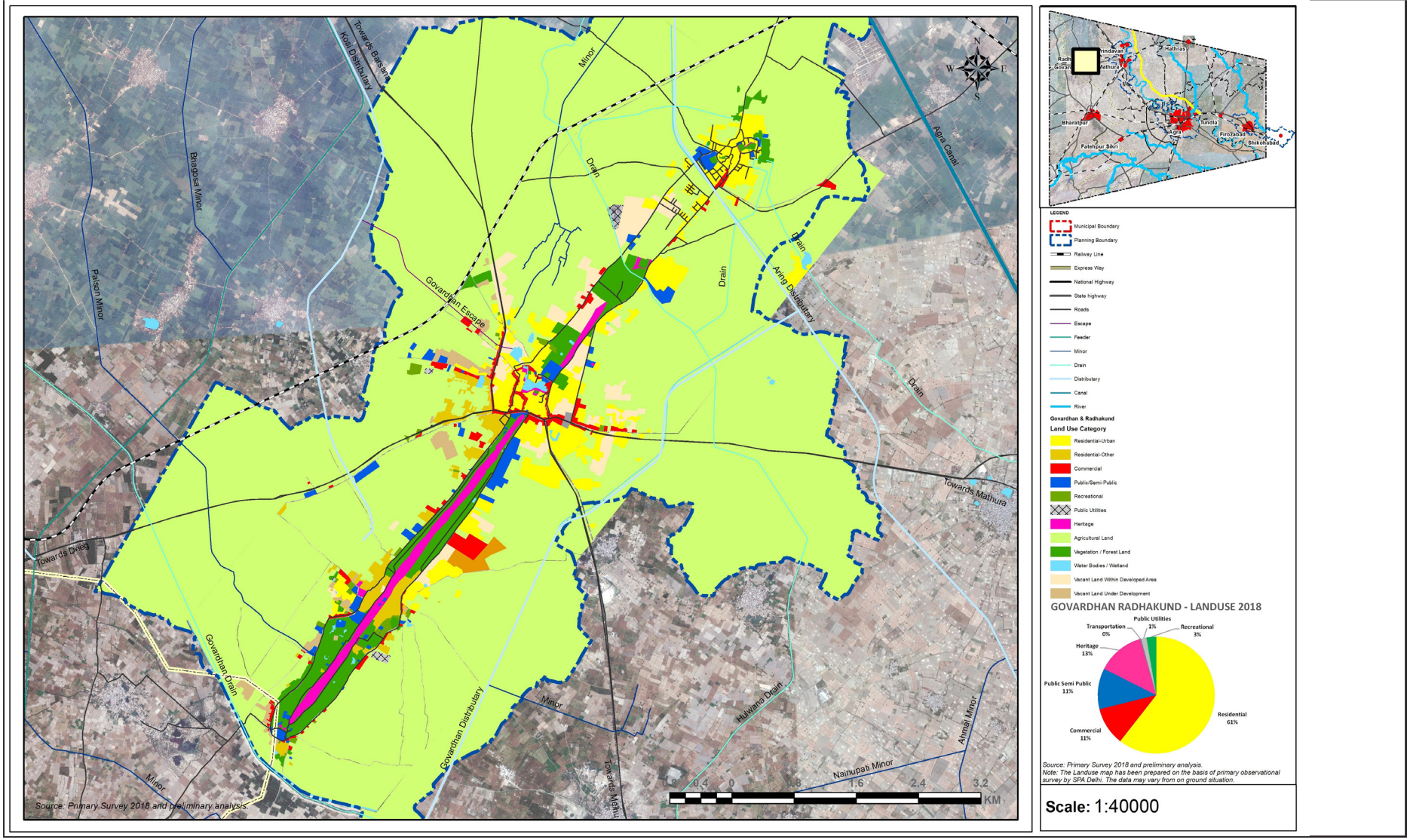
Source: Primary Survey and preliminary Analysis by SPA Delhi 2018. Note: The land use map has been prepared by SPA Delhi to understand the growth pattern of development. The data may not reflect exact on-ground estimates since detailed survey was not possible in the limited time frame.

Figure 4.87 Existing Landuse of Govardhan and Radhakund 2018



Source: Primary Survey 2018

Map 4.37 Land Use Map of Govardhan



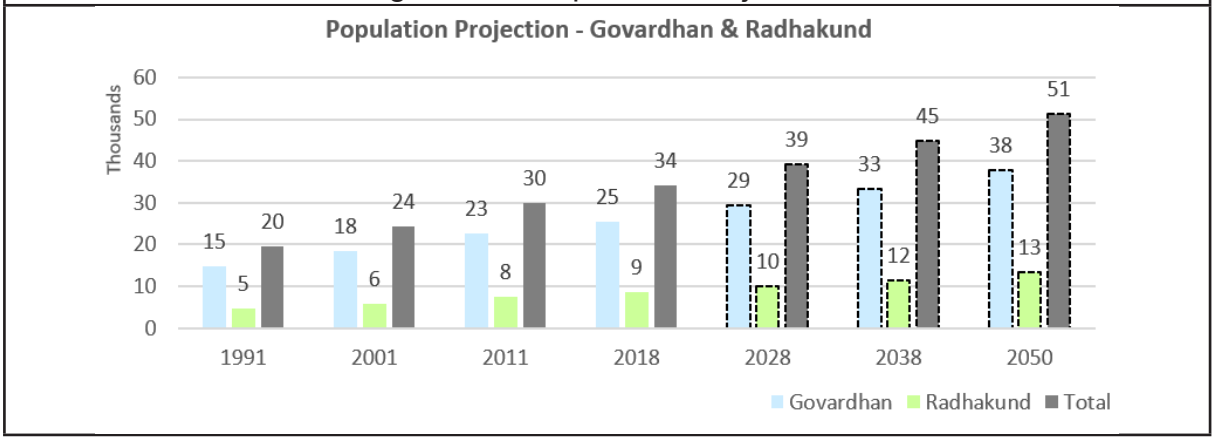
Source: Primary Survey, 2018

The Master Plan of 2021 includes proposals for parks and open spaces in Govardhan. Proposal for parking facility and Camp area for festivals and fair celebrated during festival season have also been included. There are proposals for the development of the Parikrama Marg and the reserved green belt along it. The ground reality reveals non-conformity of uses as per the provisions of the Master Plan[92].

4.2.1.36 Demography and Settlement Pattern

The current population of the twin cities is around 30,087 lakhs as per Census 2011 and projected population for 2018, 2028 and 2038 are 25,433, 29,515 and 33,597 respectively. The literacy rate of Govardhan is 75.2%, which is higher compared to the literacy rate of 70.4% of Mathura. The sex ratio of Govardhan is 864 as per Census 2011.

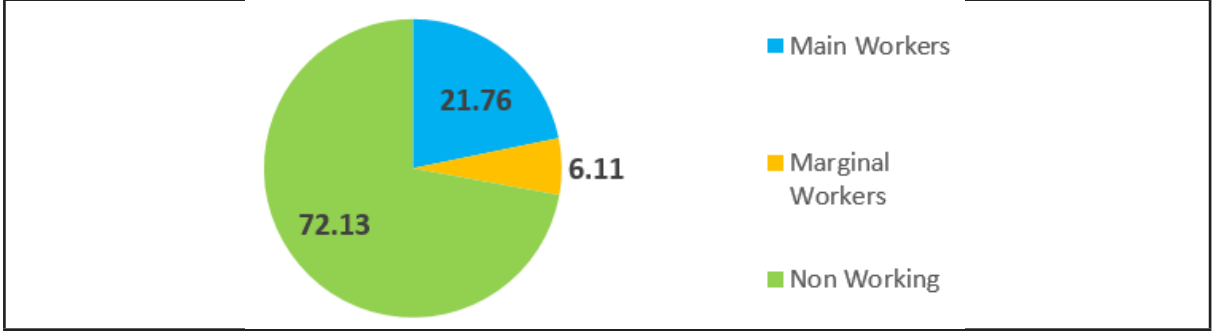
Figure 4.88 Population Projections



Source: Census of India 1991, 2001 & 2011, Preliminary analysis and projection

The total working population of Govardhan is 6,219 which constitutes 27.87 % of the total Population as per Census 2011. Main Workers are 21.76 % and Marginal Workers are 6.11 % of the Total Working Population.

Figure 4.89 Workforce Participation, Govardhan 2011



Source: Census of India 1991, 2001 & 2011, Preliminary analysis and projection

Main workers include Cultivators, Agriculture Laborers, Household Industries and Other Workers. Remaining 72.13 % of population is Non-Working Population. Govardhan was divided into 13 wards in 2001 and one additional ward was added in 2011. Ward

92 Proposed Master Plan 2021 and Primary Land Use Survey 2018

number 2, 3, 4, 6 and 7 have dense population concentration as per Census 2011. The increasing number of pilgrims (five to seven million annually burdens the carrying capacity of the city. Existing infrastructure to support the movement and needs of such large numbers of pilgrims is inadequate[93].

The main source of economic revenue of the local population is generated from farming, herding livestock and pilgrim donations Temples drive local economy with self-generated demand for small shops which supply sacred objects necessary for temple worship rituals[94].

Congested, dilapidated housing is common in old areas of the city. Growing slums and unhygienic squatter settlements are widespread in the cities. Inadequate infrastructure is a major concern.

4.2.1.37 Economic Opportunities

A. Dominant Temple Based Industries

As per the 2021 Master Plan, there were 45 types of small scale industries in 2002 which included oil industries, metal manufacturing, furniture, electrical workshops which are concentrated in the core city, increasing congestion and poor quality living conditions. Jain village in Govardhan is the home of the authentic tulsi mala, where every person is groomed from childhood to pursue the craft. Mahawan is the sweet corner of Braj, with a small cluster producing the mouthful kheer mohan, inviting brisk sale from pilgrims. The key bottleneck for many of such creative industries is the lack of retail support to market these produce.

The temple sites are located at a fair distance from such production sites, and thus lack tourist visits. It is important that these creative products are made available at the temple premises with necessary branding, and to ensure that the production sites are easily accessible by tourists through heritage tours thus opening windows to promote the Braj culture. Projecting the native art forms as an integral part of the Braj mythos can be instrumental in the ascension of Braj from a purely religious destination to a center for arts and culture.

B. Commerce

Pilgrimage supporting commercial activities are widespread in the city such as Dharamshalas, Flower shops etc.

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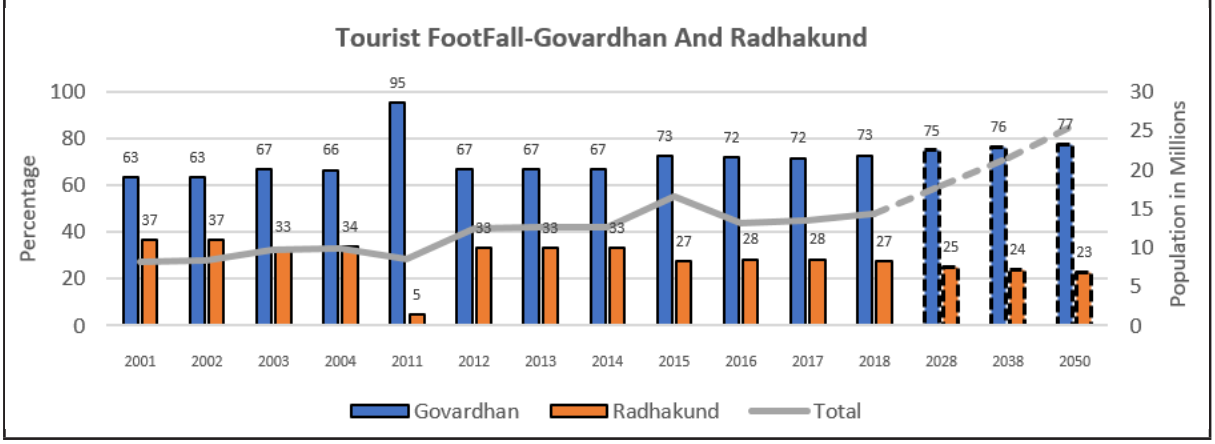
93 Sacred Landscapes of Govardhan in Braj Imagined, enacted and reclaimed, AMITA SINHA, Context VIII, 2011

94 Govardhan Hill in Braj, India. Report by University of Illinois at Urbana-Champaign, USA and Braj Foundation, Vrindavan, India. 2014

C. Inefficient Tourist Infrastructure and /heritage Conservation

Unprotected and unmaintained Kunds and heritage sites may be restored, protected and promoted for attracting tourist influx. Narrow entrances to the Kund premises gets challenging during heavy footfall seasons. Many of the kunds and water bodies are polluted by sewage dumping.

Figure 4.90 Tourist Footfall – Govardhan and Radhakund



Source: Mathura Vrindavan Master Plan (part G-Govardhan, Radhakund), Uttar Pradesh Tourism Department, Preliminary analysis and Projection

As per future projections, the tourist population is estimated to increase by 25 million by 2050. for which the adequate tourist facilities are required and provisions should be made for the same in mater plans. As per Master Plan 2021, more than 30 lac population visit Govardhan & Radhakund during Gurupurnima, Adhimas, Ekadashi and Purnima. This influx of huge population causes pressure on the existing infrastructure. The connectivity between Govardhan-Radhakund and Mathura-Vridavan is not adequate. Poor public transportation system, overloading of passengers in buses, and inefficient tourist infrastructure is a big challenge in Govardhan-Radhakund particularly during festival seasons.

Figure 4.91 Garbage dumping in Kunds and Damaging of Footpaths and Drainage

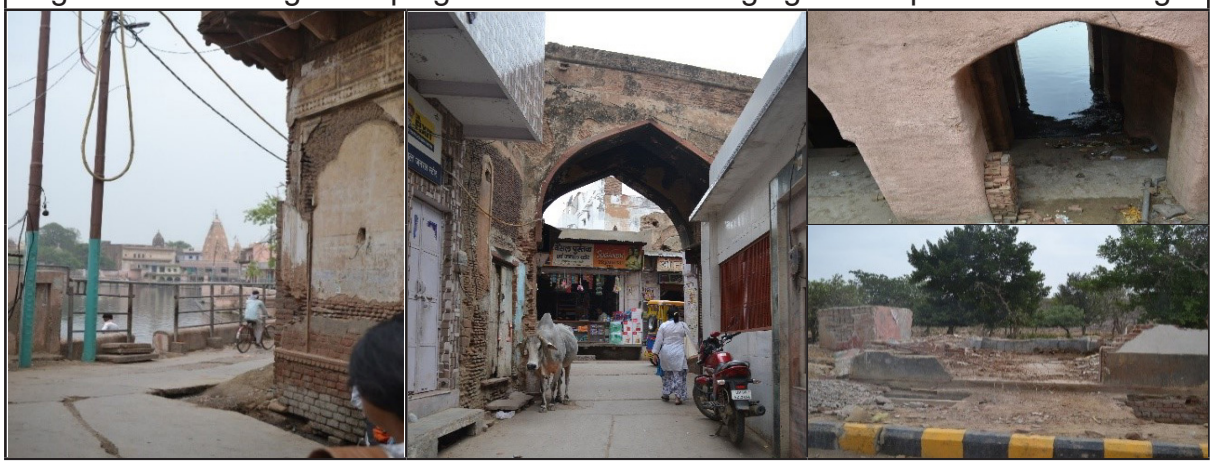


Figure 4.92 Many houses have historic characteristics which are in dilapidated conditions

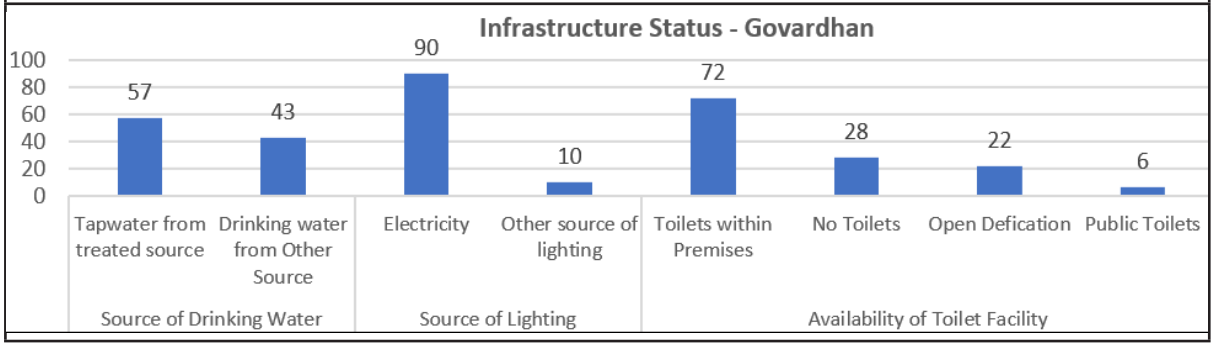


Source: Primary Survey 2018

4.2.1.38 Inadequate Urban Services and Infrastructure

The existing infrastructure of Govardhan-Radhakund are not adequate to support the needs of the residing population and the visiting tourists.

Figure 4.93 Infrastructure Statistics of Govardhan

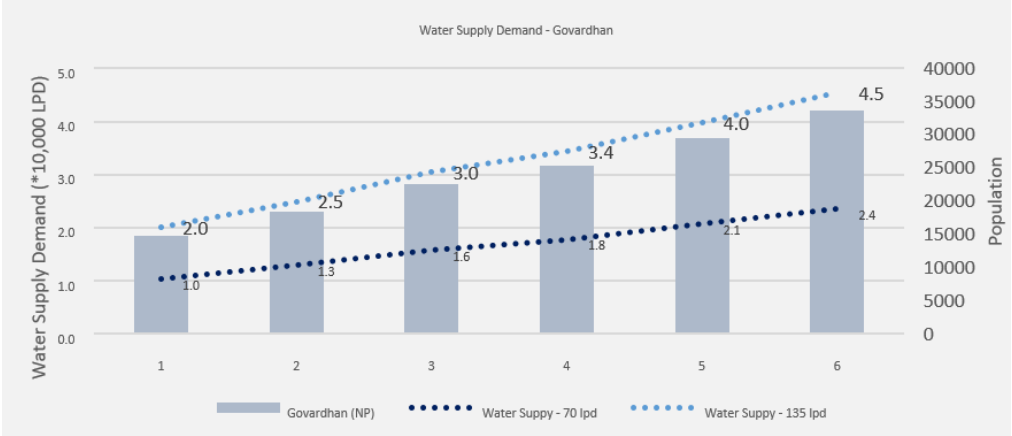


Source: Govardhan City Master Plan and Census 2011

A. Shortage of Water Supply

As per census 2011, 57 % of the Households have drinking water supply from Nagar Panchayat. 43 % of Households use other sources of drinking water such as well, hand-pump, tube-well, borehole, spring, river, canal, tank, pond, lake, etc.

Figure 4.94 Water Supply Demand of Govardhan



Source: Mathura Vrindavan Master Plan (part G-Govardhan, Radhakund), URDPFI Guidelines, Preliminary analysis and Projection

As per URDPFI Guidelines 2014, cities provided with piped water supply with existing/ contemplated sewerage system require a maximum of 135 lpcd water supply. Based on above guidelines, and the estimated calculation for 2018, 5 MLD Water Treatment Plant (WTP) is required for 135 lpcd of water supply. The land required for installing 5 MLD Water Treatment Plant is 0.1 Hactares, as per the guidelines.

As per Master Plan 2021, the current water supply is 50 lpcd which is very low as per the guidelines. The minimum water supply should be 70 lpcd. There is a shortage of 5.39 MLD water in 2018.

B. Absence of Sewerage and Drainage Systems

There is no separation of rain water drain and sewage drain in the cities which creates unsanitary conditions particularly during rainy season. As per 2011 census, 55% of Households have toilets within premises. 45% of the Households do not have toilets within premises out of which 36 % Households defecate on open land and 8 % households use Public Toilets. Sewage generated is 3.16 MLD and 4.17 MLD in 2018 & 2038 respectively[95].

Table 4.33 Sewerage Statistics of Govardhan and Radhakund

Year	Population	Sewage generated @80% of supply (MLD)
1991	19510	2.42
2001	24426	3.03
2011	22576	3.74
2018	25433	4.23
2028	29515	4.88
2038	33597	5.55
2050	51211	6.36

Source: Mathura Vrindavan Master Plan (part G-Govardhan, Radhakund), URDPFI Guidelines, Preliminary analysis and Projection

95 Preliminary analysis and URDPFI Guidelines 2014

C. Power Supply

As per Census 2011, around 90 % of total population has electricity supply and 10% of population depend upon other source like Kerosene, other oil, etc. that are polluting in nature. Since the duration of power supply is short, people have to depend on other sources of energy supply despite having power connections.

Table 4.34 Power Supply Statistics of Govardhan and Radhakund

Year	Population	No of Substations required
1991	19510	1.30
2001	24426	1.63
2011	22576	1.51
2018	25433	1.70
2028	29515	1.97
2038	33597	2.24
2050	51211	3.41

Source: Mathura Vrindavan Master Plan (part G-Govardhan, Radhakund), URDPFI Guidelines, Preliminary analysis and Projection

D. Absence of Solid Waste Management System

Solid Waste piles are dumped along the hills and into the Kunds leading to unsightly unhygienic conditions. Waste generated in Govardhan per day in 2018 is 30.52 MT excluding the waste disposed by the floating population. It is projected to double by 2050. Adequate measure need to be taken to avoid worsening the unsanitary conditions in the city.

Table 4.35 Solid Waste Management - Govardhan & Radhakund

Year	Population	Waste Generation from Residential refuse @0.6kg/ capita/day (in MT's)	Waste generated from Commercial refuse @0.2 kg/ capita/day in (MT's)	Waste generated form Street Sweeping @0.2kg/ capita/day (in MT's)	Waste generated from Institutional refuse @0.2 kg/ capita/day in (MT's)	Waste generation per Day (in MT's)
1991	19510	11.71	3.90	3.90	3.90	23.41
2001	24426	14.66	4.89	4.89	4.89	29.31
2011	22576	13.55	4.52	4.52	4.52	27.09
2018	25433	15.26	5.09	5.09	5.09	30.52
2028	29515	17.71	5.90	5.90	5.90	35.42
2038	33597	20.16	6.72	6.72	6.72	40.32
2050	51211	30.73	10.24	10.24	10.24	61.45

Source: Mathura Vrindavan Master Plan (part G-Govardhan, Radhakund), URDPFI Guidelines, Preliminary analysis and Projection

E. Dearth of Open and Recreational Areas

As per Master Plan 2021, there were no existing parks and recreational facilities in

2004 in Govardhan and only 1.92 Ha land was existing under Parks & recreational use in Radhakund. In 2021, there is a proposal of 380.98 ha of land under parks and recreational use which constitutes 12.13 % of the total area. The Master Plan includes proposals for developing entertainment area and recreational areas near water bodies to conserve them. The hill area and the buffer belt along Parikrama Marg is proposed as Recreational & Open Space in the 2021 Master Plan document. The Parikrama Marg has been developed without green cover and illegal constructions have been observed along it in the 2018 primary survey[96]. It is essential that the Master Plan implementation is strictly adhered to and it is monitored regularly to prevent non-conforming land uses and encroachment.

4.2.2 Heritage Issues

Agra has a very rich heritage comprising primarily of Lodi, Mughal and Colonial layers of history. The table below lists briefly significant historical events and the evolution of built heritage in Agra over various periods of history.

Table 4.36 Significance of Sites

Period	Significance	Major Typologies
Early Mediaeval Period	Architectural	Fort
In 11th C the fort at Agra was attacked by the Ghaznavid rulers of Afghanistan. Mid 15th C Agra is mentioned as dependency of Bayana, In 1475 CE Badal Singh built Badalgarh fort		
Lodhi Period (1504 -1526)	Architectural	Fort, Garden at Sikandra, Ruins in Sikandra, Palace, Mosque, Fort
In 1504 CE Sikandar Lodi shifted Court to Agra to be close to Gwalior. In 1505 CE earthquake destroyed many buildings. 1517 CE Ibrahim Lodi constructed palace and mosque with in Badalgarh Fort		
Early Mughal Period (1526 -1555)		Architectural, Ecological
Gardens. Mosque, Fort, River front gardens – char bagh gardens, Residential settlements.		
Babur invaded India, defeated Ibrahim Lodi set up base in Agra and the foundation of the Mughal empire was laid in Agra. Babur built gardens on bank of river in Agra.Babur's architectural contributions were mainly in form of gardens, mosque, and hammam. He was succeeded by Humayunwho built a mosque in Kachpura and Gyara sidhi on east bank of Yamuna, across the river from the fort. In 1540 CE Sher Shah Suri seized power and repaired Badalgarh Fort. He laid down the imperial road, evidence of which is in the form of kosminars and remains of sarais along Delhi Agra. Nai ki Mandi, parts of Belunganj and Kachpura were the settlements established during this period.		
Mughal Period (1556-1628)	Architectural	Fort, Moat, Fortified walls, Residence, Mosque, Diwan-i-aam, Palaces, Memorial – Tomb, River front gardens

96 Mathura Vrindavan Master Plan (part G-Govardhan, Radhakund) 2021

Period	Significance	Major Typologies
Akbar ruled from Agra and made Agra his capital, naming it Akbarabad. The Red fort of Agra was constructed over the site of Badalgarh fort. In 1569 CE Akbar established the city of Fatehpur Sikri. Prominent areas developed during Akbar's reign were Shahpur, Shah mandi, Loha Mandi.In 1605 CE Jahangir shifted capital to Lahore but also laid many gardens in Agra. Nur Jehan was also a great patron of gardens the most famous being Itmad-ud-Daula's Tomb garden for her father on the banks of the river in Agra in 1622 CE. Nur Ki sarai was also built during this time. . In 1629 CE Palseart listed 33 gardens in Agra which were created or remodeled in Jahangir's time.		
High Mughal Period (1628- 1658)	Architectural, Ecological	Taj Mahal and River front Gardens.
Shah Jahan came to power and shifted his capital back to Agra briefly before planning Shahjahanabad in Delhi. He built Taj Mahal during 1632-1643 CE		
Late Mughal Period (1658-1857)	Architectural, Ecological	Memorial. Fort, Havelis, Residences, Palaces,
It was in Aurangzeb's time when Haveli of Alamgir, Masjid Mubarak Manjil, Jatni Ka Bagh, Haveli and rauza of Shaista Khan, Rauza of Zafar Khan, Haveli of Hoshdar Khan, and Haveli of Islam Khan were built in Agra. Maratha governor was appointed in Agra in 1758 CE. In 1764 CE Raja Suraj Mal of Bharatpur took over Agra. Jaswant Singh ki Chattri was built by Rajas of Bharatpur. In 1785 CE the fort was occupied by Scindias before the fort was taken over by General Perron in 1799 CE.		
Colonial Period (1857-1947)	Architectural, Social	Schools, Libraries, Colleges, Hospital, Churches, Administrative offices.
1836-68 CE when British soldiers were stationed in Agra the Cantonment and civil lines area started developing.Hessing tomb, St George'scathedral, St Mary's Church, St Peter's College, Medical college, Agra college are few institutional structures that were built during this period.		

4.2.2.1 Lack of Protection of Heritage

Lack of awareness and recognition of heritage

Only a small fraction of the diversity of heritage of Agra is recognized and protected. A large part of the heritage goes unrecognized and unprotected.

Table 4.37 Typologies, Number and Protection status of Heritage resource

Agra City Level					
ASI Protected Structures	55	State Protected Structures	1	Unprotected structures	111

Typologies	Number of Structures
ASI Protected Structures	
Well	3
Tomb	9
Dargah	1
Mound	1
Palace	1
Mosque	4

Typologies	Number of Structures
Takht	1
Pavilion	1
Residence	3
Statue	1
Inscriptions	1
Idgaah	1
Gardens	3
Gateway	9
Kos Minar	8
Chattri	5
Cemetery	1
State Protected Structures	
Shikargah	1
Unprotected Structures	
Cemetery	3
Chattri	2
Church	7
Tomb	10
Temple	10
School	5
Samadhi	1
Residence	7
Hospital	3
Ghat	2
Gateway	3
Garden	9
Factory	2
Dargah	3
Court	2
College	7
Mill	2
Library	2
Idgah	1
Administrative structures	3
Railway Station	2
Offices	3
Police Thana	2
Pavilion	1
Palace	1
Jail	1

Typologies	Number of Structures
Mosque	8

Only individual monuments or complexes like Taj Mahal, Agra fort are perceived as heritage, even though there are several heritage zones and precincts within Agra, each with their own character.

Some of the key zones and precincts identified are:

Table 4.38 Heritage Zones, Precincts, and significant characteristics.

AGRA
TAJ PRECINCT AND RIVERFRONT GARDENS, AGRA
Precinct 1: Taj and immediate surroundings, Agra Precinct 2 : Extended Riverfront Gardens
HISTORIC CORE OF AGRA
Precinct 3 : Hing ki Mandi and Surrounding areas Precinct 4: Marble industry of Gokulpura, Agra Precinct 5 : Belunganj and its bazaars Precinct 6 :Colonial Bungalow precinct, Agra Precinct 7: Colonial Institutional Precinct, Agra Precinct 8: Precinct of Sikandra

Agra riverfront which could be a major asset of the city is completely neglected and only a few monuments are recognized and protected.

Historic elements of significance belonging to heritage structures are left neglected and abandoned in the streets.

Inadequate recognition and protection of intangible heritage

Many crafts still survive in historic areas like petha making in Moti Pada, Noori Darwaza; stone carving in Gokulpura and zardozi in Nai basti.

Figure 4.95 Agra: Valuable pieces of historic building elements



Figure 4.96 Agra: Valuable pieces of historic building elements



Inadequate recognition and protection of intangible heritage

Many crafts still survive in historic areas like petha making in Moti Pada, Noori Darwaza; stone carving in Gokulpura and zardozi in Nai basti.

Table 4.39 Location of Crafts Centers

Sl. No.	Craft	Location
1	Marble inlay /Pietra Dura	Gokulpura, Taj Ganj
2	Leather Craft (Selling and packaging)	Taj Gang, Fatehabad Road, Sadar Bazaar
3	Carpet Weaving	Villages around Agra - Rasoolabad, Tedhi Baghiya, Gutlashan, Lal Garhi
4	Zari work	Hing Ki Mandi, Lohamandi
5	Petha Making	Noori Darwaza (Moti Katra)

However traditional craftsmen engaged in stone carving, zardozi are existing on the margins of society, and in the absence of adequate recognition of the rich craft traditions they nurture, the living conditions of craftsmen are very poor, lacking basic standards of health and hygiene.

Figure 4.97 Agra: Zari work in Nai ki Mandi



Figure 4.98 Agra: Zari work in Lohamandi



Figure 4.99 Agra: Petha making unit in Noori Darwaza



Figure 4.100 Agra: Stone carving in Gokulpura



Figure 4.101 Agra: Stone carving in Gokulpura	Figure 4.102 Agra: Marble inlay work in Tajganj
	

4.2.2.2 Inadequate Heritage Conservation Management Systems

Absence of heritage management plans

Agra has three World Heritage Sites of Taj Mahal, Agra Fort and Fatehpur Sikri under the protection and management of ASI. However there are no comprehensive Site Management Plans as per UNESCO guidelines which address present day site specific issues, and measures for their conservation for any of these sites and their buffer areas.

Heritage and its protection do not Figure on the agenda of various administrative civic bodies functioning within the historic core of Agra.

Absence of engagement of communities with heritage and its protection

There are very limited livelihood opportunities connected with heritage as a result of which there is a much diminished engagement of communities with unprotected heritage.

Many protected heritage sites sitting within dense habitation are fenced off as a result of which the local community has minimal engagement with them. Local community is disconnected with open spaces around both protected and unprotected monuments.

Figure 4.103 Agra: Jaswant Singh ki Chattri, ASI protected monument located in dense residential neighbourhood	Figure 4.104 Agra: Unprotected pavilion at Gandhi Smarak in neighbourhood near Itimad ud daulahs garden
	

There are no incentives for the owners, spelt out within the administrative framework and policies, for the maintenance and conservation of the large volume of unprotected heritage in the custodianship of private individuals.

Absence of tourism management plan

Because of lack of awareness and absence of interpretation the tourists leave the city with a very limited and myopic view of the heritage that exists.

Agra lacks tourist circuits as a result of which some heritage sites are over visited at the expense of the lesser known even as Agra has a rich heritage spanning several centuries, diversity of periods and typologies of heritage.

Several protected and unprotected heritage sites are inaccessible or have limited accessibility, leading to their neglect and loss of visitor potential.

Figure 4.105 Agra: Access to John's Mill area



There is a complete absence of parking facilities around many heritage sites such as Itmad-ud-daula, Chini ka Rauza and Mehtab Bagh.

There is lack of universal access to most heritage sites.

4.2.2.3 Insensitive Urban Development and Planning Impacting Heritage Adversely

Loss of heritage due to patterns of urban development

The city has turned its back to the river and the heritage assets like the gardens along the river. Historic gardens are also not recognized as part of open space systems of the city and the local population is deprived of this asset.

Table 4.40 Historic riverfront gardens, status of existence, current use and protection status

Garden no.	River front Gardens/sites	Period	Status of Existence	Current Use	Built Heritage Protection Status
East Bank Garden					
Garden 1	Bagh-i-Shah Nawaz Khan	1637	Partially Exists	Residences	Partially Protected (Remains Protected)
Garden 2	Buland Bagh	1600	Partially Exists	Nursery /Residences	Partially Protected
Garden 3	Bagh-i-Nur Afsan(Ram Bagh)	Before 1620	Exists	Monument (Sarai)	ASI Protected
Garden 4	Bagh-i-Zahanara	Before 1631	Partially Exists	Nursery /Residences	Partially Protected
Garden 5	Unamed Garden	Not Known	Lost	Residences	
Garden 6	Chini Ka Rauza	Before 1639	Partially Exists	Nursery	ASI Protected (Tombs Protected)
Garden 7	Bagh-i-Wazir Khan	1640s	Partially Exists	Nursery /Residences	Unprotected
Garden 8	Bagh-i-Sultan Parvez	Before 1621	Partially Exists	Nursery /Residences	Unprotected
Garden 9.	Maqbara Itmad-ud-Duala	1622	Exists	Garden /Monument	Protected
Garden 10.	Bagh-i-Mausawi Khan Sadar	1636	Partially Exists (a dome roof structure exists)	Residences	Unprotected
Garden 11	Char Bagh Padshahi	Not Known	Lost	Agricultural	
Garden 12	Bagh-i-Bisht	1526	Lost	Agricultural	
Garden 13	Bagh-i-Mehtab Padshahi	Before 1640	Exists	Garden /Monument	Protected
West Bank Gardens					
Garden 18	Haveli of Khan-i-Duran	1633	Partially Exists	Haveli, Gateway	Unprotected
Garden 19	Haveli of Agha Khan	1652	Structure Exists	Temple trust	Unprotected
Garden 20	Rauza of Shah Jahan	1648	Exists	Garden/ Monument	ASI Protected
Garden 21	Bagh-i-Khan-i-Alam	1609	Exists	Garden/ Monument	ASI Protected
Garden 21	Haveli of Mahabat Khan	1605	Partially Exists	Cemetery	Unprotected

Garden no.	River front Gardens/sites	Period	Status of Existence	Current Use	Built Heritage Protection Status
Garden 22.	Haveli of Hoshdar Khan	1664	Lost	Forest Land	Unprotected (Protected by Forest Department)
Garden 23.	Haveli of Azam Khan	1630	Lost	Forest Land	
Garden 24.	Haveli of Mughal Khan	1650	Lost	Forest Land	
Garden 25.	Haveli of Islam Khan	1669	Lost	Forest Land	
Garden 26	Agra Fort	1564, 1637, 1662	Exists	Monument	ASI Protected
Garden 27	Haveli of Dara Shikhoh	1620s	Structure Exists	Monument	ASI Protected (Structure protected)
Garden 28	Haveli of Khan-i-Jahan Lodhi	1620s	Lost	Residences	
Garden 29	Haveli of Asaf Khan	Before 1634	Structure Exists	Residence	Unprotected
Garden 30	Rauza of Zafar Khan	1650	Partially Exists	Tomb and Mosque , Gaushala along the river	ASI Partially Protected
Garden 31	Chattri of Jaswant Singh	1640	Exists	Monument	ASI Protected

Many heritage sites of immense significance have been encroached upon due to absence of administrative control. Protected and unprotected sites within the settlements are used as dumping grounds for solid waste.

Figure 4.106 Agra: Dilapidated heritage site in Paktola area.



Figure 4.107 Agra: Poor maintenance of open ground in front of ASI



Limited urban governance in relation to heritage

There are very few public amenities like public toilets within the heritage areas leading to misuse of heritage properties.

Absence of special byelaws and development guidelines for heritage precincts and zones

In the absence of this recognition and the appreciation of the value of each zone, new buildings not in conformity with the heritage character are being constructed. There are no special guidelines for the conservation and enhancement of character of these heritage zones.

Street furniture in areas with a distinct heritage character is not in consonance with the aesthetics of the area.

Figure 4.108 Agra: Street furniture in Shahjahan Park	Figure 4.109 Agra: Solid waste disposal system
	

Figure 4.110 Agra: Alien lighting fixtures in Taj ganj	Figure 4.111 Agra: Electrical infrastructure along the riverfront
	

Insensitive traffic and transportation plans leading to loss of heritage

The historic city was not planned for vehicles and was meant to be a pedestrian friendly city. In the absence of a traffic management plan, and with multiple modes of transport there are nodes with perennial traffic jams.

Narrow streets in the historic core of Agra, in areas such as Belanganj and Hing ki Mandi, initially meant for only pedestrian movement, have two way vehicular movement which leads to chaos.

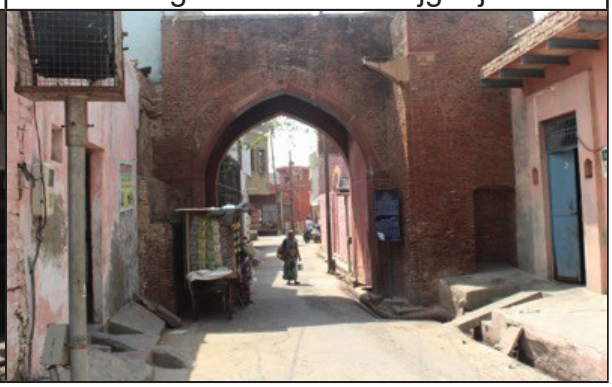
Polluting vehicles adversely impact both the natural and built heritage.

Resurfacing of historic streets in materials not in consonance with their historicity is adversely impacting the character of these historic streets.

Figure 4.112 Agra: Tajganj



Figure 4.113 Agra: Gateway in the neighbourhood of Tajganj



Heritage sites are getting fragmented due to urban pressures and new road networks. This is most visible in the gardens along the riverfront.

Table 4.41 Fragmented Mughal gardens and the roads bisecting them

Garden No.	Name of the Garden	Roads fragmenting the garden
Garden 4	Bagh-i-Jahanara (Lost)	Chennai Delhi Highway (National Highway 2)
Garden 10	Bagh-i-Mausawi Khan Sadar (Lost)	State Highway 39 (leading to Ambedkar Bridge)
Garden 11	Bagh-i-Padshahi (Lost)	State Highway 39 (leading to Ambedkar Bridge)
Garden 24	Haveli of Hoshdar Khan (Lost)	Agra Bah Road
Garden 25	Haveli of Azam Khan (Lost)	Agra Bah Road
Garden 26	Haveli of Mughal Khan (Lost)	Agra Bah Road
Garden 27	Haveli of Islam Khan (Lost)	Agra Bah Road
Garden 29	Dara Shikhoh Haveli	State Highway 39
Garden 30	Haveli of Khan-i-Jahan Lodhi (Lost)	State Highway 39 (Road along western edge of Yamuna River)
Garden 31	Haveli of Hafiz Khitmadgar (Lost)	State Highway 39 (Road along western edge of Yamuna River)
Garden 32	Haveli of Asaf Khan	State Highway 39 (Road along western edge of Yamuna River) State Highway 39 (Road along western edge of Yamuna River)

Garden No.	Name of the Garden	Roads fragmenting the garden
Garden 33	Haveli of Alamgir (Lost)	State Highway 39 (Road along western edge of Yamuna River)
Garden 34		State Highway 39 (Road along western edge of Yamuna River)
Garden 35		State Highway 39 (Road along western edge of Yamuna River)
Garden 36	Haveli of Sasat (Lost)	State Highway 39 (Road along western edge of Yamuna River)
Garden 37	Haveli of Jafar Khan (Lost)	State Highway 39 (Road along western edge of Yamuna River)
Garden 43	Bagh-i-Hakim Kazi Ali	Chennai Delhi Highway (National Highway 2)

Insensitive Urban development impacting natural heritage

The historic water channels running through the city, are an important part of the heritage, as they captured the storm water surface runoff and fed the river. Encroachments around these historic water channels have reduced their carrying capacities, besides increasing surface runoff in the absence of soft areas along their banks.

Table 4.42 Major Historic Nullahs and existing condition

S.No.	Historic Nullah	Historic Settlement / Site	Character of current setting
1	Drain passing close to Sat Kuiya	Garden 1 : Bagh-i-Shah Nawaz Khan	Drain passing close to the site of Sat Kuyia, partially through residential settlement along the Aligarh Road and partially through the nursery, carrying sullage.
2	Drain passing through Nur Ki sarai	Between Garden 2 : Buland Bagh and Garden 3: Ram Bagh	One of the major drains passes through a sarai, currently known as Nur ki Sarai and carries sullage from residences upstream.
3	Drain between Itmad-ud Daula and Chini Ka Rauza	Garden 7 : Bagh-i-Wazir Khan	The drain passes through a nursery.
4	Drain between Katra Wazir Khan and Moti Bagh	Gardens are lost most likely part of Garden 12 to 14	Currently the area is an uncontrolled development area. Drain running through the area needs proper restoration.
5	Drain on east side of the Taj Mahal, flowing through the forested area (called nature trail)	Garden 19 : Agha Khan Haveli and Tajganj	Forested area between east access to Taj and river has a nullah which flows through Paktola of Taj Ganj Area. This is one of the major historic drains. The drain is probably built over by a road in section of Fatehabad road to Taj Ganj. In the protected forested area the drain is modified and constructed in masonry.

S.No.	Historic Nullah	Historic Settlement / Site	Character of current setting
6	Drain flowing through Paradise Park	Garden 29: Haveli of Dara Shikoh And Garden 27 : Haveli of Islam Khan Gokulpura/ Rakaabganj Belunganj	Currently the area is called Paradise Park which is part of the buffer area of the Taj Mahal. It is a green belt along the river. This drain runs in western part of the city through Gokulpura, Rakaabganj, and Belanganj. Drain was part of the Darah Shikoh Garden as a water channel and has historic bridges over it.
7	Three drains flowing through John's Mill Area	Garden 40 to 42 : Haveli of Mukim Khan, Haveli of Khalil Khan, Bagh-i-Rai Shiv das	These drains have been built upon by industrial development of colonial period. Currently the settlement has abandoned mills with few workshops and new development.
8	Drain flowing next to Zafar Khan Tomb	Garden 44 :Rauza of Zaffar Khan	Residential Settlement. Nalla passes along a Gaushala through the settlement and functions as an open sewer.

Figure 4.114 Agra: Drain in Belanganj



Figure 4.115 Agra: Condition of drain in Gokulpura



Figure 4.116 Agra: Drain through Nur Serai



Figure 4.117 Agra: Drain near Johns Mill area



The present flood plains, with mud and sand banks have created open spaces for the city. But due to lack of infrastructure and amenities for the population residing along the river, these open spaces needs to be properly transformed in aesthetic manner.

Figure 4.118 Agra: River bank



Figure 4.119 Agra: River bank



Figure 4.120 Agra: River bed



There is no comprehensive landscape and related plantation policy in Agra, specifically addressing needs and demands of heritage zones and precincts, such as a complete absence of a tree plantation policy along wide roads in the heritage precinct of cantonment area or the river front heritage gardens.

Figure 4.121 Agra: Paradise park with lawns



Figure 4.122 Agra: Opposite riverfront without plantation as seen from Itmad-ud-daula complex



4.2.3 Urban Design

4.2.3.1 Agra Specific Assessment

Based on the study of master plan, visual studies at Agra, study of tourism policy and recent literature on Agra and response from stakeholder consultations, this section provides issues at Agra level. The assessment is carried out at two levels; city level and neighbourhood level. The section discusses issues such as degradation of old city character, Excessive commercialization of inner streets causing loss of residential quality of mohallas, pressure of urbanization and commercialization in the city and its neighbourhood, river Yamuna and its relationship with the city, negligible attention to other character districts and heritage precincts, lack of inter-modal integration at major transportation nodes, degrading image of regional corridors, and lack of quality public spaces in the city.

A. Degradation of Character of Old City

The city of Agra boasts a rich cultural history, the traces of which are deeply embedded and layered in its urban fabric. The historic core of the city has many layers of built heritage ranging from Mughal period, Post-Mughal, Art Deco, to Post-independence and along with its diverse socio-cultural practices, creates a rich character. The historic core of Agra comprises of many neighbourhoods such as Belaganj, Ghatiya Azam Khan, Pathwari, Fubbara, Daresi, Noori Gate, Rajamandi, Lohamandi, Golkura Park, Naai Mantola, Sadar Bhatti, Baluganj, Naamner, Cheepitola, Roshan Mohalla, Kuchehri Ghat, Jeewani Mandi, Kala Mahal, Gugdi Mansoor Khan etc. Due to the absence of any serious conservation policy, the old city core in Agra has witnessed a tremendous degradation. The population density as well as built density has increased over the past decade affecting not just the form and space but also the character and overall image of the place which is not able to provide any unique and coherent experience.

The connected intermediate spaces within the traditional neighbourhood are getting filled with more built spaces and courtyards are slowly diminishing from the morphological character of the neighbourhood. The area around Jama Masjid and Agra fort have transformed tremendously and grown vertically over a period of time without respecting or incorporating the surrounding heritage. The spatial clusters forming intricate and intimate public spaces are also diminishing with time. The condition of heritage structures is deteriorating with crumbling facades and no provisions are made at the policy or planning level to save the heritage of the historic core. A rather modern, low quality and generic form of construction is slowly engulfing the heritage

character resulting into a mish-mash of a messy uncontrolled urbanism. Unfortunately, the present condition of the city core is like an old decrepit neighbourhood.

A number of heritage precincts in the old city such as in Jama Masjid area historically hosting mixed-use are now used only for commercial purposes and a series of such structures can be noticed in many primary streets which has resulted in systematic deterioration of the street character. The excessive commercialization and changing built use pattern had a significant role in the changing urban character of the historic city core and its neighbourhood such as Favara Chauraha. This has also changed the overall experience of the place for not just the visitors but most importantly for the residents.

The pressure of commercialization as well as urbanization has also threatened the quality of residential living. The increase in built intensity and population density had a significant impact on the available infrastructure and lack of comprehensive planning to address the historic core has left it to decay even further. Inharmonious buildings in the traditional urban fabric in terms of height, material, physical condition, poor maintenance, lack of proper infrastructure, overcrowding, incompetent land and built use, noise and pollution has resulted in degrading residential quality and experience of the place.

Figure 4.123 Agra: A street treated as an urban backyard in Belanganj	Figure 4.124 Agra: Underutilized spaces around Agra Fort
	

The intense commercialization of settlements attracts high intensity traffic and the narrow streets are choking with vehicular traffic, noise and pollution. The high influx of traffic and vehicular movement is a deterrent to any kind of visual experience. There is an uncontrolled flow of four wheelers, private vehicles, E-rickshaws and a number of small trucks can be seen moving around the tertiary lanes of the settlements. Large number of pedestrians can be noticed on the streets throughout the historic core, yet no proper provisions facilitating pedestrian movement is evident.

The master plan or the development regulations fail to recognize the changing character of these historic neighbourhood and the loss of associated cultural heritage.

There is no recognition of the historic core in the master plan and all the existing built areas in the city are treated in the same fashion and blanket provisions are made to propose them as high density residential zones. The primary roads in these settlements have experienced high commercial activity and are proposed as Market Street. These proposal require proper attention to dedvelop in context of the diversity of character zones and the unique morphological features which are present in different character districts. There is no recognition of the present or an imagination of the future form, space and character of these neighbourhood and the proposals are based on a template based approach which seems to be followed in rest of the cities in TTZ.

Figure 4.125 Agra: Dilapidated heritage buildings in historic city core



Figure 4.126 Agra: Settlements along the drain in old city



Figure 4.127 Agra: Wholesale commerce near Jama Masjid



Figure 4.128 Agra: Specialized commercial activity in old city



B. River Yamuna and its poor relationship with city

Historically the Yamuna in Agra has held a significant place and the city had a strong relationship with the river and its edges. The city of Agra used to boast continuous riverfront gardens that were an integral part of it. Unfortunately, the river in Agra has lost its significance. Ecological linkages to the river in the form of natural drains carry city waste or are blocked, thus not just disturbing the whole hydrological system in the city but also destroying the relationship of the river with the city and its people.

Figure 4.129 Agra: Urban profile along Yamuna	Figure 4.130 Agra: Lack of character and image of riverfronts
	

A number of important monuments were located along the edge of the river including Taj Mahal, Itmad-ud-daula and a series of Mughal gardens forming a strong relationship with the river and providing an access to riverfronts in the past. The water edges are currently inaccessible except only at certain places. The rest of the Yamuna river front has become an urban backyard for the city. The cultural significance of the river in Agra is lost in time and the socio-cultural practices associated with the river are also destroyed with the ecology of the river. A few ghats, monuments and settlements located at the edge of the river provide access to the river. There are many low-key and smaller monuments such as Raja Jaswant Singh Chhatri, Chini ka Rauza etc located along the river that lack proper access and maintenance but have the potential to be developed as sites for community use or domestic tourism. This historical relationship (physical and visual) between the river and the city is disrupted, losing an important cultural resource and a potential public space in the city.

Many old settlements along the river are facing a number of challenges in the city. In spite of being historic neighbourhoods, settlements dating as old as 1950's adjoining the heritage sites along the river are facing a slum like condition without basic infrastructure provisions. The riverfront needs immediate attention and ecological restoration. There are several important visual corridors along the river providing views to the monuments that need immediate attention and conservation. There is no discussion about this integral relationship of the river with the city and its monuments in the Master plan and building regulations. The issue of water pollution in Agra is addressed in the Master Plan 2021 primarily from the tourism perspective.

Figure 4.131 Agra: Riverfronts treated as urban backyards and dumping ground



C. Negligible attention to other character districts and heritage precincts

The Agra Master Plan 2021 recognizes Taj Dharaohar as the only heritage precinct in the city when there are many other heritage precincts and character districts in the city facing negligence and a cohesive understanding or strategies of conservation and development is missing. All the important character districts such as Cantonment, Tajganj, Tajganj Extension, Old city and green cover around Taj are lying in isolation without any physical or activity-oriented integration. Rapid urbanization, economic development requiring modern buildings and the fast-growing number of private cars, all repre¬sent very real threats for these character districts which are constantly deteriorating with time. A number of heritage sites and monuments are located in these multiple character districts and heritage precincts.

Cantonment is an important urban precinct representing colonial heritage of the city and dense green cover. The character of this precinct is under threat due to planned activities. This precinct is important for Taj Mahal and the city of Agra due to large tree cover and it is necessary to address this issue through recommendations or policy level interventions in order to save the lungs of the city. Fatehabad Road is the most important road providing access to all the three gates of Taj Mahal. In recent years, a number of lot of new hotels have come up on this road. This road should be improved for proper traffic movement. Provisions to develop more up-scale hotels are stated in the master plan. An over-all vision and form of this hospitality corridor has been failed to address in the city's master plan and building regulations. The

building regulations rather provide a generic approach to the hospitality industry and presents a spatial and contextual mode of development in the city merely based on pre-defined standards and statistics.

D. Transit nodes and absence of inter modal integration and activities

All the transportation nodes- Agra Cant, Agra Fort and Bus Stand provide poor sense of arrival to this important city with three world-heritage monuments and other innumerable heritage structures. The transit nodes in the city fail to create an appropriate visual experience for visitors and domestic users. There is lack of a cohesive planning strategy for the movement in the city which lacks pedestrian friendly spaces. Agra is an old city with very high population density. Network of roads is also age old, so as far as possible pedestrian movement and construction of footpath should be encouraged wherever space is available.

Figure 4.132 Agra: Mismanaged and ill designed transit nodes	Figure 4.133 Agra: Lack of pedestrian infrastructure and mix of traffic
	

Lack of inter-modal options at major transportation nodes- haphazard movement and parking of para-transit, lack of footpaths and intense small-scale commercial activity makes it difficult for visitors to negotiate the space visually and physically. No properly designed or demarcated transit nodes are available in the city. Irregular and unorganized para transit vehicles cause nuisance to internal neighborhood streets. There are no para transit stands with proper infrastructure in the city when E-rickshaws, Autos and cycle rickshaws are the major modes of public transport in the city.

E. Poor Image of Regional corridors

Important corridors enter and exit the city. Barring the link from Expressway, all others roads also need improvement. Ribbon-based commercial activities can be noticed along these major corridors with sparse real estate or/and freehold plotted development. The areas along these corridors host a number of residential projects along with number of rural and peri-urban settlements. Different movement corridors in Agra lead to a different character district in the inner city but visual and physical characters of these corridors are not representative or contextual to the character

district it merges with. All the corridors are dotted with local commerce and parking-restricting the flow of regular vehicles and lack of pedestrian infrastructure is also evident.

F. Lack of Public spaces

The global imagination of heritage tourism has caused a huge disconnect between heritage tourism and community, creating enclaves and exclusionary tourist spaces. Over the past few decades, the focus in Agra has been towards developing tourism sites and facilitating tourist infrastructure, largely ignoring the historic old city and other parts of the town where population has far outstripped infrastructure. There are not many spaces meant for the leisure of the locals and there's very little invested in the well-being of the residents in the city.

There is no major public space available for visitors (foreign or domestic) and local population except the newly designed eastern entry of Taj Mahal and triangular green (Ambedkar Park) near Jama Masjid and space around Fort Station. This implies that despite the presence of World-heritage sites, the city has not benefitted from any public space or associated economic activity around the monuments. This is quite opposite of any world-heritage site, wherein such important sites also result in preservation and enhancement of public realm around the monuments. The city fails to provide an enriching and culturally relevant everyday experience to its residents as well as the visitors. The local spots for leisure and triangulation of people is missing except a few organic activity nodes here and there and thus no comprehensive strategy to create a system and hierarchy of public spaces in the city.

Figure 4.134 Agra: Lack of provisions and design for everyday spaces



Agra has a rich cultural past, monuments, crafts, literature, and cuisine. Yet the experience is only limited to monuments and not reflected in day-to-day city life and

spaces. It is observed that most of the visitors come in cars/buses from their hotels and after visiting Fort and Taj go back straight to their hotels, restaurants or Jaipur.

G. Need for Implementation of sustainable and comprehensive tourism policy

After a detailed review of tourism policy, it is evident that aggressive brand marketing of only the Taj by the state and tourism agencies. Lack of recreational opportunities and degrading nature of the city may account for the condition that out of the total daily tourist arrivals in the city, most of them leave after visiting only the Taj Mahal (Refer Annexure 6.2). It has also been noticed that most of the tourist depart from the city the same evening of the arrival after visiting three major monuments in the city (Taj Mahal, Agra Fort, Itmad-ud-daula Tomb) as it is close to Delhi and Jaipur. The annual footfall of visitors in Itmad-ud-daula tomb and Agra fort is 3.7% and 49% respectively, of the footfall of Taj Mahal (Refer Annexure 6.2). The city is unable to convert World Heritage designation into proportionate advances in local community development in a context where it is most needed. The Planning agendas in the city are unable to find a balance between the tourism and everydayness of the city and there is a lack of a pro-poor, community-based heritage tourism and comprehensive vision for the city (Refer Annexure 6.2).

The low tourist footfall for other historic sites nearby has resulted from a lack of knowledge of their presence and whereabouts, compounded by accessibility and infrastructure issues. Not only the development of infrastructure around other monuments is poor but also, connectivity is low and amenities are inadequate which result in lower number of visitors.

Figure 4.135 Agra: Point based design interventions at East Gate towards Tajganj



The master plan has a myopic understanding of this issue and considers transport

related problems in the city to have caused such short-term tourist trips. The Master Plan of Agra (2001–2021) emphasizes growth in the tourism sector, development of high-tech enclaves, corporate and private sector involvement in urban development, better intra- and intercity transport connectivity, and quality infrastructure, all seen as necessary for global tourism and global city aspirations. Leisure and recreational activities get preference and are planned to be concentrated in the southern zones of the city. It is evident that the Master Plan is influenced by the 'Global Tourist Agra' image with both the state government and its planners trying to accommodate global agendas.

4.3 Precinct Level Issues

4.3.1 Urban Planning Issues

4.3.1.1 Urban Development and Land Use Pattern

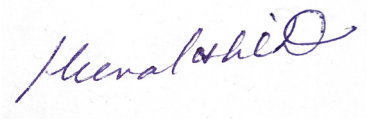
About 10% of the Land within the 'Dharohar Kshetra' boundary is water body, wetland and river. Agriculture, forest cover and reserve forest comprise about 35% of the landuse. Heritage sites constitute of about 11% while residential covers around 25% landuse of which 10% use also generates income through home-based cottage industry 5% land use is industrial (Refer Map No. 27 in Vol III).

A. Haphazard Uncontrolled Development around Taj Mahal

Many of the river fronts are encroached by squatters though these areas are assigned as green spaces and proposed as park and gardens in the 2021 Master Plan. Currently there are dhobi ghats, crematoriums, bathing ghats, open grounds along the river which play a vital role in its degeneration within the precinct area. The reclaimed land that was originally proposed for Taj corridor in 2002-2003 is now a piece of useless land partially piled with garbage from an effluent sewage canal further threatening the fragile hydrological environment of Yamuna River. It should be ensured that flood protected zones are kept free of building construction. However, any development works suggested around the Taj Mahal may be permitted if deemed necessary, after getting necessary approvals from competent authority within the ambit of provisions of the AMSR Act 1958 and 1959. (Source: Archaeological Survey of India, 2018).

B. Lack of Strict Zoning and Development Controls along the River

Since the river is fast dying it is essential that the choice of development on the river front is well-considered. It should be ensured that flood protected zones are kept free of any building construction. Many of the river fronts are encroached by squatters though these areas are assigned as green spaces and proposed as park and gardens



in the 2021 Master Plan.

4.3.1.2 Demography and Settlement Pattern

Most settlements within the precinct are unplanned, haphazard growths without any signs of regulation. Settlements do not have adequate infrastructure and have a slum like character.

As observed from the census data of 2001 and 2011, 26% of Agra's population of is concentrated in the old city and 12 % in the precinct (Refer Map No. 29 in Vol III). However, the settlements in the core and the precinct are very dense and depend on inadequate infrastructures which are below the required standards. It is also observed that about 20% (in 2001) and 12% (in 2011) of the total population was concentrated within the 14 precinct wards. The current density of 467 persons per hectare in the precinct and 147 persons/hectare in the city is considerably high and is a matter of great concern.

A. Disorganized Growth with Inadequate Infrastructure facilities

Most of the settlements within the immediate precinct and the old city are more than 20 years old. Some settlements are as old as Taj Mahal itself, since they developed during the Mughal period, particularly, settlements around the Agra fort which are reminiscent of the Mughal era with the same built structure and character but in utterly dilapidated state. The prominent colonies in the precinct include Kachpura, Tajganj, Dhandupura, Telipada, Vibhavnagar, Belanganj, Motiganj and Rawat Pada. Majority of these settlements are tenured slums on government land, while some are encroachments in land allocated for recreation/open spaces/Mughal heritage gardens. Slum and squatter development has also resulted in obstruction of Heritage and river connection.

4.3.1.3 Economic Profile

Closure of polluting industries, resulted in lower quality of life and increase in poverty and slum growth. Almost 90% of the home based cottage unit work in unhygienic conditions in poorly ventilated and lit rooms with inadequate waste disposal system.

Tertiary Sector

Deteriorating Quality of Life due to Closure of Industries

Closure of polluting industries have had adverse effect on the income of the households that relied on those industries. It has resulted in unemployment, migration of youth to bigger cities in search of better opportunities, deteriorating quality of life, greater dependency on home based industries and informal tertiary jobs.

4.3.1.4. Infrastructure

Poor Quality of Physical Infrastructure

A staggering of 43% of the households, do not have access to drinking water and are dependent on public water taps, tube wells, open wells, hand pump and water tanker in the precinct. Sewage connections are devoid of adequate in-house connections. 98% of the slums have street lighting facilities, but it requires proper maintenance.

4.3.1.5. Tourism Profile

A. Congestion around Tourist Spots

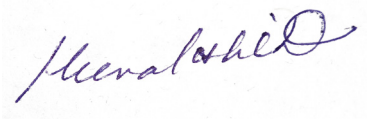
Festive season and holidays result in heavy congestion and alarming level of pollution, particularly in the core. The major tourist activities are observed within the precinct area. Majority of the tourist footfalls are generated at the Taj Mahal and Agra fort. A greater number of the City's hotels and Restaurants are also located in the Precinct area. This adds to the traffic and congestion in the already over populated precinct zone. However, actions are being taken to resolve the congestion issues in the precinct by identifying street vending zones. As per Smart City Mission, three vending zones have already been identified and proposed within the city precinct area. Registration of street vendors and street vending zone plans are also under process under the Street Vending Zone Act (source: Agra Nagar Nigam 2018).

B. Isolated Tourist Spots

Many small heritage sites are lost among the slums due to codes that allow for protection of heritage sites of national and global importance only. Entire public landscape is fragmented, with no means of getting from one park to another. There are limited connections to the river from the heritage sites though the river was intended to be an integral frame in the original architectural design. As noted in a study 'Shahjahan Park lies deserted, fenced from the teeming street life of the city and neither opens onto the river, as does the cremation site and temple ghats next to the Taj. The historic monuments have thus become islands, representing vestiges of history cut off from the urban life around them'.

C. Drop in Tourist Number

Recently, a drop in tourist numbers were noticed in Agra which may have resulted due to the congestion in the core or the restrictions in the tourist flow as a concern to protect Taj Mahal.



4.3.2 Heritage Issues

4.3.2.1 Lack of Protection of Heritage

Lack of awareness, recognition and protection of heritage

The large volume of unprotected heritage is subject to dedcay and the few surviving structures are also in danger of being lost in the absence of their recognition as important heritage sites.

There are several unprotected heritage structures in Belanganj in the form of havelis. In the absence of awareness of this rich heritage, this wealth of unprotected heritage in Belanganj area is being destroyed and built over.

Figure 4.136 Agra: Belanganj



Figure 4.137 Agra: Belanganj

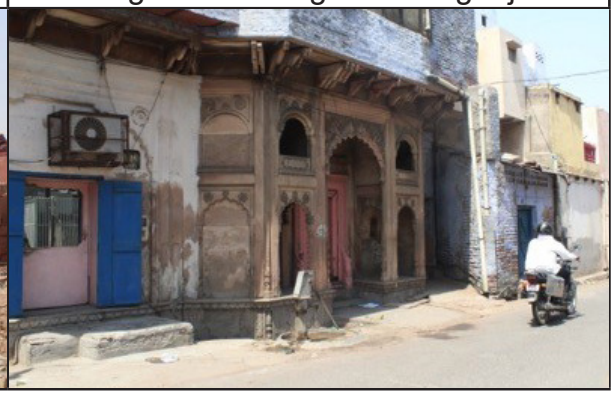


Figure 4.138 Agra: Belanganj



Figure 4.139 Agra: Belanganj



Table 4.43 Key Structures in Belanganj within the overall mediaeval urban fabric

Sl. No.	Names of structures identified	Typology
1	Dara Shikoh Library/ Municipal School	Library/ School/ Haveli
2	Shahi Madrasa Masjid	Mosque/ Madrasa
3	Kala Mahal	Residential
4	Motamid Khan Mosque	Mosque
5	Mahesh Chand Bansal House	Residential
6	Mankameshwar Temple	Temple
7	Hazoori Bhawan	Residential
8	Motamid Khan Mosque	Mosque

Heritage structures which are remains of historic gardens in Shahjahan Park are not

recognized by ASI.

Figure 4.140 Agra: Unprotected structure, part of historic garden in Shahjahan park	Figure 4.141 Agra: Ruins of historic garden in Shahjahan Park
	

There are several remains of historic building elements like arches, columns lying unattended in open areas and alongside drains in the Belanganj and other areas.

The small patch of protected forest adjacent to the Taj complex on its east side is not in a very healthy state of existence and needs to be restored.

Figure 4.142 Agra: Forest area	Figure 4.143 Agra: Open drain in forest area
	

4.3.2.2 Inadequate Heritage Conservation Management Systems

Adoption of inappropriate and inauthentic conservation practices

Mughal gardens are known to have had groves of trees, along with other plants and plantation patterns, supporting the idea of paradise as a garden. The landscape vocabularies adopted in the protected and unprotected garden sites not only undermine their historicity and authenticity but lead to a loss of interpretation of the sites and a diminished visitor experience.

Figure 4.144 Agra: Chini ka Rauza



Figure 4.145 Agra: Ram Bagh Garden



Absence of community engagement with heritage: The involvement of the local community is negligible towards the care and protection of heritage because of lack of engagement with the heritage. Historic gardens along the riverfront are inaccessible depriving the local community of a very vital open space. Gandhi Smarak has been fenced off depriving the community of a vital open space.

Figure 4.146 Agra: Gandhi Smarak



Figure 4.147 Agra: Gandhi Smarak



Many nurseries exist along the west bank over the footprint of historic gardens. They present an opportunity to connect the historic gardens with the livelihoods of the community residing in the vicinity. The nurseries also present an opportunity to promote the Mughal plant industry, which will also add another dimension to the natural heritage of Agra.

Absence of tourism management plan

In the absence of threshold capacity analysis of each of the heritage sites all heritage sites are adversely impacted. The heritage site of Taj Mahal is over visited at the expense of the scores of other sites having immense potential as tourist destinations.

Table 4.44 List of Heritage and Significance

Site	Historic Garden	Significance	Archaeological	Ecological	Historical	Architectural	Religious	Socio - Cultural
Protected Chattri and nursery	Garden 2: Buland Bagh	Buland Bagh is a historic garden with remains of Chattris and has archaeological and architectural value. Currently its being used partially as a nursery giving it an ecological value	Y	Y	Y	Y	N	Y
Ram Bagh Garden	Garden 3: Bagh-i-Zar-Afshan (Ram Bagh)	Ram Bagh garden has high architectural value because of its terraced gardens and water system. It is the first garden built along the river front by Babur. It has high ecological value.	Y	Y	Y	Y	N	Y
Chini Ka Rauza and Maqbara called Kala Gumbaz between Chini-ka-Rauza and Bagh Wazir Khan through a nursery	Garden 6: Chini Ka Rauza	The garden is a community space and has access to river. Part of the garden is a nursery and has economic significance as well. It is one of the garden which has limited access to the river.	Y	Y	Y	Y	N	Y
			Y	N	Y	Y	N	Y
Ruins of Prince Parwez Tomb	Garden 8 : Bagh-i-Sultan Parvez	Site has high archaeological value and architectural value. Has huge open space around it	Y	Y	Y	Y	N	Y
Itmad - ud - Daula Tomb	Garden 9: Maqbara Itmad-ud-Duala	The garden has high architectural value, with the tomb having marble inlay works on walls and paintings on the ceiling. The garden of Itmad-ud-Daula has high landscape and ecological value.	Y	Y	Y	Y	N	Y

Site	Historic Garden	Significance	Archaeological	Ecological	Historical	Architectural	Religious	Socio - Cultural
Gyarah Sidhi	Sites close to Mehtab Bagh	Area has high archaeological. Also has view of Taj Mahal from across the bank of river.	Y	Y	Y	Y	N	Y
Humayun Masjid		Associational value and architectural value as it has been built by Humayun.	Y	N	Y	Y	Y	Y
Mehtab Bagh on the riverfront facing Taj Mahal	Garden 17 : Bagh-i-Mehtab Padshahi	The garden stands across the river and has view of Taj. It has high ecological value.	Y	Y	Y	Y	N	Y
Khan-i-Alam Bagh	Garden 21: Bagh-i-Khan-i-Alam	Now the garden is part of the protected forested area along the east gate of Taj. It has high archaeological value.	Y	Y	Y	Y	N	Y
Agra Fort, group of monuments	Garden 28 : Agra Fort	Agra fort is area of high architectural and associational value.	Y	Y	Y	Y	N	Y
Dara Shikoh Haveli/ Municipal School	Garden 29 : Haveli of Dara Shikhoh	Dara Shikoh Haveli has high architectural value. It now functions as a school.	N	N	Y	Y	N	N
John's Mill	Garden 40 to 42 : Haveli of Mukim Khan, Haveli of Khalil Khan, Bagh-i-Rai Shiv das	John's Mill area has two layers of history, one of baghs, which can be seen in the walls in lakhori brick and Chattris and the other layer as industrial heritage of Agra from colonial period, remains of which still exist. Site has high archaeological and architectural value.	Y	N	Y	Y	N	N
Jaswant Singh-ki-Chattri	Garden 45 : Chattri of Jaswant Singh	Ornate baradari which sits with in a walled enclosure gives the site its architectural value. There are remains of water channels, chaddar giving the structure high landscape and archaeological value.	Y	Y	Y	Y	N	Y

Inaccessibility is one of the major reasons for the neglect and subsequent deterioration of this heritage. Many river facing garden sites with remains of structures within are

inaccessible.

Total absence of well worked out and visitor friendly heritage trails is why many tourists miss out on heritage sites. Khan -e- Alam heritage site next to Taj Mahal, which also houses the aqueduct which fed the gardens of Taj Mahal, is not on the visitor itinerary. Haveli of Khan -e- Duran near the east gate of Taj Mahal is neglected and not visited even though it has the potential to become a major destination. Jaswant Singh chhatri is a protected site and has remains of tank and a chaddar. It has a difficult access due to which very few visitors visit it. It is however used by the community residing around. While Ram Bagh is a protected site by ASI and visited by a few visitors, the adjacent Nur Serai and remains of Buland Bagh go unnoticed and are in a state of neglect.

Figure 4.148 Agra: Khan-i-Alam aqueduct	Figure 4.149 Agra: Nur ki Sarai
	

There is lack of universal access to most heritage sites.

There is lack of parking and other visitor amenities for the heritage sites along the river.

There is absence of signage in most heritage properties along the river front.

4.2.2.3 Insensitive Urban Development and Planning Impacting Heritage Adversely

Loss of heritage due to patterns of urban development

Only six of the original forty five historic gardens along the riverfront are protected in their entirety. The rest have been lost completely or are encroached upon. New infrastructure like bridges, roads and flyovers, built over the last several decades, have fragmented the riverfront gardens. Multistory apartment blocks have been constructed in the north part along the west bank of the river, many over the footprint of the river facing gardens. Jafar Khan's tomb garden has been lost and converted into a gaushala in the last few years.

Table 4.45 Riverfront gardens, status of existence, current use, accessibility and protection status

Garden no.	River front Gardens/ sites	Period	Status of Existence	Current Use	Accessibility to the garden	Accessibility to the river	Formal organized Parking Availability (yes/no)	Built Heritage Protection Status
East Bank Garden								
Garden 1	Bagh-i-Shah Nawaz Khan	1637	Partially Exists	Residences	No	No	No	Partially Protected by ASI (Remains Protected)
Garden 2	Buland Bagh	1600	Partially Exists	Nursery / Residences	Limited accessibility	No	No	Partially Protected by ASI
Garden 3	Bagh-i-Nur Afsan(Ram Bagh)	Before 1620	Exists	Monument (Sarai)	Yes	No	Yes (parking space not allocated, informal parking)	ASI Protected
Garden 1	Bagh-i-Shah Nawaz Khan	1637	Partially Exists	Residences	No	No	No	Partially Protected by ASI (Remains Protected)
Garden 2	Buland Bagh	1600	Partially Exists	Nursery / Residences	Limited accessibility	No	No	Partially Protected by ASI
Garden 3	Bagh-i-Nur Afsan(Ram Bagh)	Before 1620	Exists	Monument (Sarai)	Yes	No	Yes (parking space not allocated, informal parking)	ASI Protected
Garden 15	Char Bagh Padshahi	Not Known	Lost	Agricultural	-	-	No	
Garden 16	Bagh-i-Bisht	1526	Lost	Agricultural	-	-	No	
Garden 17	Bagh-i-Mehtab Padshahi	Before 1640	Exists	Garden / Monument	Yes	No	No	ASI Protected
West Bank Gardens								
Garden 18	Haveli of Khan-i-Duran	1633	Partially Exists	Haveli, Gateway	Limited accessibility	-	No	Unprotected
Garden 19	Haveli of Agha Khan	1652	Structure Exists	Temple trust	Limited accessibility	Yes	No	Unprotected
Garden 20	Rauza of Shah Jahan	1648	Exists	Garden/ Monument	Yes	No	Yes	ASI Protected

Garden no.	River front Gardens/ sites	Period	Status of Existence	Current Use	Accessibility to the garden	Accessibility to the river	Formal organized Parking Availability (yes/no)	Built Heritage Protection Status
Garden 21	Bagh-i-Khan-i-Alam	1609	Exists	Garden/ Monument	Limited accessibility	No	No	ASI Protected
Garden 22	Haveli of Aslat Khan	1644	Lost	Residence	-	-	No	
Garden 23	Haveli of Mahabat Khan	1605	Partially Exists	Cemetery	Yes	Yes	No	Unprotected
Garden 24.	Haveli of Hoshdar Khan	1664	Lost	Forest Land	-	-	Yes	Unprotected (Protected by Forest Department)
Garden 25.	Haveli of Azam Khan	1630	Lost	Forest Land	-	-	Yes	
Garden 26.	Haveli of Mughal Khan	1650	Lost	Forest Land	-	-	Yes	
Garden 27.	Haveli of Islam Khan	1669	Lost	Forest Land	-	-	Yes	
Garden 28	Agra Fort	1564, 1637, 1662	Exists	Monument	Yes	No	Yes	ASI Protected
Garden 29	Haveli of Dara Shikhoh	1620s	Structure Exists	Monument	Limited accessibility	No	No	ASI Protected (Structure protected)
Garden 30	Haveli of Khan-i-Jahan Lodhi	1620s	Lost	Residences	-	No	No	
Garden 31	Haveli of Hafiz Khitmadgar	Not Known	Lost	Residences	-	No	No	
Garden 32	Haveli of Asaf Khan	Before 1634	Structure Exists	Residence	-	No	No	Unprotected
Garden 33	Haveli of Alamgir	1600	Lost	Residence	-	No	No	
Garden 34								
Garden 35								
Garden 36	Haveli of Sasat	1657	Lost	Residence	-	No	No	

Garden no.	River front Gardens/ sites	Period	Status of Existence	Current Use	Accessibility to the garden	Accessibility to the river	Formal organized Parking Availability (yes/no)	Built Heritage Protection Status
Garden 37	Haveli of Jafar Khan	1637	Lost	Residence	-	No	No	Partially Protected by ASI
Garden 38	Rauza of Sasat, tomb of Shaista Khan,		Lost	Residence	-	No	No	
Garden 39	Haveli of Wazir Khan,		Lost	Multiple Use : Residences offices, industrial	-	No	No	
Garden 29	Haveli of Dara Shikhoh	1620s	Structure Exists	Monument	Limited accessibility	No	No	ASI Protected (Structure protected)
Garden 30	Haveli of Khan-i-Jahan Lodhi	1620s	Lost	Residences	-	No	No	
Garden 31	Haveli of Hafiz Khitmadgar	Not Known	Lost	Residences	-	No	No	
Garden 32	Haveli of Asaf Khan	Before 1634	Structure Exists	Residence	-	No	No	Unprotected
Garden 33	Haveli of Alamgir	1600	Lost	Residence	-	No	No	
Garden 34								
Garden 35								
Garden 36	Haveli of Sasat	1657	Lost	Residence	-	No	No	
Garden 37	Haveli of Jafar Khan	1637	Lost	Residence	-	No	No	Partially Protected by ASI
Garden 38	Rauza of Sasat, tomb of Shaista Khan,		Lost	Residence	-	No	No	
Garden 39	Haveli of Wazir Khan,		Lost	Multiple Use : Residences offices, industrial	-	No	No	

The road along the western bank of the river has not only fragmented the gardens

but also disconnected the city with the river.

John mill area is a surviving example of colonial industrial heritage. It is abandoned and neglected and prone to encroachments. With the removal of industries functioning from within, the area is under threat of real estate development, which will result in the loss of the colonial industrial heritage.

Figure 4.150 Agra: John's Mill compound	Figure 4.151 Agra: Johns mill compound
	

Large heritage properties are laying vacant and in disuse, depriving the community of use of large spaces along the river edge.

Adoption of insensitive urban design vocabularies

Designed access to the river is very limited. Because of high walls along the road running next to the river, the latter is not visible and stays disconnected from the many visitors who frequent this road.

The east gate entry stretch from the parking to the east gate of Taj Mahal is designed with excessive use of bollards and lighting fixtures. There is a complete absence of shade along this route meant for pedestrian movement.

Figure 4.152 Agra: Taj Mahal East gate	Figure 4.153 Agra: Taj Mahal East gate
	

Absence of design guidelines in heritage areas

Lighting fixtures and other infrastructure are ill sited in front of heritage structures.

Figure 4:154 Agra: Taj Mahal East gate



4.3.3 Urban Design Issues

4.3.3.1 Assessment at Taj Precinct Level

This section discusses and assesses the issues at the Taj precinct level in Agra. The section primarily looks at the present delineation Taj Precinct as per the provisions and proposals in the Master plan as well Smart city proposal. Apart from the delineation issues, other aspects covered in the section are relationship of Taj Mahal with Tajganj, rapid and uncontrolled change in urban form and character of settlements around Taj, movement in and around Taj precinct and visual relationship of Taj Mahal and Agra fort with river.

A. Definition of Taj Precinct

The Master plan 2021 for Agra defines a 'Taj Dharohar Kshetra' as a heritage precinct around Taj by identifying important heritage sites along the Yamuna starting from Taj Mahal to Mahtab Bagh on either side of the river. The region has been defined at a 500 m buffer distance from the Taj Mahal Complex, including the Taj nature walk area, Proposed National Park area on the other side of the river and extends till Rambagh along with Itmad-ud-daulah marg. Towards east crossing, the Yamuna Bridge area is delineated from Water Works Chauraha, along with Yamuna Bank Road till Railway Bridge. Later it also includes the area enveloping Agra Fort road along with the monument. This entire strip is defined as 'Taj Heritage Precinct' where Taj Mahal complex, Fort complex, Mehtab Bagh/Charbagh, Humayun Mosque, Itmad-ud-daula, Chini ka Rauza, Rambagh etc. are the protected monuments falling under the defined area. Many historically and archaeologically important monument/complex are located within the precinct. The main intent of defining Taj Dharohar Kshetra in the master plan

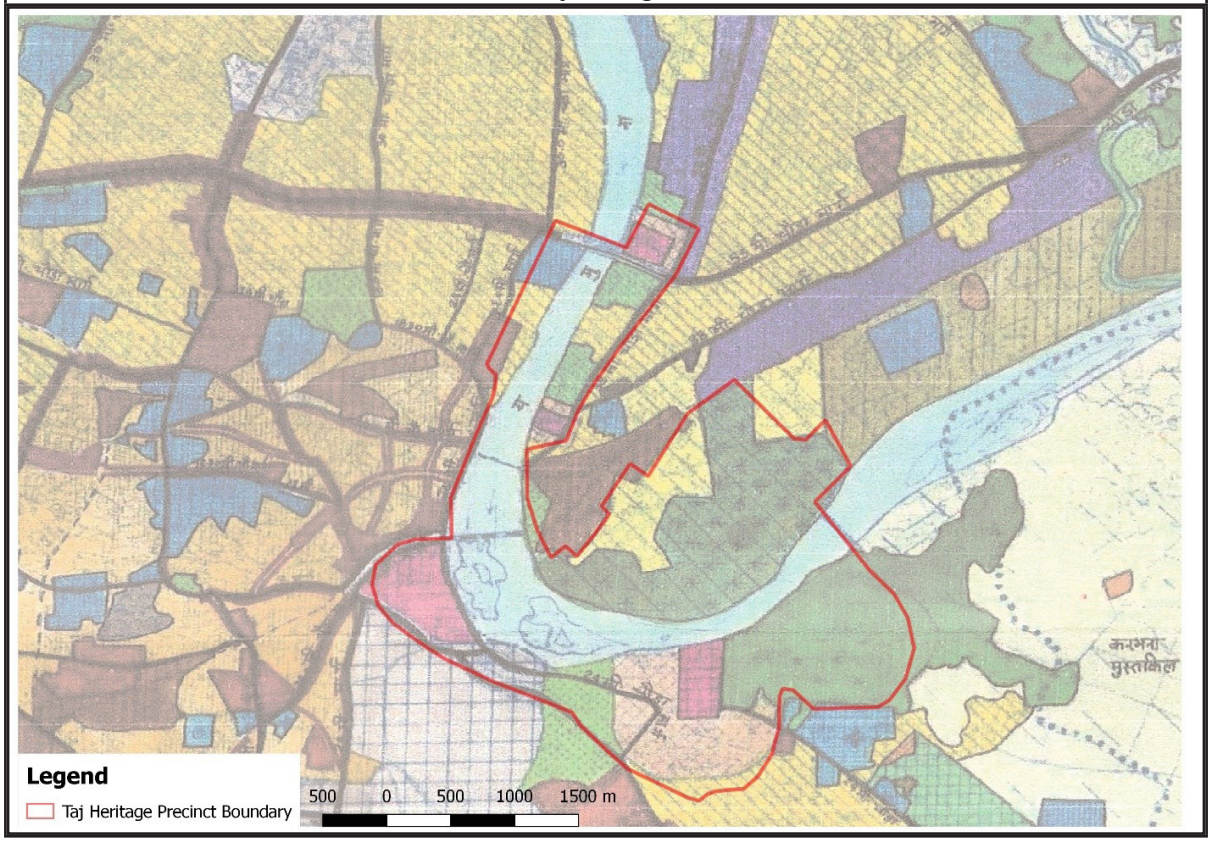
is for easy access of historic sites for a pleasant experience of tourists by creating tourist circuits and protecting historic sites along the Yamuna bank.

There are certain areas within the precinct that are residential in nature and many Bastis are located north of Mehtab Bagh and Charbagh. A large chunk of the land parcel is used

for Water Works on Mathura-Kanpur road by the Water Works department around which industrial activities are also evident.

There is no discussion about the alteration of existing buildings in the Master Plan 2021 in Taj Dharohar Kshetra. The Master Plan prohibits any new construction or rebuilding. It also proposes to relocate industrial units to industrial zones in a phase wise manner. Similarly, there are a number of commercial establishments and complexes located on the road extending from water works Chauraha to Jiwani Mandi Chauraha that are proposed to be retained as they are currently catering to the needs of the surrounding areas. Even though it is proposed to retain these in the Master Plan, the development of such areas is also taken into account and to be controlled and regulated as per the Master Plan.

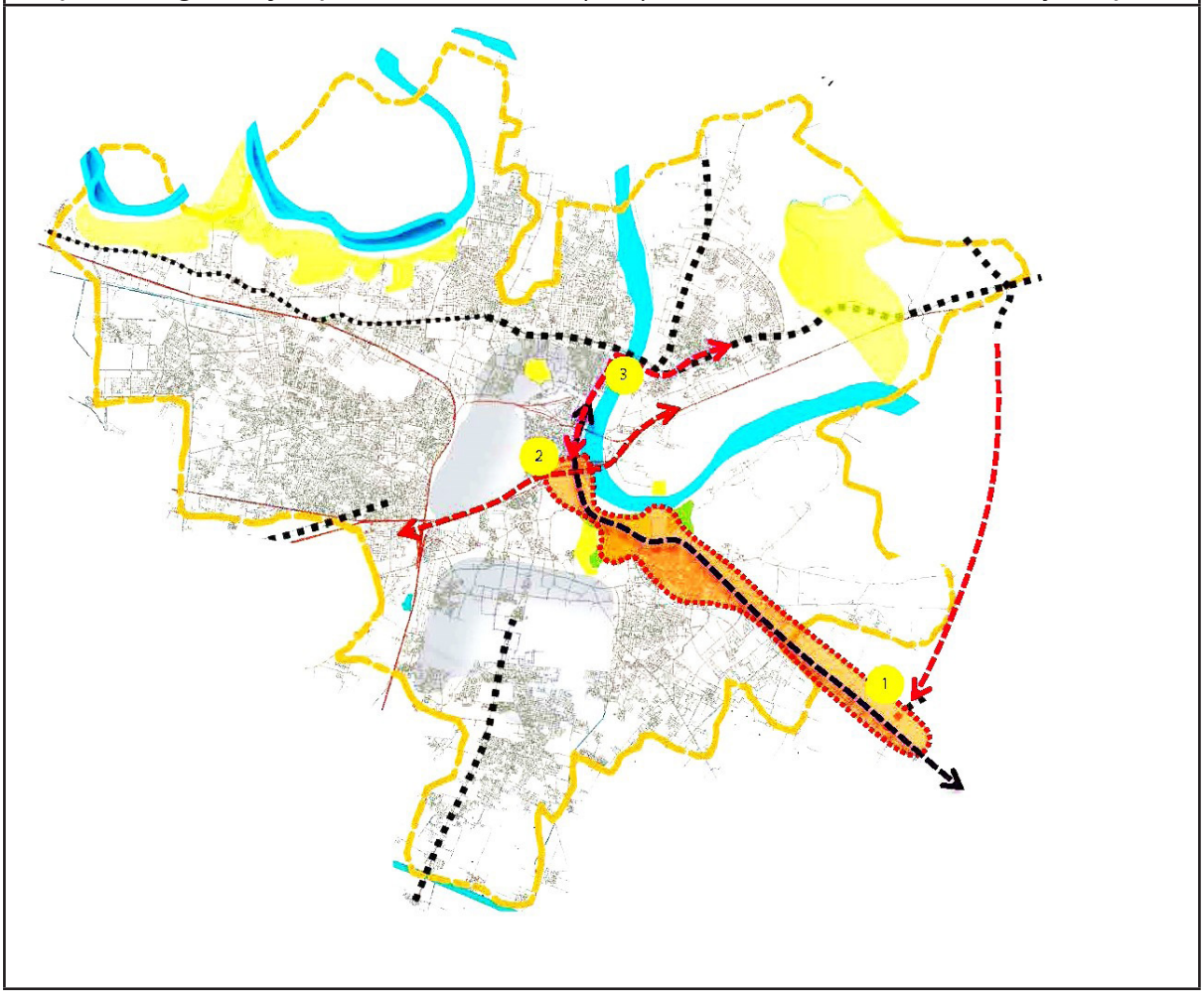
Map 4.38 Agra:Taj Dharohar Kshetra delineation and other character districts in the city of Agra



The Master Plan 2021 takes a clear stance in retaining and improving the existing

residential settlements (including the slums) within the demarcated heritage precinct and are reserved for residential use which is sustainable, inclusive and cost effective. It also specifically mentions proposals for the beautification, improvement and infrastructure provision for slums located in the demarcated area.

Map 4.39 Agra: Taj Improvement District (TID) demarcated in the Smart City Proposal



Smart City proposal of Agra defines another heritage precinct called Taj Improvement District (TID). It envisions retrofitting of 2250 acres comprising of Taj Mahal and area comprising Tajganj, Agra Fort, Jama Masjid and Fatehabad road till inner Ring Road. With an envisaged outlay of INR 1699 Crore spread over the next five years, the TID aims to revive the historic relationship of the micro commerce with the monument. The retrofitted areas are imagined to become a new socio-economic engine for the Taj experience. The proposal revolves around mainly street improvement, beautification, decorative flyovers, murals and some façade improvements in the old city and lacks comprehensive approach towards making provisions in conserving the heritage precinct defined in the Smart city proposal and at the same time does not acknowledge the Taj Precinct defined in the Master Plan 2021. Both the delineated heritage precinct/ district do not fall in tandem with each other and TID although tries to capture the

form and space of the proposed district and makes provision for creating urban design guidelines for the region. The Master Plan proposals for the Dharohar Kshetra fails to discuss the local conditions, socio-economic or physical aspect of the areas falling under the precinct and a template regulation of Mughal style elevation and 3.75 height restriction is proposed. Any attempt of delineating a heritage precinct by the State is not contextual and does not represent varied nature, history and socio-economic profile of the settlements and sites falling under the delineated area.

The imagination of an important heritage precinct such as Taj Dharohar Kshetra is devoid of any consideration around form and space apart from the 300 and 100m buffer zone and height restriction of upto 3.75m in the Dharohar Kshetra and 7.5m in the adjacent areas. The tourism policy around the Taj precinct is based on point-to-point approach and lacks a comprehensive understanding in the development agenda of the city authorities (Refer Annexure 6.1).

There are no special provisions, development controls, regulation or guidelines in the Agra building bye laws for the Taj Heritage Precinct. The document provides generic guidelines for the city and does not take any special demarcated area into consideration. The building bye laws for the city are general building bye laws by the UP town and country planning department and do not correspond with the Master Plan proposals.

B. Relationship of Taj Mahal with Tajganj

The bazaar and the Caravan Sarai complex which originally formed an integral part of the Taj Mahal has now almost been obliterated by the city quarter known as Tajganj. The narrow streets lined with small shops trading in marble inlay work and other souvenirs was once the main bazaar street of the utilitarian complex.

As Taj Mahal gained prominence by itself being declared a World Heritage monument, the settlement fabric of Taj Ganj became merely a buffer zone and the integral relationship between the monument complex and its surrounding settlement got lost. The mausoleum was designed to be accessed as a transition from the realm of the worldly and the material to the realm of the funerary and spiritual. This transition was marked by a series of entrances in Tajganj. At the southern end of the complex is the Dakhini Darwaza, which marks the entrance into the complex into its worldly zone. It is a transition between the city and the Taj complex. There are a total of four Katras (Katra Omar Khan, Katra Phulel, Katra Reshum and Katra Jogidas) leading to the South gate that also marks the distinction between the present boundary of the Taj Mahal complex and the Katra, which were once part of it.

Figure 4.155 Agra: Congested inner lanes leading towards historic gates	Figure 4.156 Agra: Deserted streets in the evenings
	

Tajganj currently represents an ironical condition when compared with Taj Mahal. economic and visual relationship of Tajganj with the monument is an important issue to be addressed. Protection and enhancement of the morphology of Tajganj along with livelihood options and public space improvement are important areas of concern as Taj and Tajganj share a historic link. The sequential vision provided by the streets of Tajganj towards the monument is a unique experience (planned in the original layout of Taj) and thus needs enhancement. Areas around Tajganj are dead after evenings, whereas with the present streetscape work, especially around east gate, an unused opportunity exists to activate spaces in and around Tajganj for tourist and most importantly local everyday experience.

C. Development Zones and Urban Form

A rapid transition in the character and urban form of the settlements around Taj precinct can be noticed due to pressure of urbanization with lack of basic infrastructure provision. In addition, ASI Act stipulates 100m prohibited and 200 m regulated zone around the nationally protected monument. In this regard, no special regulations and heritage bye-laws are in place to protect the urban form around these monuments.

The multiple character districts around Taj and other ASI heritage sites are not recognised in the master plan and building bye laws for future proposals. The character of these heritage districts is degrading with time due to lack of infrastructure provision and development regulations. Specific provisions for building level improvements (façade, height, reconstruction etc.) are not in place and this may lead to complete destruction of visual character and urban form of areas around the monuments.

The bastis located along the Nallah (which forms the moat for Agra fort) are in poor and unhealthy living condition, facing a sheer lack of basic infrastructure. The state of housing is also under deterioration, in other residential areas, around the various heritage districts. Uncontrolled expansion of floors and built density is resulting in loss of unique form-space relations of the character zones.

The proliferation of commercial establishments in the primary streets is bringing unchecked commerce and haphazard development pattern in the settlements. There is no provision for pedestrian movement and vehicular transport remains unchecked. Lack of provision for arrival space/drop-off space, haphazard on street parking of two wheelers and four wheelers and hawkers selling essential commodities to visitors is also creating chaos and degrading the quality of living.

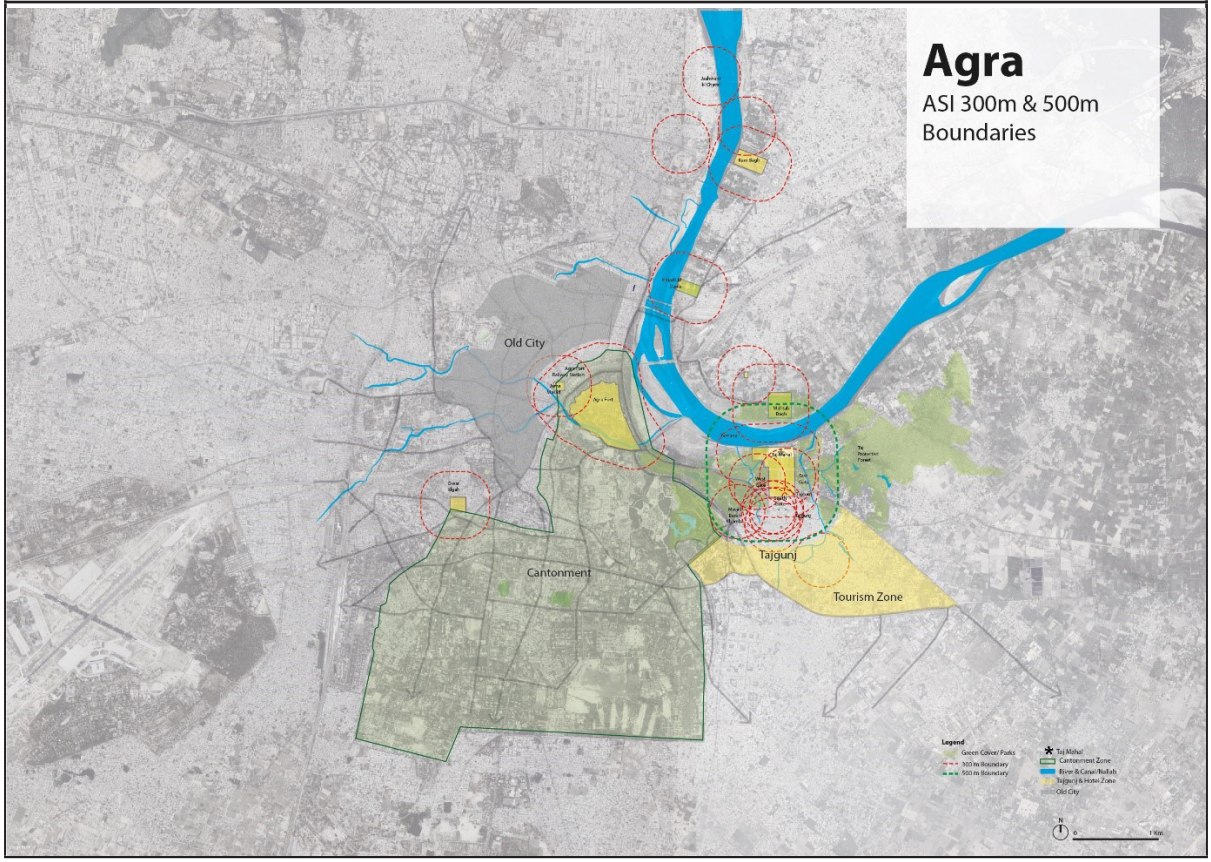
The space between the Road and Fort Wall is not properly maintained. Unregulated vertical development in the settlements around the monuments is resulting in the obstruction of the historical visual axis and vantage points at various locations. There were many vantage points located where a strong visual connections were formed with the Fort, Jama masjid as well as the Taj Mahal. These vantage points are in threat due to pressure of urbanization.

Figure 4.157 Agra: Settlement around Raja Jasant ki Chatri facing lack of basic infrastructure, subsequently losing its character	Figure 4.158 Agra: Street character in Tajganj
	

The defined heritage zones would have a significant impact and influence on the surrounding areas. Neither the influence zones nor the edges of the precinct are taken into account in the master plan, building bye laws or any other state sponsored programs. There is no discussion about the edge treatment of the Heritage precinct. There are proposals under the smart city project that covers some of these character zones to redefine urban morphology, improve walkability, provide infrastructure and revive heritage and facilities to promote tourism. Land use in these areas is a mix of commercial and residential, with houses, shops and workplaces having a long history

of coexistence.

Map 4.40 Agra Map with 300m & 500m boundaries around the monuments



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D. Movement in and around Taj Precinct

Despite the implementation of a detailed footpath and lighting plan at the Eastern Gate, the footpaths are not user friendly as they are without any major tree cover. As Agra has hot weather for more than 8 months, pedestrian convenience around the Taj needs a sensitive design approach and proper maintenance. E-rick and Auto movement through Tajganj East-West Spine without any demarcated or designed infrastructure to serve as transit node or stands is also creating nuisance and disrupts in the viability of a pleasant pedestrian experience.

The forecourt of Agra Fort, despite being a UNESCO protected monument represents a case of neglected space by the city authorities. Mixing of City traffic with destined traffic at Fort is another issue to be addressed for enhancing the visitor experience and convenience. Lack of any convenient pedestrian infrastructure is also observed around the fort and other monuments.

Roads connecting Agra Fort to Taj Mahal West Parking & Purani Mandi Chowraha are major connectors for tourists and fails to provide pedestrian friendly environment. It has narrow footpaths with high curb stone. These routes are accessed through cars by most of the tourist, but if suitable edge condition is created this can enhance the quality of space for the tourist as well as for locals. The present edge conditions of the roads and important routes to access the monuments and the Taj precinct at large is facing negligence and lack of character.

Figure 4.159 Agra: underdesigned pedestrian corridor at Tajganj	Figure 4.160 Designed pedestrian corridor leading towards East gate
	

E. Visual Relationship of Taj Mahal and Agra Fort with River

Historically, Taj Mahal had an integral relationship with the Yamuna River and Mehtab Bagh across the river. The strategic location of the Taj at the meandering point of the river provided a dramatic backdrop to the monument. At present, Yamuna riverfront is in a barren condition, covered with untreated sewage, plastic and needs an ecological restoration. At the same time, the river cannot be accessed and enjoyed by the public. The river bank around the Fort in Agra lacks any character or access and is almost treated as an urban backyard. The Fort once overlooked the river and a striking visual connection was established between the two entities. At present, the river holds no importance around the monument and its surrounding areas and lack of accessibility presents further challenges.

The Master plan recognizes the degrading condition of Yamuna in Agra and specifically around the Taj Precinct and addresses it primarily from environmental pollution and

tourism point of view. A national park has been opposed north of Taj mahal, across the river and including Mehtab Bagh, Charbagh etc. In order to save Yamuna from pollution, it proposes to tap the drains discharged in the river and it is suggested to release them downstream.



C

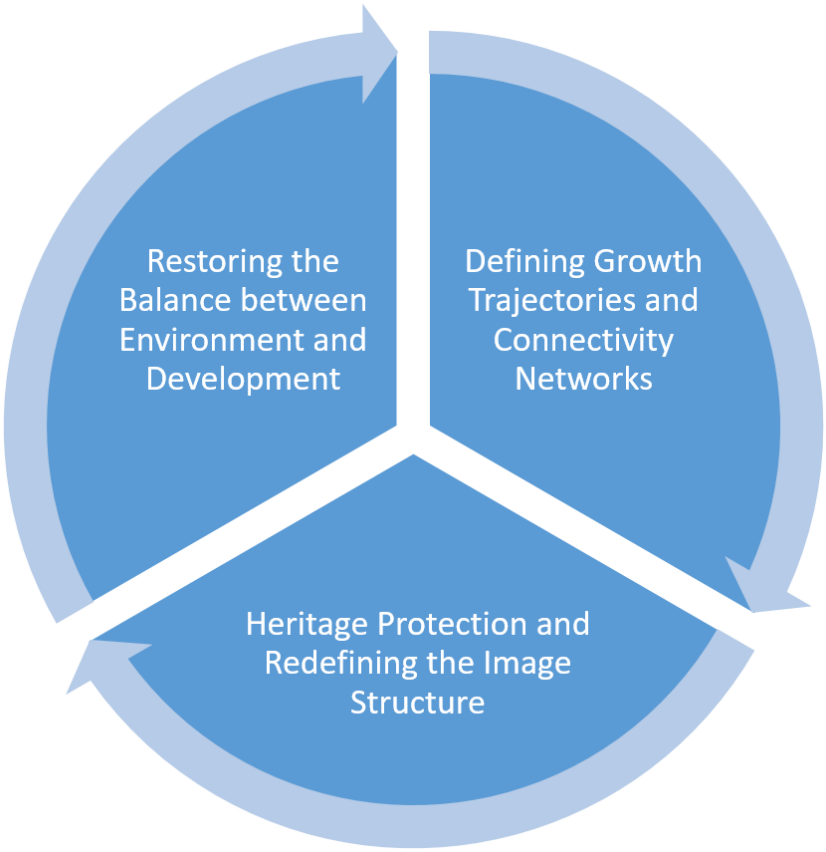
Part C - Strategies, Recommendation & Action Plan

5. STRATEGIES, RECOMMENDATIONS & ACTION PLAN

Vision Statement

"Prosperity through enviornmental upgradation, heritage conservation by enhancing livelihood and revival of socio-cultural and economic linkages and promoting sustainability in sectors such as tourism, industry, agriculture, services and transportation"

5.1 Anchors of the Vision



5.2 Anchor 1: Restoring the balance between Environment and Development

5.2.1 Strategeis at Regional Level

5.2.1.1 Strategy 1: Resource Conservation, Protection and Augmentation:

- Reclamation of wastelands (ravines) and controlling salinity.
- Demarcation of flood plains of River Yamuna and listing permitted and non-permitted activities in flood plains.
- Improvement of water quality of River Yamuna by ensuring for actions by other states upstream of TTZ and within TTZ.
- Control of pollution that directly enters River Yamuna from and streams and tributaries (perennial and seasonal).
- Identification, listing and protection of all lakes, ponds, waterbodies in TTZ and bringing them under protection in urban and rural areas.
- Promotion of water conservation/recharging practices in rural areas.
- Regulating activities in Eco-Sensitive Zones around the Protected Areas in TTZ, Keoladeo Sanctuary, Keetham Sanctuary and Bandh Baretha Sanctuary.
- Preparation of Management Plan for Keetham sanctuary.

5.2.1.2 Strategy 2: Pollution Control and Waste Management

- Setting up of new monitoring stations for air and water pollution to monitor pollution level in urban and rural areas (not all towns in TTZ have air monitoring stations and monitoring is required for large villages which are market centers or mandis.
- Control of agricultural waste burning
- Control of dust from rural area by afforestation, agroforestry, plantation along canals, river and stream banks and around water bodies.

5.2.1.3 Strategy 3: Infrastructural Upgradation

Ensuring safe water supply and sanitation in rural areas as per norms proposed in RADPFI (Rural Area Development and Plan Formulation and Implementation Guidelines, Government of India, 2016).

- Improvement of sanitation and achievement of Open Defecation Free status (ODF) in rural areas.
- Upgradation of Social Infrastructure, Health, Education and Community Facilities is rural areas as per RADPFI norms, GoI, 2016.
- Upgradation of Physical Infrastructure in rural areas, Transportations, Rural Roads, Electricity, Communication as per RADPFI norms, GoI.

5.2.1.4 Strategy 4. Socio-economic upliftment by Promoting non-polluting industries and eco-tourism.

- Promotion of traditional and household industries existing in rural areas by ensuring links to market facilities.
- Promoting green energy, waste management and recycling practices in household industries.
- Green Skill Development to develop manpower for eco-tourism, monitoring pollution and enabling recycling.

5.2.2 Strategies at City Level

5.2.2.1 Pollution Control and Waste Management

- Setting up of monitoring stations to record trends of air, noise and water pollution in new upcoming areas.
- Control of waste- municipal solid waste hazardous waste, bio-medical waste, e-waste, CD waste by adhering to regulation of Government of India.
- Strict implementation of dust control rules and norms.
- Environmental Impact Assessment of projects as per MoEFCC Notification and as per management of environment in TTZ emphasizing the need of sustainable

development in the light of basic principles of environmental protection viz., Precautionary Approach and Polluters Pay Principle.

- Proper waste water management (convention & decentralized methods).

5.2.2.2 Resource conservation, Protection and Augmentation

- Identification of areas for water recycling and developing appropriate green cover in parks, institutional areas and green incidental open spaces.
- Propagation of indigenous, naturalized species for afforestation, roadside plantation, plantation in parks and play grounds etc.
- Air Pollution: Apportionment study recommendations to be implemented as and when available
- Propagation of clear a green energy in all sectors, residential, commercial, industrial, transport, institutional utilities etc.
- Rain Water Harvesting at building level to be impleted strictly.

Figure 5.1 Waste water treatment methods

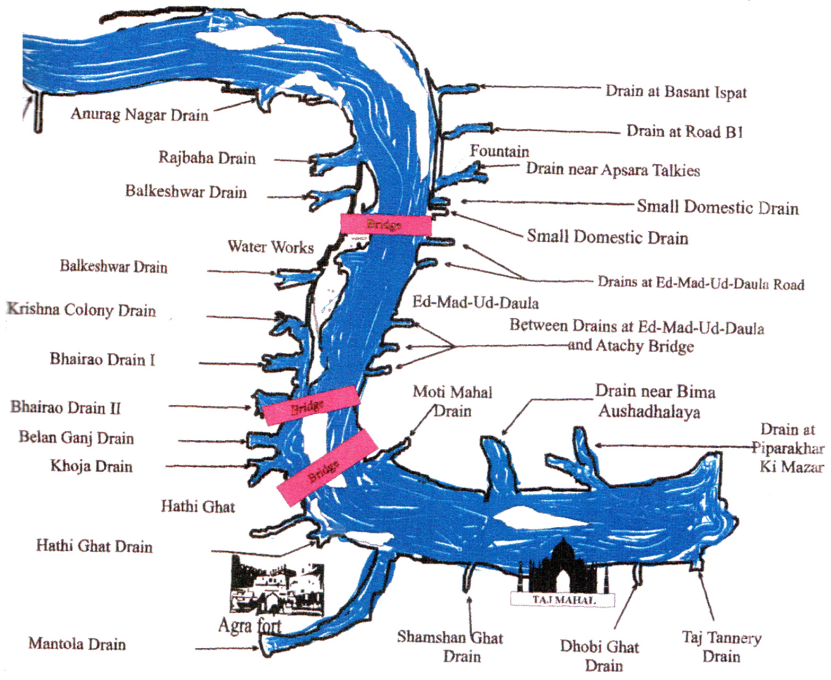


Fig. Outfall of Drains into Yamuna
Jain, R.K. (2007) , Impact of Agra Masterplan 2021 on Ecology, Environment and Heritage of Agra City

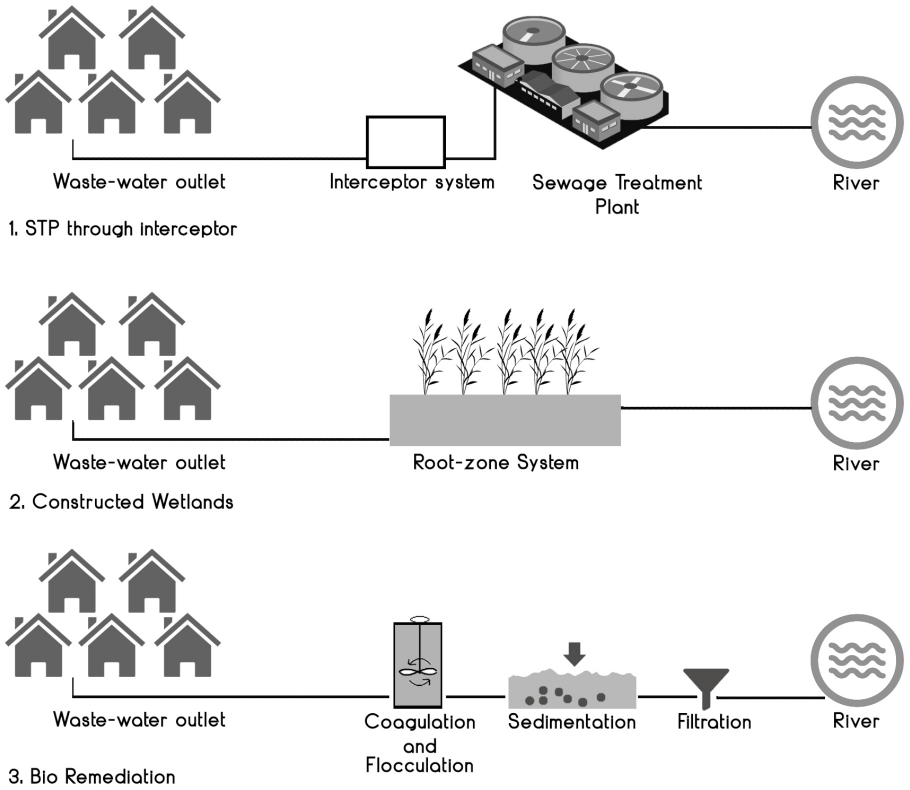
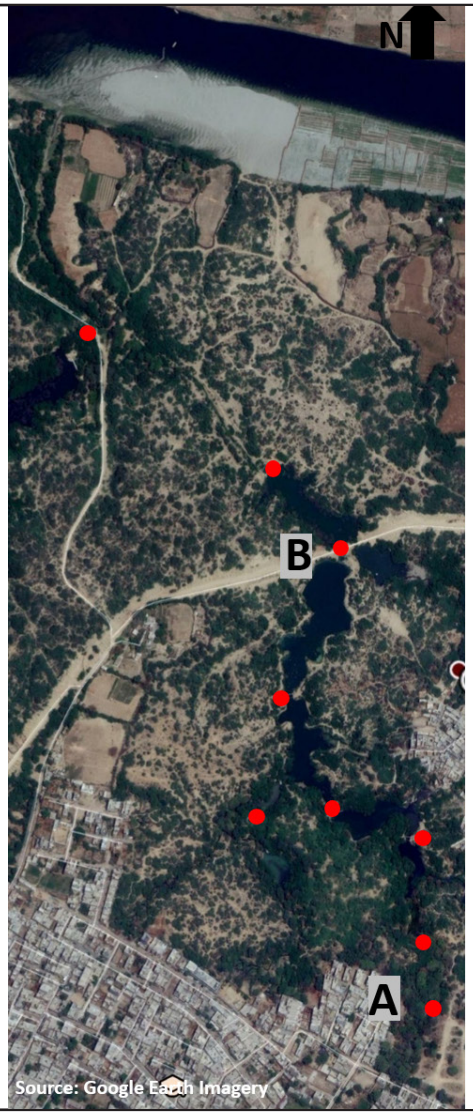


Fig: Solutions proposed for treatment of Wastewater

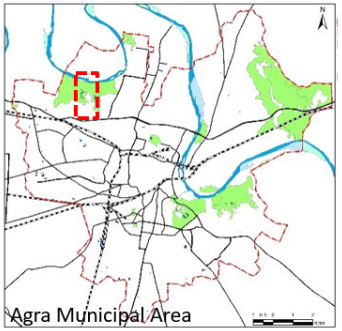
Source: Impact of Agra Master Plan 2021 on Ecology, Jain, R.K., 2007

Figure 5.2 Kakreta Constructed Wetland



Kakreta Constructed Wetland

Location



Wetland where nallahs are treated through means of natural ways and as a output-water is cleaner than STP treated ways over a span of 1.5 km. (Source: SPCB)

- Inlet is of 8 nallahs of 8-10 MLD each,
- Aquatic plants and filtration techniques are only used.
- Water is treated through levels of 9 check dams in total.

Legend:

Check dam structures



VIEWS AT B (Check-dam number 6)

2(a): Outlet into the wetland
2(b): View of the wetland
2(c): Check dam number 7

VIEWS AT A (Kakreta nallah)

1(a): Sewer outlet into the system
1(b): Steps for overflow and filtration at check dam
1(c): Outlet from Gate 1



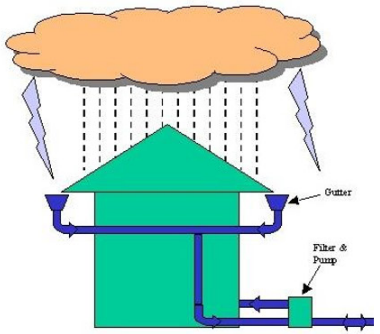
Source: SPCB and Primary Survey, 2018

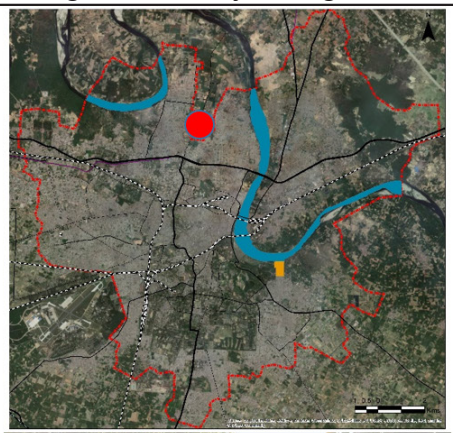
Figure 5.3 Dayal Bagh Eco-Village

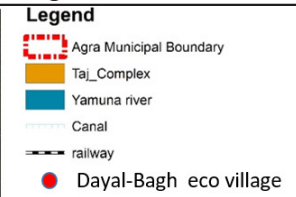
Dayal Bagh Eco-village, Agra

KEY FEATURES:

- Developing open protected areas.
- Maximizing conservation range and ecological variability of habitats.
- Developing ecologically resilient and varied landscapes to provide niche for local and migrant species.
- Establishing ecological networks through habitat protection.
- Recycling and reducing energy.
- Increasing greenery, better trash management, less use of private vehicle.







Dayal Bagh is a self-contained colony renowned for its serene environment and secular establishments, in which its inhabitants lead an active, disciplined and co-operative community life.









Source: Dayal Bagh Way of Life for Better Worldliness; D.K. Chaturvedi, Lajwanti

Table 5.1 Biodiversity Index

Sl. No.	Indicators
1	Proportion of natural areas in the city
2	Connectivity measures or ecological networks to counter fragmentation
3	Native biodiversity in built-up-areas - Bird Species
4	Change in number of native vascular plant species
5	Change in number of native bird species
6	Change in number of native buttterfly species
7	Change in number of native reptile species
8	Change in number of native fresh water fishes species
9	Proportion of protected natural areas
10	Proportion of invasive alien species (as opposed to native species)
11	Regulation of quantity of water
12	Climate regulation; carbon storage and cooling effect of vegetation
13	Recreational and educational services (area of parks with natural areas and protected or secured natural areas)*/ 1000 persons)
14	Recreational and educational services (number of formal educational visits per child to parks)
15	Budget allocated to biodiversity
16	Number of biodiversity projects implemented by the city annually
17	Policy, rules and regulations - existence of local biodiversity strategy and action plan
18	Institutional capacity: number of essential biodiversity-related functionaries in the city
19	Institutional capacity: number of city or local government agencies involved in inter agency cooperation pertaining to biodiversity matters
20	Participation and partnership existence and state of formal or informal public consultation process
21	Participation and partnership number of agencies/ private companies/ ngos/ academic institutions/ international organisations with which the city is partnering in biodiversity activities, projects and programmes
22	Is biodiversity or nature awareness included in the school curriculum (e.g. biology, geography, etc.)
23	Number of outreach or public awareness events held in the city per year

Source: Singapore Biodiverstiy Indicators

5.2.2.3 Infrastructural Upgradations.

- Ensuring safe drinking water supply
- Making urban areas open defection free
- Ensuring adequacy of Social Infrastructure (Health, Education, and Community Facilities) as per URDPFI norms 2015.
- Physical infrastructure such as electricity, street lights, to be adequate as per norms.

5.2.2.4 Socio-economic implement by promotion of Green Skills.

- Green Skill Development in all development sectors to enable monitoring and implementation of environmental friendly activities, as per GSDP (Green Skill

Development Programme) launched by Government of India.

5.2.3 Strategies at Precinct level

5.2.3.1 Resource Conservation and Protection

- Ensuring appropriate plantation in and around Taj to protect movement from dust and humidity
- Strom water drainage to be kept free from clogging up to prevent flooding in the area.

5.2.3.2 Pollution control and waste Management

- Control of all air polluting activities in the precienct, prevention of dust, control of vehicular congestion informal cooking activity in open.
- Pollution control of the drains in the east and west of Taj Mahal, desilting, intercepting the sewage for treatment at STP.
- Waste recycling reuse, waste to energy system to be promoted.
- Conversion of crematorium to electric crematorium or only limiting cremation when wind direction is away from Taj Mahal.
- Crowd management to be within holding capacity of the Taj Mahal taking into account the time spent by each tourist.

5.2.3.3 Infrastructural Up gradation

- Water supply, Toilets, Lighting, and Dust bin to be as per norms.
- Installing of digital methods for maintenance of infrastructure.

5.3 Anchor 2: Defining Growth Trajectories and Connectivity Networks

5.3.1 Strategies at Regional Level

5.3.1.1 Streamlining Urban Development and Land Use Allocation Processes

Objective 1: To encourage and facilitate a planned development process

Strategy 1: To effectuate and ensure, the adherence to the planning regulations and processes laid down by the Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines of 2014.

- To prepare GIS based resource plan for TTZ - land, air, water and biotic resources.
- To prepare Master Plans and Development Plans for the Municipal Corporation boundary and the planning boundary for all class I, II and III cities and towns in TTZ.
- To integrate Master Plans (at the Regional level) with the sectoral plans including,

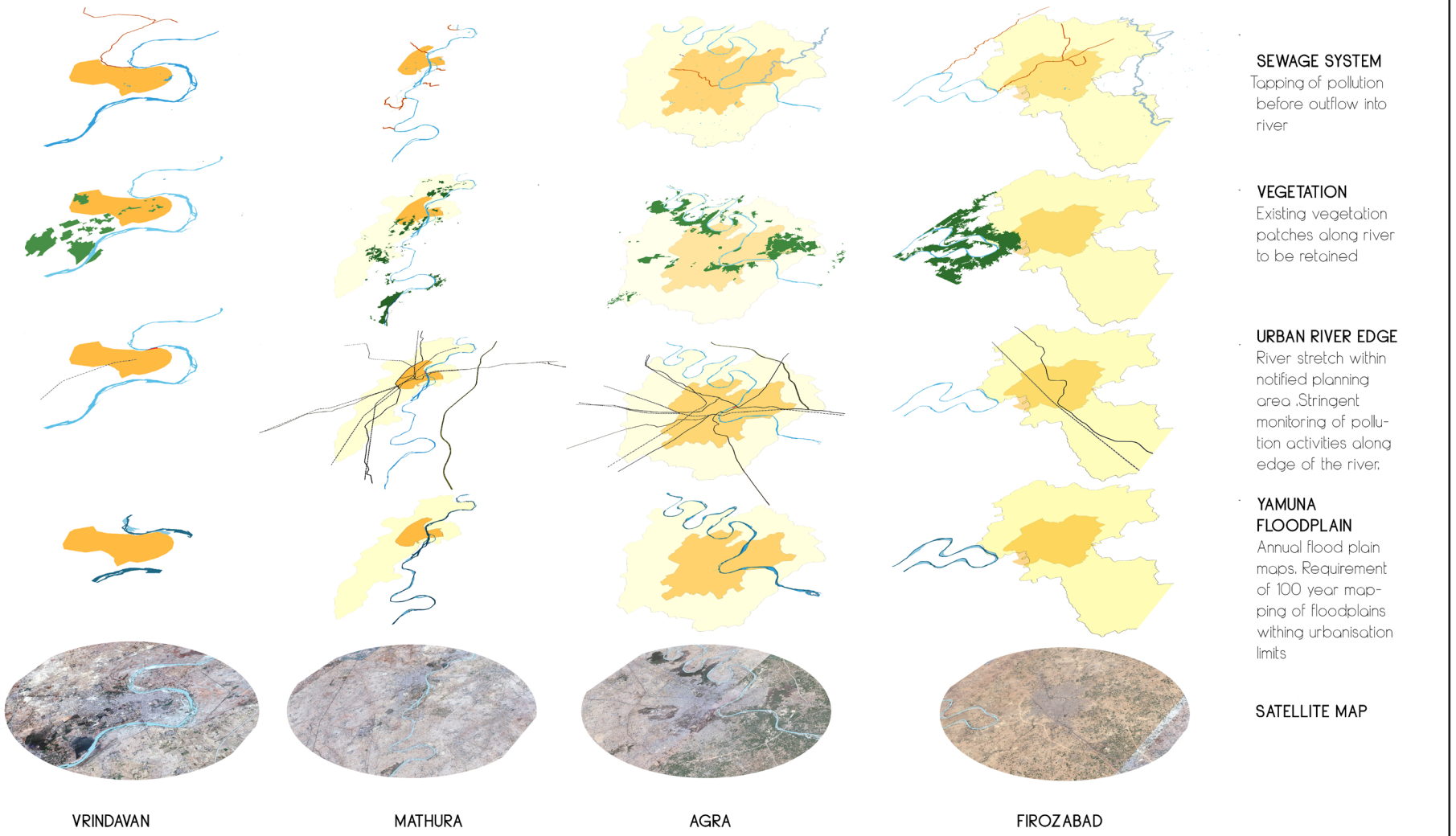
transportation, infrastructure, MSME schemes, etc.

- To review, update and amend the City Level Master Plans nearing their 20-year period, in coordination with the proposed TTZ Regional Plan.
- To set up New Development Control Regulations for historic core of Vrindavan, Bharatpur, Mathura, Agra, Firozabad, etc., w.r.t. facade control, height and plinth control in TTZ.
- To initiate Capacity building in all Urban Local Bodies

Strategy 2: To ensure that the Regional Plans, Master Plans, Land use Plans, Zoning ordinances and other related planning documents reflect the visions and mandates of TTZ.

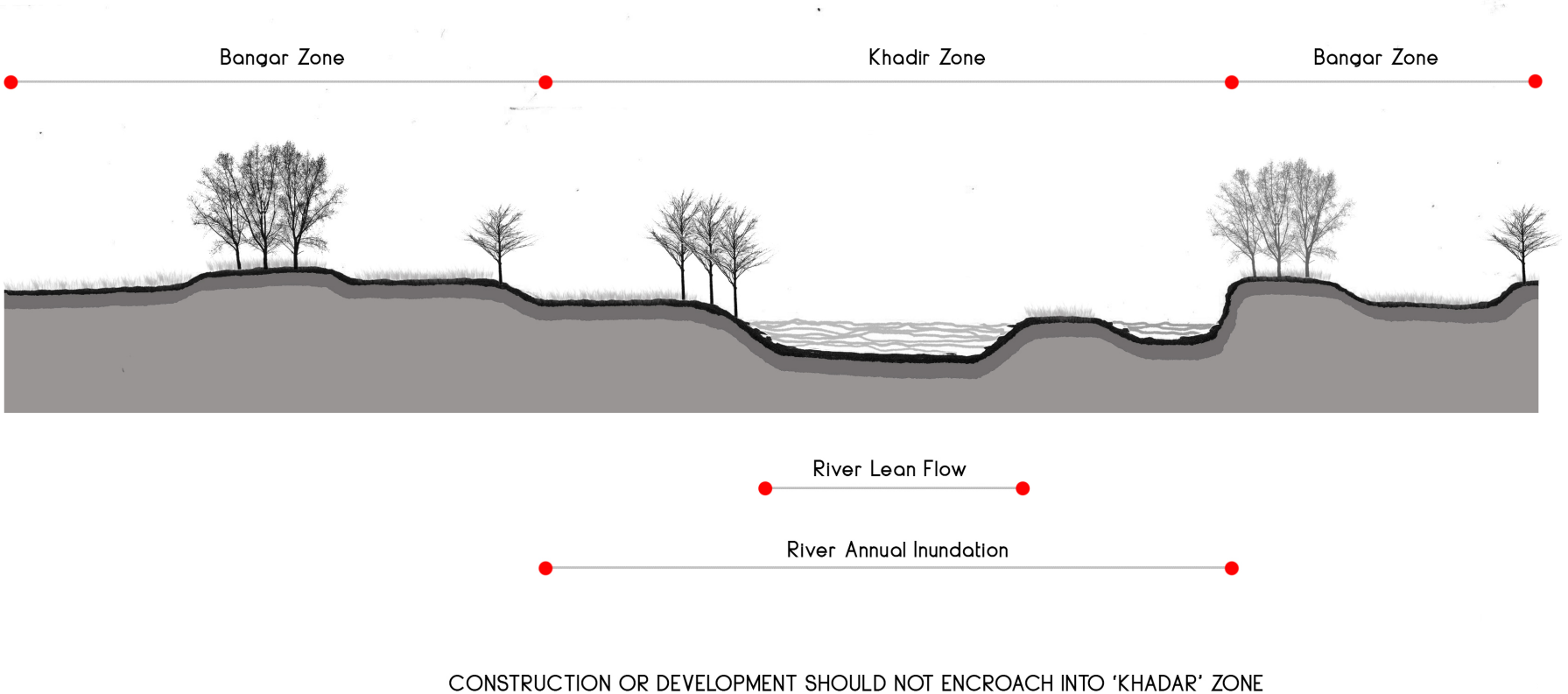
- To strictly allocate land uses as per the proposed Regional level and City Level Master Plans.
- To integrate land use plans along expressways with the Regional development plan following rules and regulations laid by the supreme court and the Government of Uttar Pradesh and Rajasthan
- To regularly monitor the growth and development of the cities particularly along the expressways and fringes to ensure the Master Plans are being adhered to.
- To ensure land use changes are made as per the planning guidelines and as per the Master Plans.
- To strictly adhere to land uses allocated along the river as per Master Plan to ensure the restoration and conservation the River Yamuna.
- To ensure all planning processes and documents developed for same incorporate the visions and mandates of TTZ to protect, conserve and restore the environment, heritage and the social structure of the region with the adoption of sustainable environment friendly initiatives and strategies.
- To adopt Development Control Regulations (DCRs) for mixed use development.

Figure 5.4 Cities along River Yamuna



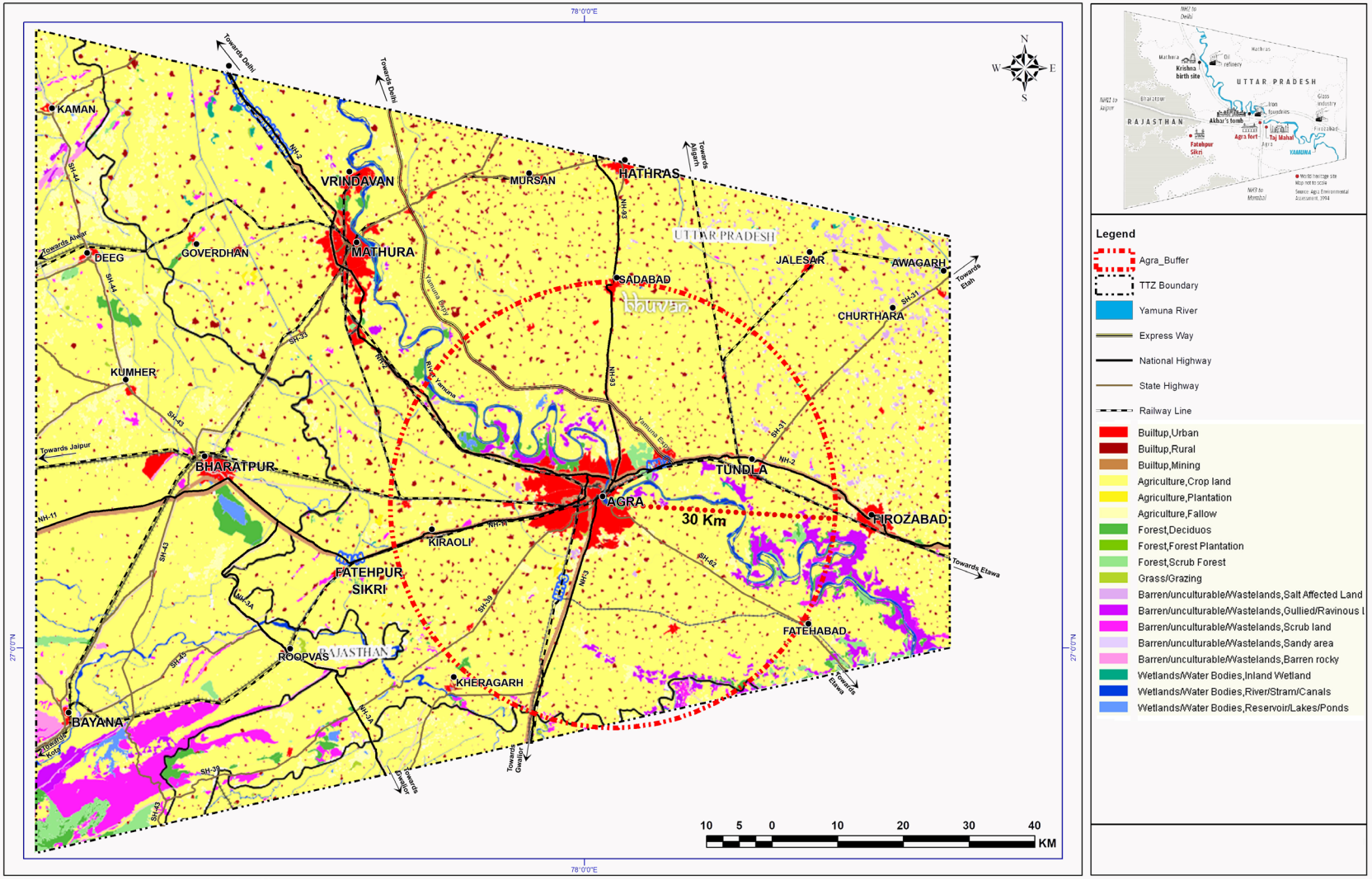
Source: SPA, Delhi

Figure 5.5 Khadar and Bangar Zone Schematic



Source: SPA, Delhi

Map 5.1 30 Km Controlled Area around Taj (Airshed to control air polluting activities)



Legend

- Agra_Buffer
- TTZ Boundary
- Yamuna River
- Express Way
- National Highway
- State Highway
- Railway Line
- Builtup,Urban
- Builtup,Rural
- Builtup,Mining
- Agriculture,Crop land
- Agriculture,Plantation
- Agriculture,Fallow
- Forest,Deciduos
- Forest,Forest Plantation
- Forest,Scrub Forest
- Grass/Grazing
- Barren/unculturable/Wastelands,Salt Affected Land
- Barren/unculturable/Wastelands,Gullied/Ravinous l
- Barren/unculturable/Wastelands,Scrub land
- Barren/unculturable/Wastelands,Sandy area
- Barren/unculturable/Wastelands,Barren rocky
- Wetlands/Water Bodies,Inland Wetland
- Wetlands/Water Bodies,River/Stram/Canals
- Wetlands/Water Bodies,Reservoir/Lakes/Ponds

Source: Generated in GIS; SPA, Delhii

5.3.1.2 Upgrading Existing Economy Generating Mechanisms and Exploring New Economy Generating Opportunities

Objective 2: To promote TTZ as a region that values innovative and creative industries, invests in small-scale entrepreneurialism, and emphasizes on education, arts and culture.

Strategy 1: To encourage Central/UP government to investment in small-scale industries, home based industries and small scale entrepreneurial ventures

- To promote alternative, innovative and creative industries as identified under the "Mapping and Assessment of Creative Industries" report by UP Tourism in March, 2018.
- To promote skill building Institutions for small scale entrepreneurship.

Objective 3: To ensure that the industrial and commercial development adhere to the visions and mandates of TTZ.

Strategy 1: To upgrade infrastructure facilities for commercial and industrial areas

- To provide adequate infrastructure facilities for the commercial and industrial sectors as per URDPFI Guideline Norms 2014

Strategy 2: To discourage and prohibit illegal, unregistered and non-conforming industries and commercial activities.

- To assess unregistered industries, review their eligibility and take actions to enforce registration by upgrading the industry with proper infrastructure as per industry norms.
- Heavy construction material shops to be discouraged within the cities and new commercial areas within the city limits to be identified for them.

5.3.1.3 Exploring Polycentric Approach to Tourism

Objective 4: To encourage the development of new "Urban Destinations with Tourist attractions" in TTZ.

Strategy 1: To create new tourist circuits encouraging tourists to travel to unexplored areas of interest.

- To assess the tourism potential of the region through detailed project reports and develop Tourism Plan for TTZ as per the assessment in the prominent destinations and the unexplored destinations of interest.

- To identify new tourist circuits in the Tourism Plan for TTZ.
- To prepare GIS supported sustainable tourism infrastructure planning framework including attraction, service and transportation facilities.
- To upgrade tourist accommodation and infrastructure facilities as per requirement based on the URDPFI Guidelines 2014 norms in proposed Tourism Plan of TTZ.

Strategy 2: To diversify tourist activities and reduce the seasonality of tourist destinations

- To develop non-conventional areas of interest by quantifying the carrying capacity of each cluster by conducting assessment studies at the sites, while strengthening and applying monitoring and evaluation systems.
- To formulate a holistic visitor management plan, while considering each site cluster in TTZ.
- To promote the art and craft industry as an incentive for attracting tourists in off season.
- To conduct major events during off seasons
- To allocate land-uses with high end amenities to attract, retirement communities, destination weddings and events, long term holiday homes, etc.

5.3.1.4 Deconcentrating and Decongesting Existing Settlements

Objective 5: To encourage a settlement pattern free of congestion and adequate breathing space for approved quality of life as per WHO guidelines.

Strategy 1: To initiate drives for restoration, conservation, retrofitting and redevelopment of core congested settlement areas.

- To effectuate Conservation Zoning and high density and congested settlements within the conservation zones to be redeveloped / restored with adequate upgraded housing and infrastructure.
- To reduce slum development, promote employment opportunities and skill building to ensure a higher earning capacity and encourage approved quality of life.
- To regulate New large-scale developments.

5.3.1.5 Upgrading Infrastructure Facilities and Social Amenities

Objective 6: To ensure that the TTZ has adequate and standard physical and social infrastructure facilities required for a sustainable, healthy and an approved quality of life as per URDPFI guidelines.

Strategy 1: To assess and incorporate plans to meet existing and future physical

and social infrastructure needs.

- To assess the Demand Capacity and the carrying capacity of existing infrastructure.
- To adopt levels of service standards
- To facilitate synergistic co-location of infrastructure facilities to encourage efficient use of limited resources.
- To develop life cycle planning of infrastructure facilities
- To identify, investigate, plan and implement, alternative source of water for water supply (domestic use, drinking, agricultural use and industrial use)
- To adopt decentralized systems for infrastructure in big cities like Agra, and Mathura-Vrindavan.
- To prepare drinking water supply Master Plan for all cities of TTZ and install Water Treatment Plants (WTPs) as per the plans.
- To prepare City Sanitation Plan for all cities in the region and implement it at the earliest possible time frame.
- To adopt mechanisms in industries to encourage generation of bio-degradable waste, zero waste or promote recycling of waste and alternative use of waste.
- To make plan for functioning of STPs with full capacity that can treat wastewater as per norms.
- To give incentives and encourage the use of renewable energy sources like solar energy as alternative energy source
- To regularly monitor and evaluate the infrastructure facilities and their demand from time-to-time.
- To promote infrastructure management and Monitoring Projects like the PAS Project in Gujarat and Maharashtra.

5.3.1.6 Equitable distribution of roads spaces and areas allocated for transportation network

- Existing practices of network and infrastructure planning have prioritized land allocation for roads space and operational design of roads for motorized vehicles. It is recommended to segregate primary pilgrimage routes like Parikrama Marg of Mathura, Govardhan and Vrindavan and retrofit the roads with facility for movement of pedestrian.

5.3.1.7 Restricting growth of polluting and private vehicles

- The unprecedented increase in private vehicles particularly two wheelers need to be curtailed with the objective of improving environmental quality. Strategies

like introducing vehicle quota registration system especially for two wheelers and strict enforcement of standards/norms for checking pollution needs to be adopted.

- In addition to this, the vehicular traffic (driven by fossil fuel) is recommended to be restricted along the entry/exit points particularly in major tourist destined settlements in TTZ like Agra, Mathura, Vrindavan and Govardhan by providing proper parking spaces along these entry/exit points. Further, strict vehicles inspection must be enforced and fossil fuel driven vehicles older than 10 years must be banned in entire TTZ.
- However, in a longer run it is recommended to achieve targets of 100% electric or green fuel vehicles in TTZ by complete ban on sale of fossil fuel driven vehicles.
- In settlements like Vrindavan, vehicular traffic has been increasing thus, on the basis of technical requirement and traffic density widening of Mathura vrindavan road can be undertaken depending upon the policy, guidelines of the government and availability of funds and resources. However, strategies should be laid down to discourage private vehicles within the city. The traffic management plan needs to be developed and actions to de-congest the city should be taken by encouraging energy efficient environment friendly technologies like electric vehicles, public transport, non-motorized vehicles and walking.

5.3.1.8 Revival of the Yamuna River

- Proposals for revival and long-term security of Yamuna are recommended with the objective of restoring the wholesomeness of Yamuna. It is proposed that the water levels must be maintained throughout by constructing check dams, dams or barrages and there must be provisions for environmental flows at dams, barrages and other structures. This would decrease the distance between ground and ground water levels, thereby providing benefits of enhanced vegetation growth in turn reducing erosion, less evaporation losses due to increase in vegetation cover and maintaining the ground water table.
- In addition, since Yamuna is bereft of manmade pollution, it must be proposed that the water quality in the river shall be maintained throughout by managing solid and liquid wastes generated from various land-uses. Further, riverfront development, floodplain management and rejuvenation of water bodies must be adopted to ensure unpolluted flow. Riverbed farming and sand mining from riverbeds shall also be regulated.

5.3.1.9 Enhancing regional public transportation

- Develop a long-range transportation plan to establish a regional road-based

environment friendly public transport system, operated and managed by tourism or transport department or could be through partnership model. This would serve to connect residents of constituent settlements as well as tourists/visitors easily and comfortably to the diversified tourism options offered in the TTZ region.

5.3.1.10 Planned approach towards future mobility planning

- To establish a planned future growth several detailed studies are recommended to enhance the mobility for inhabitants and tourists/visitors.
- Multimodal integrated hubs are required to be designed and developed at major terminals with organized parking for other modes.

5.3.1.11 Parking Management

- On-street parking has been a major concern within TTZ, thus it needs to be addressed with the objective of enhancing road capacities and environment. Strict guidelines need to be adopted discourage private vehicles in the settlements. For those having private owned vehicles, the parking charges, location of parking bay and strict penalty for unauthorized parking could play a major role in how an individual would prefer to travel.

5.3.1.12 Planned future growth

- The urban development needs to be restructured with the objective of an integrated development of transport system, regulated transport and travel patterns which would promote mobility, mixed use of public spaces and lower per capita movement.
- It is recommended to prepare an integrated landuse and low carbon mobility plan suggesting development of dense transport networks and combination of transportation modalities for seamless passenger transfer to meet the local community as well as the regional needs. Such a network of roads should be developed which provides better connectivity, reduced travel time, ease of traffic movment and minimised congestion which in turn also contributes in mitigating air and noise pollution substantially.
- In addition to public transport, individual mobility must be an important factor in network planning. The mobility plan must consider the principle of polycentrism. Widening and strengthing of roads should be done in TTZ area to improve riding quality of roads and adopt measures to facilitate traffic movement based on government policy and depending upon availability of funds and resourecs in addition to technical requiments.

5.3.1.13 Provide connectivity / accessibility to major activity centers

- Major activity centers in the settlements must allow for greater degree of association with the tourists and locals. However, presently these centers lack an identity as well as accessibility. Thus, it is recommended to ensure all activity centers/ tourist spots hubs to have high quality public transport and non-motorized transport facilities that are appropriate to the role of the center/ tourist spot. Further, the identified potential tourist circuits in the region must ensure accessibility to all key destinations through well-organized electric public transport modes.

5.3.1.14 Strengthening regional connectivity for shared prosperity

- Regional connectivity is multifaceted since the connectivity of one sector influences the connectivity of others. The deficiency in regional infrastructure negatively impacts the profitability and performance of small scale industries. Thus, urban economic vitality must be enhanced by providing regional transport system that considers the needs of the business community and create opportunities for connections between regional centers.

5.3.1.15 Road Safety

- Safety of road users is of paramount importance. Authorities should be committed to provide safer roads for its users. Road Safety Plan framed under the directions of Hon'ble Supreme Court shall be implemented while construction of new roads as well as remedial safety measures as per guidelines of IRC shall be implemented in already constructed roads to reduce number of road accidents, as well as the fatality rate. Road safety measures shall include construction of medians, separation of local traffic by service lanes, pedestrian facilities like footpath, road crossings, bus bays, rest areas, illumination of underpass and foot over bridge, development of junctions, installation of retro-reflective signage and road marking by thermoplastic paint, traffic calming and safety management measures as per IRC, providing W beam crash barriers in parapets and approach of bridges and culverts. Road safety measures shall be based on Government policy and depending upon availability of funds and resources in addition to technical requirements.

Objective 7: Ensure a seamless planning process through effective Institutional Interventions, Funding Strategies and Planning Policies

Strategy 1: To strengthen the role of TTZ Authority as a Unified Land Use Transport Planning and Development Authority (ULTPDA).

- To develop finance plan/strategies to fund ULTPDA for the preparation and

execution of plans and development activities.

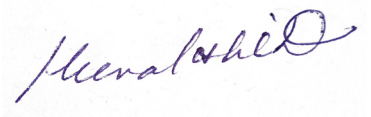
- To increase the Human Resources and Capacity Building of all stakeholders involved in the tasks.
- To develop educational and capacity-building programs to teach each stakeholder to be environmentally responsible and understand the values of the TTZ Region.

Strategy 2: To Prepare Unified Land Use Transport Plan for TTZ

- Amendments to be made to the Uttar Pradesh Town Planning and Development Act 1973 to make provision for preparation of Regional Plans (TCPO Agra).
- Preparation of Regional Plan and Master Plans of all cities in the TTZ region. Most of the City Master Plans in TTZ have reached their term & need to be reviewed/ updated/amended in coordination with the proposed TTZ Regional Plan.
- Preparations of Regional Level Integrated Sustainable Landuse Transport Plan emphasize on protecting natural resources and enhancing livelihood opportunities.
- New land use plans approved for the Expressways in the TTZ region need intervention and monitoring.
- New Tourism Policy of the State to be prepared with attention to polycentric organization of its tourism strategies by focusing on the development of new “urban destinations” in the TTZ region identified by the Tourism department in Uttar Pradesh.
- Low Carbon Mobility Plans to be prepared for settlements with a population more than 5 lakhs.
- Comprehensive Mobility Plan to be prepared for settlements with a population ranging between 1-5 lakhs.

Strategy 3: To make the Vision Document, Regional Plan and Master Plans along with other integrated Plans, a one-point document for development in TTZ.

- In order to ensure effective planned development, the Master plans should be implemented, enforced and amended as per requirement. Master plan to be review present status of Land use in every five year to efficiently monitor growth and development in the cities.
- Master plans to be the key/one-point document for project implementations. All projects identified through DPRs and sub plans are to be amended into the Master plans for implementation.
- Master Plan policies to be reviewed and amended to enhance the efficiency of planning process.



5.3.2 Strategies At Agra City Level

5.3.2.1 Strict Segregation of Land Use and Enforcement of Land use codes

Objective 8: To effectuate and encourage strict allocation of Land Use as per the proposed Regional and Master Plan.

Strategy 1: To ensure land demarcated for any particular use in the Master Plan are not encroached upon by a different land use and are used as proposed and intended in the Master plan.

- To strictly adhere to the allocation of Land Uses as per the Master Plan.
- To regularly monitor and evaluate the development process as per the zoning ordinances and development control regulations (DCRs)
- Heavy fines to be imposed for disregarding zoning and land use codes.

Strategy 2: To ensure all vacant/ empty parcels of land belonging to government and sick industries (applying Transfer Development Rights (TDR) with incentives for private land owners) within the prohibited boundary to be converted to recreational open spaces, bagichis, plantations, parks and gardens.

Objective 9: To ensure efficient use of available land and to limit misallocation and unused waste land

Strategy 1: To temporary zone all abandoned sites, unused waste lands and open spaces as 'recreational zones' to parks and gardens till they are developed as per their intended, proposed, allocated use in the updated and amended Master Plan.

- To ensure no piece of land is left un-zoned, all plots and parcels to be assigned a specified purpose and land use.

Objective 10: To restore and conserve land along river banks and flood plains as per the visions and mandates of the TTZ

Strategy 1: To allocate a special conservation zone to river banks and flood plain.

- To adopt strict zoning ordinances for all parcels of land along the river.
- To allocate public access zone on river banks.
- To encourage afforestation and plantation only in the special conservation zone along river banks.

- To restrict all non-conforming uses and activities like crematoriums, dhobi Ghats, idol immersion, animal bathing etc. in the special conservation zones along river banks.
- To prohibit construction of any kind of built form on the flood plains and special conservation zones.

5.3.2.2 Alternative Economy Generating Initiatives and Opportunities

Objective 11: To promote new economic opportunities that value innovative and creative industries

Strategy 1: To encourage UP government to invest in small-scale creative industries

- To identify alternative economy generating initiatives, creative industries and opportunities in the Comprehensive Industrial Plan which conform with the mandates of TTZ industry norms
- To encourage skill building initiatives for promoting small scale entrepreneurship
- To develop proposals for Craft villages with feasibility plans and funding strategies. The identified projects to be amended into the Master plan for implementation.
- To create cooperatives and societies in all neighborhoods where cottage industry clusters are prevalent for organized business platforms, enhanced economy and skill building.

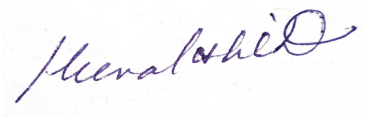
Strategy 2: To create employment opportunities for semi-skilled and unskilled population of the city, to improve quality of life standards

- To initiate Pro-poor tourism projects to create job opportunities for the unskilled and semi-skilled population
- To provide alternate employment opportunities for employees of Industries that have shut down due to the pollution mandates of TTZ
- To make policy amendments by adopting the National Street Vendors Act 2014, to protect and promote informal workers and their livelihoods
- To provide opportunities for skill building for workers in the informal sector. For example, engaging in heritage craft markets.

Objective 12: To ensure existing industries conform with the industry mandates of TTZ

Strategy 1: To monitor and regulate development plans of industries in the city.

- To review and amend all Master Plans and Sub regional and Expressway Plans



to exclude non-conforming industrial developments from the projected city limits and immediate periphery.

Strategy 2: To assign specific hubs for small scale industries like stone inlay, petha making, leather products within the cities and not encouraged as household industries.

- To upgrade the infrastructure of alternate small scale industry hubs like, the alternate Petha enclave developed by the Government at Kalindi Vihar
- To promote skill building programs and training for alternate methods of producing Pethas and other small scale industries with environment friendly means and hygienic waste disposal systems

5.3.2.3 Regulating planned development of urban Settlements

Objective 13: To discourage unplanned and unregulated development of settlements with poor physical and social infrastructure and encourage sustainable urbanization

Strategy 1: To initiate in situ redevelopment and rehabilitation of congested, high density, slum like settlements

- To develop low cost housing units through in-situ redevelopment for slums.
- To develop night shelters as per URDPFI Guidelines 2014 for squatter population
- To relocate or rehabilitate existing squatters residing for at least more than one year to identified locations within the city.

Strategy 3: To curb rural to urban migration

- To plan rural urban interface
- To develop rural management plan emphasizing rural development, agriculture development and tourism development.

5.3.2.4 Upgrading Infrastructure Facilities and Social Amenities

Objective 13: To ensure that the City has adequate and standard physical and social infrastructure facilities required for a sustainable, healthy and an approved quality of life.

Strategy 1: To assess and incorporate plans to meet existing and future physical and social infrastructure needs as per URDPFI Guidelines of 2014.

- To assess and evaluate demand and capacity of existing infrastructure
- To develop and implemented a Master Plan for Water Supply System

- To develop and implement a Sewage Management Plan
- To adopt and enforce city level SWM Regulations of 2016
- To develop renewable Energy Plan.
- To identify infrastructural needs and amend into the Master Plan for implementation and monitoring. All proposals and projects identified to be amended into the new Master Plan for review and implementation.

Strategy 2: To encourage minimum to zero waste management systems

- To enforce “Bulk Waste Generators” to handle and treat their own waste as per SWM Rules of 2016.
- To implement ‘UP Plastic Ban’ to reduce a significant amount of waste generation in the city. (Source: MC Mehta feedback)
- A landfill site to be developed as per norms of SWM Rules 2016.

5.3.2.5 Developing Integrated, Sustainable Tourism as an Engine for Economic Development

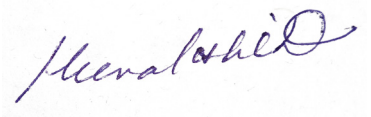
Objective 14: To boost the entrepreneurial capacity of tourist areas

Strategy 1: To launch and establish diverse economic activities throughout the identified value chain

- To develop a sustainable Tourism Plan for the city. The plan should be reviewed, updated and amended every 4 years. The plans and proposals identified in the tourist plan to be amended into the new Master Plan for implementation.
- To identify projects and amend it into the Master plan for implementation
- Links between tourist activities and other economic areas, as well as social and cultural players in the territory, to be strengthened to create economy generating opportunities.
- Tourist service training and professionalization to be promoted to ensure excellence and competitiveness.

Strategy 2: To promote tourism at unexplored or unfrequented heritage sites.

- To establish new tourist circuits with non-seasonal attractions
- To identify new internal tourist circuits for the city with more unexplored tourist destinations in and around the city.
- To promote both internal and external tourist destinations in TTZ through branding, advertisements and promotional events.



5.3.2.6 Enabling transition towards e-mobility and green fuels

- The main fuels that is being used presently includes petrol, diesel and CNG. However, considering its environmental impacts, it is recommended to advocate vehicles using clean and environment friendly fuels like CNG, electric and hydrogen with the objective of decreasing the environmental footprint due to transport modes.
- Strategies to replace the existing fossil fuel operated buses to be adopted and complement the proposed pedestrian friendly environment with modernized non–polluting electric taxis, public and intermediate public transport system. This electric mobility needs to be encouraged in conjunction with developing requisite infrastructure parallelly.
- Further, the city is witnessing a growth in the market of e-rickshaws, which aid in reducing vehicular emissions in comparison with diesel fleet autos. However, considering the long-term vision of environment sustainability, the market of e-rickshaws with lead acid batteries need to be replaced with lithium ion batteries.

5.3.2.7 Adopting integrated approach towards public mobility

- In Hong Kong, MTR Corporation Limited, company primarily into building and operating railways, have been given the right to develop properties above depots and railway stations. These developments include office buildings, hotels, residential units, shopping arcades and transport interchanges for different modes well connected to railway stations. This integrated approach has led to developing these locations as major transport hubs catering huge passenger flows, enhanced market value and encouraged demand for different transport services creating a winning situation for all stakeholders.
- Such an integrated approach is recommended for different bus terminals in Agra, to encourage users towards public mobility. In addition, the different modal choices available like rail, bus and IPT needs to be provided with well-designed interchanges for seamless multi-modal connectivity, with adequate park and ride facilities, common mobility card etc.

5.3.2.8 Pedestrian and traffic calming facilities

- Since, the city attracts huge number of tourists the safety of the tourists must not be compromised. All the transport system developments should be with the objective of improving accessibility, road safety and air quality.
- The entire pedestrian infrastructure shall be designed as per the guidelines and can be physically protected from incursions by motorized vehicles by placing bollards. Adequate road signage must also be provided to guide the commuters.

The vehicular traffic must be slowed down to protect pedestrians through speed restrictions as well through infrastructure changes along major NMT routes. Since cycling is the environmental friendly mode for shorter trips, facilities lime public bike sharing must be encouraged.

5.3.2.9 Deconcentrate Activities

- Increase in urban sprawl and motorized movements are a major cause for degrading environmental conditions. Thus, to reduce the existing pressure on the settlements it is recommended to limit the further expansion based on settlements carrying capacity and then adopt policies for well-planned transport infrastructure expansion, deconcentrate activities and managing the land-use structure.
- Thus, it is proposed that the administrative activities less relevant to tourism sector be relocated in other settlements of Agra district. This strategy could reduce the unnecessary commuter trips in the city. France and UK have adopted such policies to address intolerable transport conditions.

5.3.2.10 Restrict/regulate entry of heavy goods vehicles

- Presence of wholesale markets/mandi severely affect the operational efficiency of transport system. Thus, it is proposed to relocate the existing wholesale/mandi activities of Agra to the outskirts or other settlements of Agra district. Further, no heavy vehicular/truck movement should be permitted within the city centre. Internal movement of goods should be restricted to LCV's and small pick u cargo vehicles at specific times of day and night. This would eliminate the issues of on-street parking of goods traffic as well as loading and unloading operations thereby augmenting the carrying capacity of roads in the city and also reduce the veh-kms travelled by the goods vehicles.

5.3.2.11 Promoting Public Transport Travel

- Increasing the efficiency of public transport can deliver benefits of enhanced road capacities, accessibility and safety and security. Thus, it is proposed to improve the efficiency of existing public transport system and bring in new fleet for tourists. New electric hop-on-hop-off tourist buses must be introduced covering the other less explored tourist spots in the cities. In addition, common mobility card for residents a separate tourist cards must be introduced. These tourist cards must comprise of parking charges at the entry/exit points of the settlements, local public transport travel and entry fee to various tourist spots within the city.

5.3.2.12 Offer iconic experiences

- The economy of Agra is predominantly tourism sector dependent, hence, focus to be given to creating tourist experiences that offer lifelong memories to tourists/ visitors and give them reasons to stay, explore and return. Also, new anchors of identity to be added beyond the experience provided by Taj to create a memorable association with the city.

5.3.2.13 Influencing travel behavior and mode choices

- Current travel behavior in the TTZ region indicates high dependence on private or intermediate public transport modes for travel, which is a serious concern in terms of congestion, road safety, emissions and inefficient use of road space. Thus, it is proposed to provide travel information and incentives to encourage people to walk, cycle and use public transport. Facilities of electric tourist buses should be introduced to facilitate mobility for tourists and make them aware of other unexplored tourist destinations.

5.3.2.14 Enhance existing public transport services

- The key to smart mobility is high standard, well-organised, integrated public transport network covering most of the city. Thus, it is recommended to plan a coherent multimodal public transport system making public transport an increasingly realistic alternative for tourists and locals. The appeal of existing public transport services must be increased by improving reliability of services, quality i.e. replacing existing diesel fleet to electric, raising comfort standard and establishing an adequate system of passenger information.

5.3.2.15 Improving environment for all entry/exit corridors

- The city has 10 major entry/exit points to Agra which should provide a sense of conviviality and also define the image of the city to the tourists/visitors entering the city. These stretches must be clutter free from on-street parking proposed in the traffic management plan.
- All the roads should have an equitable distribution of road spaces, giving more priority to pedestrians and public transport. The infrastructure to the primary route to Taj Mahal i.e. Fatehabad Road should be improved.

Objective 15: Establish a seamless planning process through effective Institutional Interventions and Planning Policies

Strategy 1: To strengthen the role and responsibilities of all three level of Authorities – City Development Authority, City Municipal Authority and "Dharohar

Shethra" Administrating Authority

- To clear out the roles and responsibilities along with proper coordination mechanisms for all the three authorities
- To develop finance plan/strategies for preparation and execution of plans and development activities.
- To increase the Human Resources and Capacity Building of all stakeholders involved in the tasks.
- To develop educational and capacity-building programs to teach each stakeholder to be environmentally responsible.

Strategy 2: To Prepare Unified Land Use Transport Plan for the City of Agra

- To prepare/update the current Master Plan for the City.
- To prepare a Comprehensive Industrial Plan with sustainable development strategies for Industries in Agra and amend it in to the Master Plan for implementation.
- To prepare Slum Rehabilitation DPRs for the city. The DPR proposals to be reviewed and implementable projects to be identified and amended into the new Master Plan for implementation.
- Infrastructure Plan to be prepared with inclusion of Master Plans for Water Supply, Sewerage System, Power Supply, Drainage & Storm Water System, Solid Waste Management for all the sectors and implement the same in the city
- Social Infrastructure Plan to be prepared for the City of Agra. The projects and proposal to be amended into the new Master Plan for review and implementation.

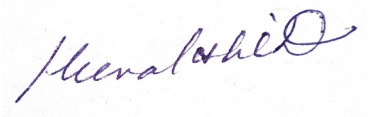
5.3.3 Strategies At Taj Precinct Level

5.3.3.1 Special Conservation Zoning Along River

Objective 15: To restore and conserve land along river banks and flood plains as per the visions and mandates of the TTZ

Strategy 1: To minimize and restrict access and construction along river banks

- To allocate a special conservation zone to river banks and flood plain.
- To adopt strict zoning ordinances for all parcels of land along the river.
- To frame policies and zoning ordinances to be framed to regulate restricted access to the river and allowing access only at special access zones.
- To define special zones with adequate infrastructure for accessing the river for activities like washing clothes, cremations and religious purposes.
- To encourage afforestation and plantation only in the special conservation zone along river banks.



- To restrict all non-conforming uses and activities like crematoriums, dhobi Ghats, idol immersion, animal bathing etc. in the special conservation zones along river banks.
- To adopt zoning ordinances to prohibit conventional crematoriums along river banks. Conventional crematoriums to be relocated or replaced by electric crematoriums
- To restrict and/or prohibit large-scale construction or built forms on Flood Plains and special conservation zones. River banks are proposed to have natural plantations of indigenous species only.

5.3.3.2 Building Sustainable, Productive and Inclusive Economy

Objective 16: To raise the economy and earning capacity of the population living in the precinct

Strategy 1: To promote indigenous art and craft industries and native small scale industries that can make use of the existing skills of the population living in the precinct

- To develop plans to adopt sections of precinct neighborhoods as craft villages or cottage industry villages. Example community led craft villages or cottage industry villages in Bangladesh.
- To promote and encourage native craft industries like zardozi work and marble inlay work since they have the potential to grow into substantial economy and income generators. Petha, jam, snacks industries are also major tourist magnets particularly for the domestic tourists.
- To revive the Tasar industry and the berry industry which thrived in the city in the past.

5.3.3.3 Regulating development of settlements

Objective 17: To release the development pressure in the precinct while keeping in focus the conservation mandates of TTZ

Strategy 1: To decentralize new growth in the precinct particularly for new migrants and the peak season tourist flow to release the congestion pressure in the core

- To restrict new developments, hotels and restaurants in the core and encourage in other parts of the city.

Objective 18: To ensure sustainable, planned development of the existing

settlements in the precinct while following the guidelines and mandates of the vision of TTZ

Strategy 1: To restrict / add a cap to the density of the existing settlements in the precinct

- To assess and evaluate the carrying capacity of the precinct for additional settlements as per future demand and growth of the precinct.
- To adopt stringent rules for issuing high rise building permits. Issuance of Building permits to be restricted and made conditional for multi-story buildings or dense settlements.

Strategy 2: To upgrade the existing settlements

- To develop low cost housing facilities with adequate infrastructure and amenities for slum like settlements.
- To restore, reconstruct and upgrade the sewage and sanitary infrastructure of the existing settlements in the precinct.
- To identify and develop alternate living quarters for squatters and slums.
- To provide incentives of new employment opportunity and better quality of living standards for relocating squatters and slum dwellers.

5.3.3.4 Developing an Integrated, Sustainable, Tourist Friendly Urban Planning Model

Objective 19: To develop tourism as a strategy for urban development and to develop urban infrastructure as a strategy for Tourism development

Strategy 1: To engage local communities in promoting an authentic, culturally inclined tourism development plan

- To develop local handicrafts and souvenir market.
- To develop old mohallas around Agra fort as craft villages with tourist homestays with a Mughal era feel.
- To promote community based Tourism initiatives like Pro por tourism initiatives
- To design tourism activities with the involvement of the local community

Strategy 2: To upgrade local infrastructure and tourist infrastructure. ("A city that does not serve its citizens cannot serve its visitors" – UNWTO secretary General, T. Rifai.)

- Identified tourist circuits to be provided with amenities and high grade public

infrastructure facilities.

- To explore the potential of Green Tourism
- To upgrade the tourism experience with new state of the art technology and Smart Tourism
- Connectivity strategies to be developed for all heritage sites within the precinct. Heritage walks, greenways, bike ped scenic routes and river walks and treks to be designed while linking Taj Mahal with all other heritage sites.

5.3.3.5 Restoration of paths with pedestrian walkways and non-motorized transport

- Non-motorized mode are resource efficient modes of transport, consuming minimal road space and impose negligible costs on commuters and environment. Hence, it is recommended to improve the functioning and environmental compatibility of pedestrian mobility components by promoting cycling and walking thereby supporting the objective of sustainable development.
- These mobility components must simultaneously adapt well-designed infrastructure to support non-motorized transport i.e. considering the extreme weather conditions, the roads must be provided with shaded sidewalks or built to pavement edge building with overhangs or arcades, proper signages and other facilities like information desk, toilets and water dispensers. In addition, high albedo materials must be used for paving road surfaces to reduce urban heat island effect. Several pathways like Agra Bah road, road connecting Taj mahal and Agra Fort in the Agra City should be the exclusive domain of pedestrians with necessary amenities and visually attractive environment.

5.3.3.6 Revival of Inland Water Transport System

- Traditionally, the river was used for recreation and for transportation purposes. However, with the degradation of river people's interaction with river and the cultural landscape has been hampered. Thus, it is recommended to revive the traditional water transport link from Mehtab Bagh to Taj Mahal and Agra Fort by maintaining the minimum draft of 3 meters throughout.

5.3.3.7 Preferred to be a pedestrianized zone

- The delineated Taj Precinct zone should be preferred to be a pedestrianized zone i.e. walkable with shaded pedestrian's sidewalks, controlled traffic (electric IPT's) and designated cycling infrastructure. This zone must ensure that all relevant new developments take full account of the significance of the area and does not

hamper its value.

5.3.3.8 Improve environment for all approach roads to Taj

- The delineated Taj Precinct zone should be preferred to be a pedestrianized zone and must ensure that all relevant new developments take full account of the significance of the area and does not hamper its value. The pedestrian walkways should be as per the guidelines including provision for universal accessibility with clearly demarcated zones i.e. static pedestrian activity areas along shops, multi-utility areas for street furniture, amenities like toilet blocks, drinking water, information kiosk etc.
- Further, considering the existing site conditions, functional classification of roads & available right of way, the approach roads to Taj needs to be improved in terms of its hardscape. The quality of public places along all the access roads to Taj particularly along the West Gate Road and Agra Bah road needs to be improved. The south entrance to Taj also needs to be revived.

Objective 20: Ensure Institutional Interventions for the "Dharohar Shetra"

Strategy 1: Special Zoning Codes and Acts to be followed in the Dharohar Shetra.

- Special Zoning codes to be developed for land within the prohibited boundary of the heritage sites to restrict built form, construction and non-conforming landuse.
- The development works suggested around Taj Mahal can be taken up after getting necessary approvals from the Competent Authority within ambit of provisions of the AMSR Act 1958 and rule 1959 (ASI, Agra).

5.4 Anchor 3: Heritage Protection and Redefining the Image Structure

5.4.1 Strategies

A. Recognize the natural heritage as an important ecological and environmental resource for the health and wellbeing of the people as well as the environment.

B. Rejuvenate, safeguard and enhance the natural ecology of the region by protecting and sensitively managing the heritage resources in a sustainable manner.

C. Ensure protection of the natural heritage resources by regulating urban growth around natural heritage.

D. Adopt authentic and appropriate landscape design vocabularies in heritage sites to help improve the environmental quality.

E. The historic character/ design vocabulary of the Kunds should be preserved, conserved and restored in its original shape and form.

F. In-fill,mixed use development, in all the land parcels, government and privately

owned, to achieve compactness within the core of the settlements

G. Review of Corridor Development Plans of all the main corridors to check the nature of development and its impact on environment including induced trips from the core of cities

H. Integration of smaller water bodies and sites with the local urban development in the form of open spaces and community spaces without compromising with the ecological systems associated with the sites

I. Harnessing the potential of socio-cultural beliefs associated with the various ecological sites within the local community towards protection of these sites

J. Re-establish the significance of the riverfront zone in TTZ region as a repository of heritage resources and traditional systems for the protection and conservation of the river.

K. Designate the riverfront as a heritage zone and through proper management of the heritage resources along the river front improve the quality of interface of the heritage resources with the river and the community.

L. Use the heritage assets along the river edge more actively and responsibly in order to bring the river back in the lives of the local community.

M. In-situ improvement of basic services in the settlements located along the river edge, irrespective of their tenure and improvement of accessibility of river edge to these local communities in order to create local everyday spaces and sense of ownership

N. Maintaining the prominence of historic skyline as viewed from river as well as from key visual nodes along the river by suitably regulating new built forms

O. Landscape based treatment of the edges, banks and bed of all the Nallahs/streams discharging water into the river for natural recharge and pollution control

P. Enhance and create sustainable livelihood opportunities by strengthening interface of heritage and local economies centered around heritage.

Q. Promote cultural entrepreneurs and site interpreters through capacity building of artisans and youth by harnessing their skills and abilities vis a vis care and conservation of heritage assets.

R. Practice development-oriented conservation that integrates heritage with the daily lives of the people and ensures meaningful stakeholder involvement and participatory management of heritage.

S. Identifying the spatial attributes associated with these products in terms of production and enhancing these spatial attributes in any regeneration or redevelopment proposal for the settlements. This will promote local trade and add to the unique indigenous

experience if overlapped with tourist circuits.

T. Identifying live-work relationships and spatial home-shop-workshop typology for specific trades and retaining them in any regeneration and newer proposals in the existing settlements

U. Recognize the large volume and diversity of unprotected heritage and establish its role as a major functional base for tourist activity and hence a determinant for urban growth in the region.

V. Develop unexplored and low on visitation heritage sites which can help take pressure off from overburdened heritage sites and settlements.

W. Ensure that any future developments and interventions respond sensitively to the heritage resources to maintain their authenticity and integrity.

X. Enable capacity building of all engaged and involved in the care of unprotected heritage.

Y. A comprehensive tourism plan for the region after considering all the spaces-ecological, religious, architectural, historic settlements and products offered by the region. Identification of actors and graded audience need to be part of this tourism plan.

Z. Cultural &Creative industry and trade hubs as a catalyst for urban character

AA. Enhance the quality of the physical and social environment within and around heritage precincts through provision of infrastructure that is sensitive to heritage.

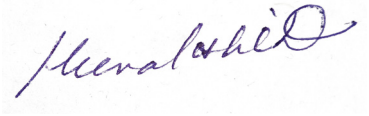
BB. Introduce tourism related infrastructure and requisite amenities across TTZ.

CC. Utilization of local assets such as river front, nallah edges, unprotected heritage structures, kunds, any government owned structure and defunct industrial areas for improvement of public realm and creation of additional open spaces in TTZ settlements.

DD. Develop heritage sites to become part of the multi-nodal development to enable dispersal of visitors and convergence of local communities.

EE. With various layers of transformation due to technological and need base evolution, the cities and towns under TTZ shall visually represent various images of evolution with prominence to historical core. Rather than enforcing singular image of a city or town, based on the transforming functional roles, the new images need to be strengthened. Like in case of Vrindavan, new sense of spirituality and religiosity can be identified as a unique character from the inner city. Multi-image based zones can be identified radially from the core and through the specific landuse parcels.

FF. Strengthen the ability of heritage to contribute towards the urban character and image of the settlements by developing heritage sites as urban landmarks through



place making activities.

GG. Delineation of Historic Cores based on multi-sector criteria and creation of an urban conservation and design plan towards protection and enhancement of heritage areas through specific development controls and strategies for continuity and change-spatial types for conservation, adaptive re-use, retro-fitting and pockets for renewal, redevelopment or revitalization etc.

HH. Incorporation of the elements of regional landscape, archaeological sites and urban heritage in the Master/Development Plans of all the towns with specific directions and immediate revision of Master/Development Plans of TTZ Towns.

II. Management of land along highways with suitable landscape measures for dust reduction.

JJ. Preparation of context specific tourism management plan for important sites/spots in TTZ with focus on public facilities, quality of access, pedestrianization and overall landscape improvement.

5.4.2 Recommendations

5.4.2.1 REGIONAL SCALE

1. GIS based comprehensive database needs to be prepared through documentation, mapping and detailed inventorization of all the water and vegetal heritage resources like water reservoirs, kunds, water channels, streams(seasonal /perennial), ghats, kunds, baghs, bagichis, vans or forest. It is necessary to enable integrated planning for development of settlements which will ensure protection of these ecologically and environmentally significant sites. The database will help to determine and establish their relevance, role and linkages in maintaining a healthy ecosystem in the region. The inventories should have the key fields of name, location, geographical co-ordinates, boundaries, typology of heritage, condition, ownership, and protection status.

2. Provide statutory protection to all the water and vegetal heritage resources listed in the data base prepared above under the Uttar Pradesh Municipal Corporation Act 1959, the Environment (Protection) Act 1986, and the Forest (Conservation) Act 1980 amended in 1988 including other applicable legal regimes by the municipal corporations, urban local bodies and village panchayats. These natural heritage resources should also be integrated and notified within the Masterplan document so as to protect the significant water and vegetal heritage resources by curtailing incompatible urban development in and around them.

3. Prepare an integrated environmental and natural heritage management plan for the region which recognizes and addresses the linkages between culture and landscape.

4. All heritage kunds, waterbodies and vans to be restored authentically using internationally adopted conservation norms and practices as spelt out in the UNESCO Charters such as Charter for the Conservation of Historic Towns and Urban Areas (Washington Charter 1987), Charter for the Conservation of Places of Cultural Significance also known as the Burra Charter(1979),ICOMOS-IFLA Principles Concerning Rural Landscapes as Heritage (2017) , Valetta Principles for the Safeguarding and Management Historic Cities, Towns and Urban Areas (2011) and Nara Document of authenticity (1994).The conservation and restoration policy for the kunds and vans have to respect and enhance heritage values of the site and should be framed after the assessment of natural and ecological significance, and impact assessment of the existing and proposed development around these sites.

5. All the water assets attached to heritage sites need to be protected and conserved as part of the overall site conservation management plan for each of the sites. These include among others the moat around Lohagarh Fort at Bharatpur and Deeg Fort, Budhia ka taal at Eitmadpur, Gopal sagar at Deeg, Rani ka talaav and Jal Mahal at Kumher,Keshighat at Vrindavan,talaab at Hathras, Adam's Tank and memorial at Agra, VrishbhanuKund at Barsana, Manasi Ganga at Govardhan, Kusumvan Sarovar and Chattris at Govardhan.

6. All vegetal assets in the TTZ region in the form of historic gardens, baghs and bagichis, encompassing ASI protected, State protected and unprotected sites like Badshahi Bagh at Fatehabad, Beniram ka Bagh at Hathras, Kachha Bagh(Rani Bagh) and Gulaab Bagh at Deeg have to be conserved using internationally established norms as spelt out in the ICOMOS Florence Charter on Historic gardens. As part of the conservation exercise, replacing lawns with groves of indigenous trees which were the authentic and traditional vocabularies of design specifically in case of Mughal and Jat period gardens, will increase the bio mass, reduce pollution levels and increase water recharging capacity of the land leading to rise in water table. Restoration of the gardens of Itmad-ud-daula tomb complex, Agra under the ASI is a case in point where the lawns have been replaced with the authentic plant species respecting the design integrity of the garden.

7. Buffer zone around all water bodies including kunds in Barsana, Hathras, Govardhan, Mathura, Vrindavan, Baldeo, Agra, Roopwas, Chaumuha, Chattaneed to be demarcated and notified. The boundaries of buffer are to be decided based on site specific conditions capturing the areas critical for the wellbeing of the water bodies. The soft areas as green cover using indigenous plant species should be maximized

in demarcated buffer areas. This will ensure protection of the buffer as a community open space /recreational space and development of the catchment area in an eco-sensitive manner for water recharge and harvesting. This will also safeguard the buffer zone from turning into a garbage dumping ground that leads to contamination of the soil and ground water within and around the banks of the water assets.

8. The restoration, renewal, revival, 'beautification' in and around the natural and cultural heritage sites should be done respecting the context, using locally available materials to keep the authenticity and integrity of the heritage sites. In interpretation, these sites should not be 'Disneyfied' with introduction of statuary and other hardscape elements.

9. Establish compatible land use and thresholds of activity around and within these natural heritage assets to ensure their efficient and healthy existence. Environmental Impact assessment needs to be done for all projects, existing and proposed around these heritage assets and necessary mitigation measures should be taken.

10. Ensure that all natural water channels are not obstructed, blocked or courses changed due to development. The channels should be protected with a green buffer wherever possible and their connection with the sewer pipes has to be severed. The sewer and sullage network have to be linked to the Sewage Treatment Plant and only treated water should be discharged into these streams.

11. Enhance the role of the water bodies as water harvesting areas by removing all the newly constructed embankments around the water bodies which are obstructing the flow of storm water and preventing rain water harvesting. Ensure all road gradients also help in directing rain water into water harvesting tanks or natural water bodies.

12. Vehicular traffic in all the designated heritage precincts of settlements in TTZ needs to be curtailed and pedestrian zones introduced in the interest of heritage and well-being of residents and visitors in the area. NPVs need to be introduced in the historic inner city core of all cities.

13. Afforestation should be promoted in the TTZ region by increasing the green areas through plantation of indigenous trees along all vehicular roads, open areas, public parks and parikrama routes.

14. Assessment of quantity of land parcels during the preparation/revision of master plans of the cities/towns and fixing appropriate use, preferably, mixed use, for available land parcels.

15. Government land parcels to be developed for community use, economic activities and low-income, low rise high density, housing apart from reserving some portion of

land for green spaces

16. Review of Corridor Development Plans of Yamuna Expressway, Lucknow Expressway and developments proposed along NH-2 in various master plan to ascertain total developmental activity proposed and its impact on environment. Downsizing the development and mitigation measures to be adopted in the corridor development plans for any adverse impact on environmental and ecological resources of the region

17. Specific design controls in all the master plans of towns/cities wrt to ecological precincts covering boundary walls, landscape treatment (preferably large native trees), percentage of surface area under hard paving, design treatment of bed and walls of water bodies (preferably mud or stone pitching) etc. It is recommended here that any planning decision and design treatment must keep in mind that water bodies are ecological resources first and places for human recreation and enjoyment later.

18. Delineate and demarcate the riverfront in Agra, Vrindavan and Mathura as a heritage zone within the Master Plan. The delineation of the zone should be based on the identification and mapping of the protected and unprotected tangible and intangible heritage resources, the typology of heritage resources and their cultural associations. The boundaries should be additionally guided by the existing buffer of 300metresfor ASI protected structures.

19. Protect, conserve and restore the historic ghats and all riverfront heritage such as gardens, temples, havelis, mosques, fort and other significant structures along the ghats. Each river settlement has a unique character along the riverfront representing a diversity of heritage. Mathura has a range of heritage from ghats, havelis, temples, fort and mosque; Vrindavan has few historic ghats on the riverbank while the remaining ghats are found inside the city due to the shifting of the river course. Agra had 45 historic gardens on the riverfront of which only few are surviving at present namely Taj Mahal, Itmad-ud-daula complex, Chini ka Rauza, Ram Bagh and Mehtab Bagh while others have been fragmented or developed as residential settlements and industrial heritage over a period of time.

20. Strictly control open defecation along the river edge and provide toilet facilities as per norms under schemes such as Swachha Bharat Mission, AMRUT, HRIDAY. The design and location of toilets should be done so as not to compromise on the heritage quality of the river edge.

21. Introduce interpretation, education and outreach methods encouraging sensitivity towards heritage through signage in appropriate location along the river front without

compromising on the visual experience of the area.

22. Remove all encroachments from the public lands / government owned land on the riverbank and provide alternative locations so as not to disturb livelihood patterns of the communities displaced and to prevent re-encroachments. The public lands to be identified by the Municipal Corporation with revenue records before taking necessary action.

23. Development detrimental to the bio diversity along the flood plains of the river is not to be permitted along the banks of the river.

24. Dredging and desilting of river and other water bodies should be done at periodic intervals to enhance the water recharge capacity.

25. Disaster Management Plan specific to river front heritage resources needs to be prepared.

26. Identification of significant spaces and precincts along the length of river and classification of these spaces as per their archaeological, historical, ecological, functional and cultural values. Each interface with the river to be treated differently as per the identified value(s), immediate physical edge and local community in the preparation of a comprehensive plan for upgradation of these spaces and precincts along with movement of people towards/from these spaces, associated activities and landscape treatment. Some of the important spaces at TTZ Level to be taken up on priority are KC Ghat till Yamuna Expressway link road at Vrindavan, Maoli Khader till Army Golf Course at Mathura and stretch of river behind Sikandra Complex near Agra

27. GIS based documentation and mapping of creative industries in the TTZ needs to be undertaken to develop digital platform through mobile based application enabling tourists to identify and visit the centers of craft production.

28. Social and physical infrastructure within and around the identified heritage precincts needs to be improved for enhancing the quality of life of the communities residing within and around these precincts. Infrastructure to include provision of public amenities, proper solid waste management practices, street furniture, lighting, walkways, signage and interpretation. All projects to undertake a social impact assessment before implementation to ensure the infrastructure makes a meaningful impact on the lives of the communities.

29. Heritage open spaces and community living spaces in heritage precincts need to be enhanced through urban design interventions.

30. The living and working conditions of various craft sectors need to be improved by introducing modes of production and equipment conforming to universal safety

standards and making their use mandatory in the various craft industries. This applies specifically to the glass bangle industry and stone carving industry.

31. Adopt joint green cover management practices with the local communities and urban local bodies to rejuvenate the barren lands, lost vans and groves through introduction of social forestry that also benefits the community in economic terms. This includes tulsi cultivation, flower cultivation in Vrindavan, Mathura, Govardhan and other smaller settlements of Braj Region, and 'petha' gourd cultivation in Agra and nearby settlements.

32. Various stakeholders and management systems engaged with heritage resources need to be identified and their roles in the maintenance, management and use of these resources should be enhanced.

33. All abandoned heritage buildings need to be put to adaptive reuse, aimed at benefiting the local communities, after due conservation, repair and restoration. It should be noted that where a change of use is proposed, the new use should be compatible with the cultural heritage value of the place, and should have little or no adverse effect on the cultural heritage value as mentioned in ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value (Revised 2010). The compatible uses could be heritage home stays, public amenities, museum, interpretation centre, cultural haat.

34. Capacity building and promotion of cultural entrepreneurship among local community such as site interpreters, tourist guides at heritage precinct level and along identified heritage trails needs to be planned for.

35. Livelihood opportunities need to be enhanced through skill development and product development of local crafts and promoting direct market access for the tourists for all the craft industries. This should include economic revitalization through revival of traditional crafts skills like Sanjhi art, by diversifying into other products.

36. Crafts industry needs to be strengthened by improving marketing strategies and identifying sale outlet points and haats for traditional crafts within heritage precincts.

37. Creative industries like glass manufacture needs to be linked with environmental issues by diversifying into production of glass bottles to replace plastic bottles, while adhering to environmental pollution control standards.

38. Small scale cottage industries in the TTZ region, predominantly in the areas of Agra, Braj region comprising of Mathura, Vrindavan and Govardhan should be encouraged. These include petha making, peda making, tulsi mala making, glass industries, floral garland and silver jewelry. Production of traditional culinary items

should adhere to established norms and standards of hygiene.

39. Introduce NPVs in heritage zones which would also provide employment opportunities for e-rickshaw drivers.

40. The incorporation of craft and cultural industry shall not only include the sites of products but also the production. This will refrain the culture consumers from partial engagements with the act of buying but also, it will make them engage with the process of production. This will also help in maintaining the spatial essence through activities and associated building typologies.

41. Prepare GIS based database of built heritage resource in the TTZ region (both state protected and ASI protected) through documentation, mapping and detailed inventories. It should help recognize the different layers of history in the region manifested in monuments like tombs, gateways, city walls, dargahs, mosques, temples, havelis, gardens, institutions, churches, railway station, and bungalows. These are needed for integrated planning for development of settlements ensuring protection of historically, ecologically and environmentally significant sites.

42. Grade all the heritage assets based on their significance to enable various scales of protection regimes and norms.

43. Protect all identified heritage assets identified above through statutory protection under Uttar Pradesh Municipal Corporation Act 1959 and other applicable legal regimes followed by the municipal corporations, urban local bodies and village panchayats. The concerned development authority would need to integrate these in both the Master plan and Regional development plan.

44. Identify the significance of the historic settlements which help impart an identity to each settlement. This identity needs to be conserved and enhanced in any future development of the area. All the settlements are repositories of values because of historical narratives, but also have other values which are archaeological, architectural, religious, artistic, social and educational in nature. Hathrasis famous as a centre for production of heeng but also has numerous gardens and havelis of architectural value and archaeological mounds. Sadabad is a settlement with Nawabi architectural heritage. Deeg derives its identity from the spectacular palace garden complex and fort with high architectural and landscape value. Bayana has high architectural and cultural significance because of the syncretic nature of its architectural monuments. Firozabad is the centre of bangle production in India. Mathura, besides its association with Lord Krishna and the pivotal centre of Braj, is also associated with the Mathura school of Art and the golden age of the Guptas. Vrindavan, Govardhan, Gokul, Barsana, Nandgaon,

Baldeo and Mahavan are an integral part of the cultural landscape of Braj. Tundla gets its identity as a colonial period railway hub. And Agra has multiple identities with its crafts, Mughal and Colonial layers of architectural and urban expression. All these identities and the character of the historic settlements which give these settlements their identity need to be enhanced through future urban development policies.

45. Nature of tourism activity, thematic zones and theme-based circuits need to be developed based on the significance of each settlement. Tourism movement corridors need to be planned around these themes.

46. Awareness and interpretation of heritage, needs to be increased with adequate and appropriate site interpretation. Interpretation centres need to be sited in abandoned and restored structures within heritage precincts.

47. An Urban Heritage cell for conservation of historic buildings and precincts should be set up within each municipality wherein mechanisms are developed so that the task of conservation of heritage is shared by all urban governing bodies and coordinated and monitored by the Heritage Cell. Heritage and its protection should Figure on the agenda of all civic bodies and guidelines may be prepared requiring heritage owners to maintain their property in such a manner that it's heritage form and character does not decay. The Heritage Cell should be housed in one of the abandoned and restored heritage structures in the heritage precincts.

48. Heritage precincts need to be delineated based on a comprehensive data base compilation and concentration of heritage assets, and notified through Master plans as special areas in all the settlements to include Agra, Mathura, Vrindavan, Gokul, Barsana, Nandagaon, Govardhan, Baldeo, Mahavan, Chaumuhan, Bharatpur, Deeg,Bayana, Kumher, Roopwas, Firozabad, Tundla, Hathras, Sadabad, Fatehabad, FatehpurSikri. Heritage centric, site specific byelaws need to be framed for these heritage precincts. Development guidelines in heritage precincts should address issues of land use, plot widths, massing, building line, skyline, building materials, openings and ornamental details, viewscapes/view corridor, compatible land use and new development in heritage precincts and heritage streets.

Table 5.2 Settlement wise identified Heritage precinct/ heritage streets with key heritage structures

HISTORIC AREAS	TYPOLOGIES	KEY MONUMENTS
AGRA		
Taj Precinct and Riverfront Gardens, Agra		
Precinct 1: Taj and immediate surroundings, Agra		

HISTORIC AREAS	TYPOLOGIES	KEY MONUMENTS
Taj Ganj and katras ,Paktola, Purani mandi , Telipara, Kachhpura	Tombs and Gardens	Taj Mahal, Agra Fort , Dara Shikoh Library , Khan-i-Alam , Mehtab Bagh, Bara Khamba , Shah Jahan's Park
Precinct 2 : Extended Riverfront Gardens		
Rajwara, Radha Nagar, KatraWajir Khan, Rambagh, Street scape of Belanganj towards the river	Tombs, Chattris , Industrial Heritage and gardens	Ram Bagh Garden, Nur kisarai ,Chini ka Rauza , Parvez Khan ka Maqbara, Itmad-Ud-Duala, John's Mill, Jaswant Singh kiChattri
Historic Core of Agra		
Precinct 3 : Hing ki Mandi and surrounding areas		
Hing ki Mandi, , Moti Katra, Naiki Mandi, Raqaabganj, Mantola	Mosques, Madrasa, Residences, Historic bazaars	Motamid Khan Mosque, Mankameshwar Temple, Kalan Masjid Mosque
Precinct 4: Marble industry of Gokulpura, Agra		
Gokulpura and Loha Mandi	Residences, Temples, Historic gates, Commercial Streets	Mangleshwar Temple, Kans Gate, Gangur Gate
Precinct 5 :Belanganj and its bazaars		
Belanganj, Kashmiri Bazaar, Kinari Bazaar	Mosques, Havelis, Residences, Godowns , Historic bazaars	Kala Mahal, Shahi Madarsa Masjid, Motamid Khan Mosque, Mankameshwar Temple, Hazoori Bhawan, Mahesh Chand Bansal House
Precinct 6 :Colonial Bungalow precinct		
Cantonment Area, Civil lines, Raqaabganj	Bungalows, Churches, Institutions, Offices	NCC Officer's Mess, Adams Tank and Memorial, Agra Cantonment Railway Station, ASI Offices, St. George's Cathedral Church
Precinct 7: Colonial Institutional Precinct		
Sikandra	Tombs, Palaces, Gardens	Akbar's Tomb, Kaanch Mahal, Guru ka Taal, Colonial Structures, Church
FATEHPUR SIKRI		
Precinct 1: City of Victory: Settlement of Fatehpur and Sikri		

HISTORIC AREAS	TYPOLOGIES	KEY MONUMENTS
Fatehpur , Sikri , Rasoolpur, Guru ki Mandi	Fortified walls, gates, Bastions, Mosques, Baradari	Lal Darwaza, Todar-Mal's Baradari, Qush-khana, Tomb of Sheikh Ibrahim, HiranMinar, Ibadatkhana, Diwan-i-Khas
Precinct 2: Mughal Imperial Highway Precinct		
Agra to Fatehapur Sikri	Kos Minars	Kos Minars , Remains of Sarai, Chhatris
HATHRAS		
Precinct 1: Baghs and Bagichis of Hathras		
Nayaganj area	Baghs, Chhatris	Beniram Ka Bagh, Se-kriseriyaUdya, Jhuri-yan School, Borewala mandir
BARSANA		
Foot Hills and Historic Core		
Precinct 1 : Core settlement at the foot hills		
Core of the settlement	Temples, Kyari, Palace, haveli, Residences ,Chatri	Shri Radha Rani Temple, Shri Gahvaran-Baithak ji and bagh, Banke Bihari Temple, Chattris of Barsana, Sudama Ji ka Mandir
Kunds and Vans of Barsana		
Precinct 2 :VrishbhanuKund Precinct		
Heritage for Community	Kund and Chattris	VrishbhanuKund, Pillar with Sanskrit inscription dated samvat 1666 in the flanking tower at the Bhanakaur tank, Kirti Kund
Precinct 3 :Kunds and Temple		
Coexisting Mythology and ecology of Barsana	Temples and Kunds	Radha Raman Temple, VihavalKund, Krishna Kund, Shri Sanket Devi Temple, Prem Sarovar, Chatri, Radha Gopal temple, Rangeeli Ma-hal, Pili Pokhar
Precinct 4 :SakhiGiriParvat Precinct		

HISTORIC AREAS	TYPOLOGIES	KEY MONUMENTS
Hill precinct of Barsana	Temples and Hills	Dauji Temple, DehaKund, Lalita Sakhi Temple, Trivedi Kund, Lalita VivahSthali, SakhiGiriParvat, SakhiKup
MATHURA		
Historic Core of Mathura		
Precinct 1: Tilas and Ghats of Mathura		
Sapta Ridhi Tila to Ganesh Tila including all ghats from Ganesh Ghat to Gupta Ghat and historic structures along river front	Tilas (mounds- few residential settlements at present), Temples, Mosque, Qila and Ghats	Mazar Karbala/ Barakhamba, Ganesh Tila/ Ganesh Tirtha/ Ganesh Mahadev Mandir, SomtirthGhat/ Krishna Ganga, Dhruv Ghat, Swami Narayan Mandir, Bali Tila, SaptaRishiTila, SomthirthGhat/ Krishna Ganga Ghat, Kans Qila/ Old Fort of Mathura, Surya Ghat/ Suryatirtha/ Suraj Ghat, AsikundaGhat/ Varahatirtha, Ram Ghat, Kanakhalatirtha/ KanakhalatirthaGhat
Precinct 2: Bazaar Streets with Havelis and shops		
Chatta Bazaar and Sadar Bazaar	Residences, Historic Bazaars (Shops of Sarafas and Metal Workers)	Ram Dwar, Yamuna Dharamaraj Behan Bhai Mandir, Gatashram Narayan Mandir, Kishori Raman, Jain Temple-Shri Parshwanath-Digambir,
Keshav Ji GaudiyaMatha, Holi Gate		
Archaeological and Mythological Core of Mathura		
Precinct 3: Mosque and Janambhoomi Precinct with the bazaar, Mathura		
Janam Bhoomi and Govind nagar area	Temples, Mosque, Kund and Bazaar	Janam Bhoomi Temple, PotraKund, Idgah/ Keshav Dev Mandir, GovindpurTila, Mahavidya Kund, Bazaar.
Precinct 4: Shiv Taal Precinct		

HISTORIC AREAS	TYPOLOGIES	KEY MONUMENTS
Shiv taal with haveli, temple and open community space	Temples, Haveli and Kund	Shiva taal and Radha Raman Shiv Taal Bihari Mandir with residences and open space for community
Precinct 5: Bhuteshwar Road Precinct		
Kacheri road	Temples, Mosque, Kund and Bazaar	Gopal Khera, KankaliTila, AkhadaBhuteshwar, Bhuteswar Mahadev Mandir/ Patal Devi Mandir
Colonial Core of Mathura		
Precinct 6: Colonial Precinct of Mathura		
Cantonment Areas	Institutions (Library, museums etc.), residences, church and schools	Residential and administrative structures with in Cantonment, Churches
VRINDAVAN		
PARIKRAMA MARG ZONE		
Precinct 1: Ghat Precinct of Vrindavan		
Stretch of historic ghats and edge of receded river	Vans, Temples, Ghats	KeshiGhat, Cheer Ghat, Nidhi van, RoopSanatanGaudiya Math, Laakhnu Temple, Tatiya Sthal, ViharGhat, Dwadash Aditya Tila, Shringar Vat, Temple of Jugal Kishore, Old NandQuila, NabhaGhat
Precinct 2: Temple precinct of Parikrama Route		
Temples and Bazaars along the parikrama Route	Temples, Bazaars, Well,	Prem Mandir, Iscon Temple, Jaipur Mandir, Bajaar selling Poshak and incense and other intangible crafts.
Significant Temples and Environs		
Precinct 3: Rangji Temple and Govind Dev Temple precinct, Vrindavan		
Rangji Temple Complex with Bagichis and vans and streets leading to the Rath Yatra Route.	Temple, Bagichi, Van, Kund, Bazaars, Residences	Rang Ji temple, Jagannath Temple, Ram Bagh, Rath Yatra Route, Residential Precinct with in the temple, RangjiBaghichi, Govind Dev temple, Market Street in the complex, Goshala, Nikunj Van

HISTORIC AREAS	TYPOLOGIES	KEY MONUMENTS
Precinct 4: Banke Bihari Temple and Bazaar lanes of Vrindavan		
Residential and Bazaar lanes leading to the Banke Bihari temple	Temples, Bazaars and Residences (turned into math and Dharamshalas)	Banke Bihari Temple, NabhaWali Kunj, Seth Sagarmal Dharamshala, Sahajapura Temple, Rasik Bihari Temple, Shriji Temple, Thakur Radha Kant Bihari Mandir –Choti
GOVARDHAN		
Parikrama Zone		
Precinct 1: Hills enveloped by Parikrama Marg		
Mythological and Jaat period precinct of Govardhan	Temples, Chattris, Kunds, Maths, Ashram	Chhatris of Govardhan, Kusum Sarovar, Raja RandheerkiChattri, Apsara Kund, BilachhuKund/ Vilas Vadana, Chakra Tirth/ Chakleshwar Mahadev Temple, Brahma Kund
NANDAGAON		
Mythological and Ecological Settlement of Nandgaon		
Precinct 1: Ecological envelope of Nandgaon		
Surrounding kunds and hills	Hills, Temples, and Kunds	Surya Kund, Charan-Pahadi, Kajal Kund/ KajraraKund, PanihariKund, Yashoda Maath, Surya Kund, UddavKyari, Milan Kund, YashodhaKund
Precinct 2: Mythological core precinct of Nandgaon		
Core temple hill	Bajaar, Havelis, residences, Temples, Maths	Nand Bhawan/ Nand Rai Bhawan/NandRaiji ka Mandir, Yashoda Maath, Dhowri Haveli, Haveli, GauKhuta
BALDEO		
Precinct 1: Temple and Kund Precinct of Baldeo		
Dauji Temple and Kund of Baldeo with approach street with historic havelis and residences	Temples, Kund and remains along the kund, Havelis, Residences	Dauji ka mandir, Shri Hardev Ji ka Mandir, Sankarshankund
BAYANA		

HISTORIC AREAS	TYPOLOGIES	KEY MONUMENTS
Precinct 1 : Group of Mughal Monuments of Bayana		
Group of monuments from Satpura to SaatKunda	Chattri, Gateway, temple, Mosque, Kunds	Jahangir gateway, Kale Khan ka Makbara, Sarai-Sad-ullah, Akbar Chhatri
Precinct 2 : Syncretic Precinct of Bayana		
Bada Bazaar and Bhitarwadi Chowk	Temple, Mosque, Minar	Usha Mandir, Lodi Minar, Mosque
Roopwas		
Precinct 1 : Lal Mahal Precinct		
Mahal with water body	Water Tank and Palace	Lal Mahal, Water Tank
TUNDLA		
Precinct 1- Colonial Precinct of Tundla		
Residential railway colony	Church, residences and gardens	Bungalows with forecourt gardens, residences with common green spaces, company bagh now railway colony park, Church.
BHARATPUR		
Fortified City of Bharatpur		
Precinct 1 : Fort including the moat		
Fort precinct with its defence architectural elements	Fort, Town hall, Moat	Lohgarh Fort, Moat, Mahal Khas, Sujan Ganga, Sinsini Burj, Bihariji Ka Mandir, KachahariKalan , Kothi Khas, Chaman Bageechi(garden)Kamara Khas, Hansarani Mahal, Hammam &mud wall
Precinct 2 : Colonial Precinct		
Residential precinct of Pai Bagh and NamakKatra in proximity including colonial layer within the fort and surroundings	Temples, Residences, Shops, Town Hall	Janana Hospital, Jatonki Haveli, Upadhyay haveli, Salgiram ka Kund, Chatri and mandir, Kuan, Mud fortification wall, Radha Vallabh Ji ka Mandir, Giriraj Singh ki Haveli
Precinct 3 : Historic haveli and bazaar street of Bharatpur		

HISTORIC AREAS	TYPOLOGIES	KEY MONUMENTS
Stretch from KumherDarwaza to NavgrahaMandir and kund including Daujikamandir and tank upto circular road	City gates, Temples, Residences, Shops.	KumherDarwaza, Sarafa Bazaar, Laxman Mandir, Saraf Haveli, Jain Mandir, Rekha Nanga ki Haveli, Sharma Haveli, Oswal Haveli, Rajkiya Shree Vrishbhan Kumari Balika UchhyaMadhamik Vidyalaya, Shri Venkatesh Purana Laxman Mandir, AnahDarwaza, VeernarayanDarwaza, Lohgarh Press Club, Agarwal Dukan and Haveli
DEEG		
Precinct 1:Royal Garden and palaces precinct of Deeg		
Fort precinct including the gardens and the baghsin front of the palaces and surround water bodies.	Fort, Palaces, Gardens	Deeg fort, Gulab Bagh, Kachha Bagh, Ram Bhawan, Jal Mahal
KUMHER		
Precinct 1 : Historic and ecological precinct of Kumher		
Kumher fort and surroundings	Fort, Talaab (kund), Gaushala	KachaTalaab, Rani ka Talaab, Gaushala and tank, Kumher fort
FATEHABAD		
Precinct 1 : Mughal Precinct of Fatehabad		
Seraiand mosque precinct including the bazaar street with havelis.	Mosque, Bazaar, Residences, Serai	Mughal Serai, Humayun's Mosque, bazaar street, havelis.
Precinct 2 : Mughal Garden of Fatehabad		
Badshahibagh	Garden	Badshahibagh
Firozabad		
Precinct 1 : Historic Bazaar Street		
Economic and socio cultural drivers of the city : From the tomb of Feroz Shah to the entire Sadar Bazaar Street including the arterial lanes such as BohranWaliGali, Irfan Market	Bazaar Streets with Residential havelis and religious structures	Sheikh Khalif Masjif, Feroz Shah Maqbara, Farookihi masjid, BohranWaliGali, Irfan Bazaar, Residences and havelis on Sadar Bazaars and internal lanes.

HISTORIC AREAS	TYPOLOGIES	KEY MONUMENTS
SIKANDRA RAO		
Precinct 1 : Old fort/ tehsil precinct		
Ruins of SikandraRao	Remains of old tehsil (previously a fort) and the water body	Remains of Tehsil, Rehtom Pond and open area

49. Special byelaws and guidelines need to be framed for prohibited and regulated zones around ASI protected sites as per the regulations of the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010.

50. Capacity building of the urban local bodies to tackle heritage related issues in a sensitive manner needs to be enhanced through workshops, training and outreach programs to cover aspects related to, among others, technical knowledge of traditional materials, urban conservation norms and conservation implementation mechanisms.

51. Archaeologically significant sites, both protected and unprotected, need to be maintained and conserved and development around them to be monitored to enhance their significance and value. Wherever possible, the archaeological mounds should be integrated with the urban development patterns as open spaces, to ensure that there is no encroachment.

52. Heritage precincts with significant architectural, cultural and natural heritage need to have sensitive tourism management plans that enhance the values of these sites. Adaptive reuse of the vacant and abandoned heritage structures for amenities for tourists should be considered.

53. A robust tourist triangle of TTZ with three main nodes in the form of Mathura-Vrindavan, Agra and Bharatpur-Deeg-Fatehpur Sikri need to be developed and the spaces and sites can be developed around existing urban geography and triangular tourist urban structure,

54. Short-term and long-term tourism circuit in the region is recommended around the above urban structure with upgradation/improvement of areas around tourist attractions and basic services for tourists at key locations

55. It is further recommended that balance between tourism and everydayness of the city (site specific everyday spaces with the attention to locals as well and their socio-cultural practices) needs to be maintained by articulating the relationship between everyday spaces used by locals and tourist sites.

56.To retain the essence and genius loci of the places in TTZ, it is recommended to strengthen the spaces and activities associated with cultural and creative industries

within the settlements

57. Physical infrastructure needs to be improved in heritage zones and precincts with living crafts to improve quality of life of the craftsmen. These include glass factories and units at Firozabad, Heeng and colour production units in Hathras, Peda making units in Mathura, Vrindavan and other cottage industries functioning in TTZ region.

58. Risk preparedness and risk mitigation plans need to be prepared for all heritage sites and precincts.

59. Improve access to heritage sites and precincts and provide parking areas outside heritage precincts. Heritage precincts should be planned to prioritize pedestrian movement with provision for transport for physically challenged, elderly and sick persons. Existing pedestrian routes should be designed to be pedestrian friendly and new routes should be developed to form the pedestrian network connecting various heritage sites.

60. Road widening activities in the heritage precincts to accommodate more vehicular traffic should be carried out taking sufficient measures to avoid pollution, based on Government policy and depending upon availability of funds and resources in addition to technical requirements.

61. All infrastructure development of any scale in heritage precincts should be given clearance only after an exhaustive Heritage Impact Assessment and providing adequate mitigation measures. For example in Govardhan, a heritage structure located at the corner of the Mansi Ganga kund, (part of the historic precinct) was demolished to provide for parking facilities.

62. Heritage precincts should be cattle free and cattle traps should be strategically located.

63. Tourist information centres/kiosks should be located strategically, close to heritage sites and precincts, along heritage trails and in heritage buildings wherever possible.

64. Improve and provide for infrastructural facilities and amenities like drinking water, public toilets, litter bins at all heritage sites and precincts. A management plan should be in place for regular maintenance and upkeep of the public amenities. The physical infrastructure such as garbage collection points and electric transformers should be placed in discreet locations to avoid visual marring of heritage sites. Infrastructure which is destroying the visual quality of heritage needs to be removed and relocated. Underground wiring needs to be introduced in all heritage precincts.

65. A battery bus service that would pick and drop visitors need to be introduced wherever possble to ensure improved access opportunities to the various heritage

spots within the settlements. This will also ensure effective tourist dispersal so that they do not concentrate on only the major, more visible tourist destinations.

66. Taking three riverfront at Agra, Vrindavan and Mathura as first stage projects for improvement of open space for surrounding local community and city at large. It is recommended that these riverfront projects are to be conceptually structured around the 'Recreation' and not 'Entertainment'.

67. Other spaces recommended under this strategy are, edges of Govardhan Parbat, Moat at Bharatpur, John's Mill at Agra, edges of Deeg Palace, Shani Mandir at Kosi, and gardens along the bank of Yamuna at Agra

68. Neglected and relatively unknown heritage sites need to be developed to help disburse visitors and take pressure off over visited heritage sites. This will also encourage visitors to stay overnight in locations, ensuring their contribution to local economy. These new nodes to be developed with tourist infrastructure include Bayana, Deeg, Roopwas, Firozabad, Itmadpur and should be developed as theme based destinations and circuits catering to different tourist interest.

69. Based on the additive layers of development such as, historic core, production units of the town, real-estate ventures, etc. to be identified under specific functional character zones.

70. Once established, suitable urban image reflecting the predominant function need to be identified.

71. Such image districts to be linked with each other with specific attention to their edge conditions and activity patterns along the movement corridors.

72. Along with the promotion of mixed land use development, the character of each functional district to be enhanced through morphological interventions specific to respective character district for redevelopment of brown field and upcoming green field developments.

73. Settlements need rediscovery of their specific visual identity achieved through built heritage expressions. These expressions in the form of heritage streets, heritage precincts need to be strengthened.

74. Urban Design Guidelines for the identified character zones in the settlements need to be formulated to address height controls, boundary wall treatment, and streets furniture, landscape design, which will enhance the visual character of these heritage sites and improve their interpretation. These guidelines should be prepared in consultation with team of technical experts from the field of Urban Design, Landscape Architecture, Urban Planning and Conservation.

75. Since the settlements showcase unique identities, movement corridors such as NH 2 and expressways to utilize the vehicular intersections (urban nodes) and built edges (urban edges) to reflect the cultural and built identity. Also, the transition from change of architecture from one cultural precinct to another in TTZ to be consciously dealt with urban design guidelines.

76. Almost in all TTZ towns, such as Mathura, Vrindavan, Deeg and Bhartpur, the way built asset is revealed is quite unique and this needs to be consciously dealt with area level interventions to enhance the overall experience.

77. The river edge is pertaining to high potentials for creating a proscenium for built heritage and cultural activities. Desilting of such assets post monsoon and development of continuous links across the ghats, while considering the flood plains, will enhance the usage of the river front and it will provide a new identity to the cities.

78. Built edge conditions of the prominent attractions such as Deeg Palace, Buland Darwaza, etc. to be considered important. Significant buildings in the region not to be considered in isolation and the overall built environment, especially around the culturally significant structures to be considered as a whole and urban design guideline to be prepared and followed.

79. In case of inner cities, the charm of narrow lanes shall be maintained through appropriate degree of enclosure. Both, the vantage and vistas to be maintained without misappropriation by individual's form-based intervention.

80. Construction of new link roads to connect unconnected villages, habitations; construction of bypass for populated towns. Construction of roads for connectivity to destinations of tourism, cultural and religious importance, heritage sites, business and commercial centers shall be done as per guidelines and policy of Government depending upon availability of funds and resources in addition to technical requirements.

81. Road should be constructed adopting new technology in construction with an aim to provide technically sound, economical, fast, environmental friendly and sustainable solution to construction activities with an aim to lessen the burden on fast depleting natural resources.

82. Construction of Bridges, ROBs and Flyovers should be carried out as per requirement of traffic density, connectivity, control and flow of traffic which shall also reduce traffic congestion, travel time thereby reducing the average time vehicles occupy roads which in turn helps reducing air pollution on roads. All development works in road sector shall be executed as per Government policy and guideline depending upon availability of funds and resources.

83. Government office and residential buildings shall be maintained and kept in satisfactory condition. According to subsequent requirements of different departments residential and office buildings need to be constructed for proper functioning of different offices. As per Government policy these buildings shall be constructed as per National Building Code provisions, specifications and other considerations envisaged by Pollution Department of the State keeping in view environmental considerations. Construction of administrative blocks, hospitals, institutions, school and college buildings etc shall be required to be constructed as per standards and byelaws laid down by the Government and also depending upon the policy and availability of funds and resources of Government.

5.4.2.2 Agra City scale

1. The natural streams which were a part of the urban fabric of historic Agra and which have been converted into nallahs for the sullage and solid waste need to be restored back as storm water drains by regulating the edge treatments and land use around them and integrating them with the open space systems of the city.
2. Restore both ASI protected (Taj Mahal, Mehtab Bagh, Ram Bagh, Sikandra)and unprotected historic Mughal gardens in Agra, using authentic plantation vocabularies like groves of trees instead of lawns and authentic plant species. Replacing present day lawns with tree cover as existed originally will increase the biomass, reduce water consumption required for the maintenance and upkeep of the garden, enhance the water table through ground water recharge and also act as natural dust catchers to reduce pollution levels as a more effective and economical option. This requires preparation of a landscape plan which follows the historic plantation scheme and design principles and is based on historical and archival research, documentation of existing plantation pattern and site explorations.
3. All the restored historic gardens need to be integrated with the open space systems of the city
4. Tree cover needs to be increased in the identified heritage precinct of the cantonment area by planting shade giving trees with dense foliage along the roads.
5. Immediate revision of Master Plan of Agra with a view to increase the compactness of the city by utilizing available government and private land parcels (except Cantonment) so that infrastructure provisions- water supply, sewerage and public transport can achieve economies of scale. The revision needs to take care of reducing the sprawl by increasing the intensity of compatible functions between the existing developed area and outer ring road.

6. Cantonment of Agra is recommended to be taken up as a special character zone due to the presence of large tree cover and colonial heritage. The tree cover acts as an appropriate sink for any kind of air pollution for the city and Taj. Separate regulations are required to be prepared respecting the above two aspects of tree cover and colonial heritage and to include design controls for maintaining the tree cover, height of boundary walls, building heights and building uses.

7. Delineate, demarcate and notify the riverfront as Environmental Heritage Zone in the Master Plan of Agra. The Master plan of Agra needs to remove the residential areas that have been proposed on the river edge which will impact the floodplains.

8. Protect the character of the riverfront zone by enabling land-uses that are compatible with the heritage resources and the environment.

9. The river and its ecosystem need to be rejuvenated by improving the groundwater recharge through adoption of water management systems within the historic gardens along the river front, which will increase the water retention capacity of the soil. This includes plantation of indigenous species of trees and shrubs.

10. Incorporate water into the image of the city as a major landscape element, by providing public access to water. This can be achieved through the restoration of gardens as green open space and recreational spaces catering to the city as well as the tourists.

11. A continuous green edge, keeping native plantation and water recharge on the floodplains and banks, to be envisioned for river at Agra in the Master Plan of the city along with development control regulations for protection of any significant historic skyline.

12. In-situ basic infrastructure improvement for settlements located along the banks of river such as settlement around Raja Jaswant ji ki Chattri.

13. Greening of all the drains entering the river with suitable landscape treatment and to restore them as natural wetlands and open spaces for the city. Paving, concretization of slopes, top or bed of nallahs is not recommended.

14. There are many existing settlements along the edge of the river. These settlements have been at these location for decades and have a right to the place. Special attention must be given to uplift the state of services and proper infrastructure must be provided. The river edge must be made accessible and designed as per the community consultation to appropriate the use and create a sense of ownership within the communities.

15. Working conditions of craftsmen working in stone carving, zardozi in the heritage

precincts of Gokulpura and Hing ki Mandi need to be improved by providing improved physical infrastructure. Open spaces in heritage precincts where craftsmen reside need to be promoted as outdoor working spaces wherever needed and possible as in the case of stone craftsmen.

16. All abandoned heritage buildings identified through detailed inventory mapping have to be integrated with the lives of the local people through compatible adaptive reuse by introducing public amenities in these buildings. This will encourage the local community to have a stake in their upkeep and protection.

17. Build capacities of local communities residing in the vicinity or within heritage precincts as tourist guides at heritage precinct level for identified trails in heritage precincts of Belanganj, Cantonment and Mall road, Colonial Agra and river front gardens and related heritage on both banks of the river.

18. Develop and organize craft based walking tours in Agra to explore the areas where Zardozi, Pachikari (marble inlay), Carpet weaving works are carried out in the neighborhoods of historic walled city of Agra.

19. Develop and organize cuisine based walks to explore the areas such as petha making street which will give the tourist an opportunity to buy directly from the shops and contribute towards improving the living and working conditions of the workers.

20. Synergy between growth of inevitable small-scale industries and fragile environment for holistic development is a way forward for Agra.

21. Small scale industries are inevitable due to the user demand, price and associated livelihoods. The stringent norms can be categorized based on quantity of air pollutant discharge. Such alterations in norms will provide legal execution of small scale industrial activities of which right now are hidden and causing more damage to the environment through poor live-work condition, intoxicated and littered open spaces, ground water extraction and discharge predominantly along ecologically sensitive sites. While this will promote the livelihood of skilled workers, the overall development will improve the quality of open spaces and experience.

22. The historic core of Agra needs to be nominated as a World Heritage City by UNESCO. This would require legal and management systems to be developed for the protection of the Outstanding Universal Values of the city, as per the criteria set by UNESCO in the Operational Guidelines for the implementation of the World Heritage Convention.

23. Within the city of Agra various heritage precincts with different thematic content need to be delineated and protected. These are Taj Heritage Precinct with the iconic

Taj; Riverfront precinct with the river facing gardens; Hing ki mandi precinct with its crafts and mediaeval fabric character; Gokulpura precinct with the settlement of stone carvers; Belangunj precinct with its urban mediaeval character; Cantonment area precinct with its special Colonial bungalows character; Dayalbagh precinct with the Colonial institutional character.

Table 5.3 Identified Heritage Zones and Precincts in Agra

Historic precinct / group of monuments	**Key Themes**	**Historic settlements / areas**	**Key Monuments**
HERITAGE ZONE 1 : Taj Precinct and River front gardens, Agra			
Precinct 1 : Taj Mahal and immediate surroundings	• Royal structures with ancillary historic bazaars and residential Settlements • Manifestations of Mughal Capital	Taj Ganj and katras, Paktola, Purani mandi, Telipara, Kachhpura	Taj Mahal, Agra Fort, Dara Shikoh Library, Khan I Alam, Mehtab Bagh, Shah Jahan's Park
	Dominant Character of the Precinct: • High tourist foot fall area around • Residential houses rapidly changing in character • Shops of historic bazaars in Taj ganj • East and West gate of Taj Mahal have large parking areas and other tourist amenities • Paradise Park, Shah Jahanparkand protected forest area near east gate are green buffer spaces around Taj and River. • Marble inlay work is the craft still surviving in Taj Ganj.		
Precinct 2 : Extended River Front Gardens	• String of royal gardens along the river • The ecological foot print of Agra • Traces of Industrial influences of Colonial Period	Rajwara, Radha Nagar, KatraWajir Khan, Rambagh, Street scape of Belunganj towards the river	Ram Bagh Garden, Nur Ki sarai ,Chini ka Rauza , Parvez Khan Ka Maqbara, Itmad-Ud-Daula, John's Mill, Jaswant Singh Ki Chattri
	Dominant Character of the Precinct: • Residential infill developments and communities along river front • Nurseries along the eastern edge of the river • Ruins of historic gardens and traces of garden elements in nurseries and within settlements. • Settlements have turned their backs towards the river leading to unhealthy state of the river and solid waste dumping along the river edge. • Layer of now abandoned industrial footprint over the historic gardens along the western edge of the river. • Urban pressure and intense development in the areas along the western river front • Commercial landuse on vehicular roads on both sides of the river		

Historic precinct / group of monuments	Key Themes	Historic settlements / areas	Key Monuments
HERITAGE ZONE 2 : Historic Core of Agra			
Precinct 3.: Hing ki Mandi and Surrounding areas	• Economic and Social drivers of the city	Hing Ki Mandi, , Moti Katra, Nai Ki Mandi, Raqabganj, Mantola	Motamid Khan masjid, Mankameshwar Temple, Kalan masjid
	Dominant Character of the Precinct: • Residential structures with shops on ground floor • Narrow streets and dense settlements		
Precinct 4: Marble industry of Gokulpura, Agra	Craft industries	Gokulpura and Loha Mandi	Mangleshwar Temple, Kans Gate, Gangur Gate
	Dominant Character of the Precinct : • Residences with courtyards and verandahs as working spaces. • Narrow streets • Shops on the ground floor of peripheral streets		
Precinct 5.:Belanganj and its bazaars	Historic housing	Belanganj, Kashmiri Bazaar, Kinari Bazaar,	Kala Mahal, Shahi Madarsa Masjid, Motamid Khan Mosque, Mankameshwar Temple, Hazoori Bhawan, Mahesh Chand Bansal House, Dara Shikoh library
	Dominant Character of the Precinct : • Residential structures • Infill Developments of new structures • Narrow streets • Commercial streets • Historic social Infrastructure – Mosques and madrasas		

Historic precinct / group of monuments	Key Themes	Historic settlements / areas	Key Monuments
Precinct 6. Colonial Residential and Administrative precinct	Colonial bungalows	Cantonment Area, Civil lines, Raqaabganj	NCC Officer's Mess, Adams Tank and Memorial, Agra Cantonment Railway Station, ASI Offices, St. George's Cathedral Church
	Dominant character of the Precinct: • Bungalows of high architectural value sitting in large compounds • Low rise development • Wide streets • Low boundary walls helping architecture to communicate and contribute to the streetscape		
Precinct 7: Colonial Institutional Precinct	Colonial institutions	Dayal Bagh and Paliwal Park Precinct.	Samru Tomb, Roman Catholic Cemetery, Kandahari Begum Tomb, St. John's Inter College, Murari Lal Katri Girl's Inter , Muzaffar Khan ka Bagh, Agra College, St. John's Church, Lady Lyall Hospital, St. Peter's College, School- St. Joseph's & St. Patrick's, University Library, Akbar's Church, Queen Victoria Inter College, Chandiwali Kothi, Paliwal Park, Gol Mandri, Hessing Tomb, Civil Courts
	• Dominant character of the precinct: • Institutional complexes with high value architecture set in large compounds • Buildings with large footprints • Wide roads • Colleges and schools as dominant use		

24. Special byelaws and development guidelines need to be formulated for identified

heritage precincts which maintain their character, through regulations that are context specific, heritage sensitive and community responsive.

25. Heritage sites and precincts within the city of Agra need to be conserved and promoted and developed with tourist infrastructure which can help take pressure off from the already overburdened heritage sites of Taj.

26. Heritage Impact Assessment, Environmental Impact Assessment and Social Impact Assessment should be undertaken for all upcoming development projects within the immediate vicinity of both protected and unprotected heritage sites and precincts.

27. Heritage precincts identified should be brought under 'Adopt a monument scheme' to improve basic civic amenities and built environment for the residents within. This is especially needed in crafts clusters like Gokulpura with pachikari (marble inlay) work, Nai ki Mandi for Zardozi, Tedhi Bagiya for carpet weaving

28. Site Management Plans for the World Heritage Sites, namely Taj Mahal, Agra Fort and Fatehpur Sikri complex need to be prepared and periodically monitored as per the mandatory requirement for all World heritage sites as per the Operational guidelines laid out by UNESCO.

29. A Historic Building Bank needs to be set up in an abandoned heritage structure for depositing all the neglected pieces of heritage buildings lying scattered and uncared for in the streets of Agra.

30. There needs to be a proper tourism plan laid out for the city by carefully identifying the actors and graded audience for tourism.

31. Physical infrastructure needs to be improved in heritage precincts identified which have living heritage such as stone craftsmen in Gokulpura, petha making units and zardozi workers in Naiki Mandi, carpet weavers in Tedhi Bagia to improve quality of life and working conditions of the craftsmen. Other areas with living crafts need to be identified for physical infrastructure improvement.

32. Riverfront gardens need to be conserved and revitalized as part of the open space system of the city. Revitalization of these areas will help in improving the experience of the local community as well as the tourists.

33. Risk Preparedness and Risk mitigation plans for the World Heritage Sites and the sites with high visitor footfall need to be prepared.

34. A comprehensive traffic management plan, responsive to the large quantum of heritage dispersed all over the city of Agra, needs to be prepared which promotes pedestrian visitor movement in heritage precincts. It should improve physical and visual connectivity between heritage resources and reduce traffic congestion in heritage

precincts. The plan should encourage visitors to travel on foot or use ecofriendly modes of transport. New movement routes should be designed for pedestrian movement. Access to heritage sites identified within the heritage precincts needs to be improved by improving road edge conditions, signage and interpretation.

35. Given the quantum of heritage in Agra different hierarchies of trails need to be planned out and itineraries worked out for various time spans available to tourists. Nodes or pause points need to be strategically located as resting spots along the heritage trail. Trails have to be designed at both pedestrian and vehicular scales.

36. Road widening schemes in heritage precincts to accommodate increasing traffic need be carried out with proper safety measures to avoid pollution, based on Government policy and depending upon availability of funds and resources in addition to technical requirements.

37. Battery operated ecofriendly modes of transport along tourist routes need to be introduced with designated stops for hop on, hop off.

38. Park and ride facilities for visiting heritage precincts and heritage zones, with nodes for parking at strategic points along heritage trails need to be introduced.

39. Public amenities, to include drinking water kiosks, public toilets and dust bins at key locations, discreetly located along heritage trails and within heritage sites need to be provided.

40. Roads more than 10 metres wide should be planted with shade giving indigenous trees as a public amenity to enhance the visitor experience in harsh weather condition and also contribute towards green cover.

41. Other than tourism oriented needs, the neighborhood concept shall be deployed for fulfilling basic day to day need at walkable distances for social and physical infrastructure as the town has other functions too other than the predominant one.

42. Provision of attractive public transport both for short and long journeys shall be provided. The drop-off and pick-up points will become a potential for integration with place making.

43. Not only near the tourist attractions (majorly between tourist parking and the attraction), but the city shall be pedestrian friendly with adequate pedestrian infrastructure.

44. The character and quality of key open spaces within heritage precincts and around heritage resources need to be enhanced to become nodal spaces as part of community open space networks. Organized public open spaces around monuments would ensure their protection against unwanted development in the future.

45. Nodes of varying hierarchies need to be developed around heritage sites to take load off the Taj area.
46. The riverfront historic garden precinct needs to be planned as a vital open space of the city.
47. While recognising multiple functional nodes such as peripheral real-estate zones, extension of Taj ganj, Old city precinct and cantonment, the Master Plan and urban development regulations shall pertain to strengthen functional distinctions which will cater to the urban image.
48. The edge conditions need to follow urban design guidelines for setbacks, activity allocation and morphological treatment to accentuate the character districts and their experience.
49. The character zones in the city of Agra forming the image of the city are identified as heritage precincts. Urban Design Guidelines for the identified character zones for height controls, boundary wall treatment, streets furniture, landscape design need to be made which will enhance the visual character of these heritage sites and improve their interpretation.
50. Monuments need to be integrated in public chowks and open spaces through sensitive urban design to enhance the imagery of the place.
51. Apart from Taj Precinct, there are three more areas of significance in the city- Cantonment, Old City and Extensions of Tajgnaj, south of Taj Mahal. These areas require specific urban design guidelines for conservation and redevelopment and renewal
52. An immediate revision of the Master plan and building regulations is recommended to incorporate and revitalize the historic cores of the city.
53. A robust community participation needs to be adopted in order to revitalize the Old City areas, Tajganj, Kachpura, Jama Masjid area and settlements around Agra Fort.
54. Create an inclusive and sustainable public realm by improving pedestrian infrastructure and quality of public spaces along Fatehabad road, Road from Agra fort station to Agra fort and further leading to Taj Mahal. Emphasis to be given to introduce climate and culturally responsive pedestrian infrastructure along the Bazaar streets proposed in Agra Master Plan 2021.

5.4.2.3 Taj Precinct scale

1. As part of the conservation of all historic gardens, all the lawns within historic gardens, including the World Heritage Sites of Taj Mahal and Agra Fort, Mehtab Bagh, Ram Bagh, Chini ka Rauza,Bagh e Sultan Parvez, Bagh e Khan e Alam,

Bagh-i-Jahanara(Jahanara Bagh), Buland Bagh, Jaswant Singh's Chattri need to be replaced with authentic and historically correct plant species and planting patterns known to have been planted in the respective Mughal garden sites, based on evidence from archival sources.

2. The health of the forest cover in the forest land adjoining the East gate needs to be improved by planting more indigenous trees.

3. More shade giving indigenous trees need to be planted along the newly designed east gateway entrance axis which will improve the microclimate, visitor comfort and the biomass to help reduce pollution levels in the precinct. More green surfaces need to be introduced along this axis for similar results.

4. Plant groves of indigenous trees in the Paradise park on the west bank of the river to hold the soil, improve the microclimate and reduce pollution levels by acting as a dust catchers.

5. Alternate livelihood opportunities must be planned in the precinct (not just tourism related). Household industries, art-craft clusters must be retained and not relocated. More innovative techniques should be adopted to tackle the pollution caused by these industries rather than adopting a conventional, unsustainable approach of relocation.

6. The river edges must be cleared from the accumulated solid waste and no untreated sewage discharge should be allowed throughout the stretch of the river.

7. The drains in the precinct should be covered and a green buffer must be designed.

8. A system of active and passive green spaces should be created through the precinct. Existing open spaces should be conserved through statutory plans and regulations and be utilized as passive green spaces.

9. Any future development on the reserved Forest area and its extension should not be allowed.

10. The existing residential settlements on the land demarcated for National park north of Taj Mahal across the river must be retained and proper infrastructure and livelihood opportunities should be provided.

11. Slums located in the precinct must be retained and different development model must be designed on case to case basis. Citizen led incremental upgradation should be prioritised over rehabilitation or relocation.

12. Robust community participation must be conducted to create any development guidelines or proposal for the residential areas in the precinct.

13. Enhance the experience of the riverfront zone by improving the accessibility, visibility, legibility and interpretation of the heritage resources sited along the river

bank, which include the riverfront Mughal gardens

14. Conserve Ram Bagh and Buland Bagh complex, ChinikaRauza, Bagh-e-Sultan Parvez, Mehtab Bagh, Khan-e -Alam Bagh, Rauza of Zafar Khan, Jaswant Singh kiChattri so that the river front contributes to the open space system of the city.

15. The edge treatment of the riverfront in different sections needs to be designed to have visual connection with the river. The urban fabric on the west bank needs to be connected with the river by lowering the walls along the road to have a visual connect with the river so that it becomes a part of the everyday experience of the people using the road.

16. Traffic along the road edging the river along the west bank needs to be curtailed so that pedestrian movement is encouraged and both local community and visitors get to experience the river more actively.

17. Protection and enhancement of important view corridors and vantage points is required in order to reclaim and redefine the relationship of the mausoleum complex with the river and Mahtabbagh across the river.

18. Ecological restoration of the river throughout the precinct should be done while maintaining the historical edge and skyline.

19. The lost relationship between the river and the monuments must be reclaimed and reimagined, access points should be introduced at strategic locations based on interest and existing visual corridors.

20. Development of infrastructure dedicated to the ghat's activities should be done. While acknowledging ghats as nucleolus of activities, the infrastructure to support activities such as bathing, aarti, boating, worshiping and basic utilities to be provided which will accentuate the activity patterns along the ghats. Once being an asset, the river front to become a source of livelihood for many and also become a revitalized public space for the communities while maintaining hygiene.

21. A guided tourist circuit through river which can help in revitalizing interface between monuments and the river. Destination oriented, spot-based tourist circuits can provide new vistas to historical monuments. It will enhance the importance of forgotten monuments and help in new representations (non stereotypical image such as Taj). This will increase the duration spent by the tourist specially in the cities like Agra where the stays typically are for single day. This can also link indigenous baghs, nursery and other significant location dotting city's evolution such as closed industries as attraction

22. Improve engagement of communities with heritage by developing spaces around

heritage structures for public use. Gandhi Smarak adjacent to Itmad-ud-daula complex needs to be designed as a public space providing access to the local community. Its regular upkeep and maintenance will be ensured if the local community is made a stakeholder. The enclosure wall also needs to be made more transparent for the residents around to have a visual connect with the heritage site.

23. The historic gardens Buland Bagh, Zahara Bagh, Chini ka Rauza, Bagh e Wazir Khan, Bagh e Sultan Parvez, partly converted to nurseries need to be developed as centres of Mughal plant industry providing increased job opportunities for sale and marketing of Mughal plants as a tourism product. Tourist guides from the local community need to be trained and imparted with knowledge of Mughal gardens and plants to be able to conduct heritage walks in these sites.

24. Develop Nur Mahal serai between Ram bagh and Buland bagh as crafts haat selling crafts of Agra as part of the adaptive reuse strategy. The design has to be sensitive to the heritage character of the site and should not undermine its historicity in any manner.

25. There needs to be a shift in focus from tourism to developing other sectors to bring livelihood opportunities for the local and create a multi-sectoral livelihood pattern in the precinct.

26. Traditional livelihood patterns should be identified and conserved in the precinct for a sustainable future growth.

27. The intensity of informal activity with the current trend is going to increase in the future and the future proposals must incorporate this trend.

28. Retail commerce should be promoted in the precinct, serving not just to the tourists but also incorporating the local needs. A mx of such retail shops must be maintained in every market space/street.

29. The precinct needs to be promoted as a garden district.

30. Other heritage sites within the precinct need to be conserved and interpreted to take visitor pressure off Taj. The sites identified are Mehtab Bagh, ChiniKaRauza, Ram Bagh, Itmad-ud-daula, GyarahSidhi, Khan-i-Dauran Bagh,Buland Bagh, JahanaraBagh, Jaswant Singh ki Chattri and Haveli of Agha Khan.

31. The riverfront precinct with its historic gardens should become part of the open space system of the city.

32. A comprehensive conservation management plan needs to be prepared to cover all the sites located in the precinct addressing their conservation, landscape design, management and interpretation for local community and visitors. The sites to be

included are Chini ka Rauza, Mehtab Bagh, Gyarah Sidhi, Ram Bagh, Buland Bagh, Jaswant Singh ki Chattri, Jahanara Bagh, Khan-i-Dauran Bagh, Khan-i-Alam Bagh, and Battis Khamba.

33. The Management plan should include development of open spaces within the precinct as community open spaces with improved landscape, infrastructure and public amenities, signages and street furniture.

34. Eco-tourism trails to be developed in the protected forest reserve on the east of Taj Mahal to create awareness among the locals and visitors about the biodiversity in nature.

35. Cultural industry shall be developed in order to carry forward the traditional knowledge and skills and, it will add to the livelihood for the less privileged people in the precinct which being an attraction.

36. The road presently running along the river front and cutting the city from the river should be planned to have limited traffic to encourage pedestrian movement and to help recover the riverfront garden landscape. Pedestrianization would also significantly help to emphasize the historic character of the site.

37. Access to river and river front gardens needs to be improved. The followings spots need to be made more accessible: Bagh-Shah Nawaz Khan, Buland Bagh, Ram Bagh, Jahanara Bagh, Chini ka Rauza, Bagh-e-Wazir Khan, Bagh-e-Sultan Parvez, Bagh-e- Mausawi Khan, Haveli of Khan-e-Dauran, Haveli of Aga Khan, Rauza of Zafar Khan and Jaswant Singh ki Chattri.

38. Identification of important tourist routes should be done and should be pedestrianized wherever necessary allowing only para transit and public transport on these routes.

39. Provisions for handling large pedestrian footfall shall be dealt with wider and accessible shaded footpaths with universal access.

40. The visual clutter, including electric cables, water supply and sewerage pipelines and drains along with hoardings shall be minimized to enhance the overall experience.

41. Develop various heritage sites along the river front precinct as nodes to accommodate various functions of the city and take pressure off the Taj area. These heritage sites are: John's mill area as public place, Khan-e-alam as heritage site, haveli of Khan-e-Duran, open Gandhi Smarak for community access, ram bagh and serai precinct etc. Johns Mill area needs to be developed as a public amenities area and a major node of the city with restaurants, crafts centre and recreation without compromising on the spatial and visual integrity of the site and its significance as an outstanding example of industrial heritage.

Figure 5.6 Viewshed around Taj



PANAROMIC AERIAL VIEW OF TAJ GANJ
SHOWING THE HEIGHT RESTRICTION REGULATED TILL DATE

Source: Google

Table 5.4 Proposals

Garden no.	River front Gardens/sites	Proposals
East Bank Garden		
Garden 1	Bagh-i-Shah Nawaz Khan	
Status of Existence :Partially Exists Current Use: Residences Protection Status :Partially Protected (Ruins Protected)		1. Protection and conservation of ruins (preparation of Conservation Management Plan /Site Management Plan) 2. Demarcation of the buffer boundary of protected site 3. Improve accessibility to Garden from Rambagh Garden Road(Hathras Road) 4. Improve access to the river 5. Interpretation of ruins as part of the Historic garden (Site Interpretation Plan) 6. Develop nursery specializing in Mughal plant species as used in historic Mughal gardens and promote their marketing 7. Residents of Kushwaha market and surrounding areas need to be engaged in the upkeep of the historic garden through community outreach programs and workshops.
Garden 2	Buland Bagh	
		1. Restoration of the historic garden along with its water channel and authentic plantation scheme (scientific investigations for site exploration are required) 2. Demarcation of the buffer boundary of protected site 3. Improve access to the garden 4. Improve access to the river 5. Residents of Kushwaha market and surrounding areas needs to be engaged in the upkeep of the historic garden through community outreach programs and workshops. 6. Develop nursery specializing in Mughal plant species as used in historic Mughal gardens and promote their marketing 7. Training and capacity building of the community youth and engaging them as custodians of heritage.
	Nur kiSerai	

Garden no.	River front Gardens/sites	Proposals
Status of Existence :Exists Current Use: Monument (Sarai) Protection Status :Unprotected		1. Conservation and Restoration of the Serai 2. Integrate the water channel, at present a nallah, into the landscape scheme. 3. Improve access from the Rambagh Bagh Road to the Seraithrough sensitive design of road 4. Provide accessibility to the river from the rear gateway of the Serai 5. Adaptive reuse of the serai as a crafts haat
Garden 3	Bagh-i-Nur Afsan (Ram Bagh)	
Status of Existence :Exists Current Use: Monument Protection Status :ASI Protected		1. Conservation and authentic Restoration of the garden using the principles of Mughal Garden design 2. Improve access to the garden from Rambagh Road to Garden. 3. Provision of visitor amenities, signageand upgrading the parking
Garden 4	Bagh-i-Zahanara(Zahara Bagh /Zora Bagh)	
Status of Existence :Partially Exists Current Use: Nursery /Residences Protection Status :Partially Protected		1. Conservation and Restoration of the garden around the surviving ruins 2. Corner chattris need to be conserved 3. Developed as a community space 4. Landscape improvement through urban design intervention of the ChattaGhat 5. Mughal plant species to be planted to evoke the memory of the space 6. Green area to be protected from encroachments and change of land use from open space to residential 7. Livelihood of people should be linked with the management of nursery 8. Improve access to garden
Garden 5	Unnamed garden	
Status of Existence :Lost Current Use: Residences Protection Status :NA		1. Develop as a green public open space
Garden 6	Chini Ka Rauza	

Garden no.	River front Gardens/sites	Proposals
Status of Existence :Partially Exists Current Use: Nursery Protection Status :ASI Protected (Tombs Protected)		1. Conservation and Restoration of the Chini ka Rauza and Kala Gumbad 2. Restoration of the historic garden along with its water channel and authentic plantation scheme (scientific investigations and site explorations are required) 3. Site development and landscape improvement of the area between Chini ka Rauza and Kala Gumbad as a community space 4. Improving accessibility from Rambagh road to the complex 5. Improve accessibility to the river from the precinct 6. Develop nursery specialized in Mughal plant species as used in historic Mughal gardens 7. Site interpretation of the Complex (Chini ka Rauza, Kala Gumbad and nursery as part of one garden complex)
Garden 7	Bagh-i-Wazir Khan	
Status of Existence :Partially Exists Current Use: Nursery /Residences Protection Status :Unprotected		1. Restoration of the ruins 2. Improving accessibility from Rambagh road to the ruins 3. Provide access to the river
Garden 8	Bagh-i-Sultan Parvez	
Status of Existence : Partially Exists Current Use: Nursery /Residences Protection Status :Unprotected		1. Conservation and authentic Restoration of the Garden with the tomb of Sultan Parvez 2. Scientific exploration for the historic remains 3. Improving accessibility from Rambagh road to the complex 4. Provide access to the river 5. Site Interpretation Plan for the garden complex
Garden 9	Maqbaraltmad-ud-Duala	
Status of Existence :Exists Current Use: Garden /Monument Protection Status :Protected		Improvement of parking facilities. Gandhi smarak should be opened to the public and developed as a public open space. Walls to be made transparent by designing a MS grill wall.
Garden 10	Bagh-i-Mausawi Khan Sadar	

Garden no.	River front Gardens/sites	Proposals
Status of Existence :Partially Exists(a dome roof structure exists), Current Use: Residences Protection Status : Unprotected		1. Restore the structure 2. Provide access to structure through school 3. Improve access to river
Garden 11	Bagh-i-Padshahi	
Status of Existence :Lost, Current Use: Railway station Protection Status :NA		-----
Garden 12	Moti Bagh	
Status of Existence :Lost, Current Use: Residences Protection Status :NA		-----
Garden 13	Bagh Padshahi	
Status of Existence :Lost Current Use: Residences/Agricultural Protection Status :NA		1. Plant three rows of trees of the Mughal period along the riverfront to evoke the memory of the historic river-front gardens 2. Development control regulations to prohibit the change of land usefrom agriculture
Garden 14	Lal Bagh Padshahi	
Status of Existence : Lost Current Use: Residences/Agricultural Protection Status :Partially Protected (GyarahSidhi Protected)		Scientific investigation to include GPR surveys and other exploration techniques to recover the footprint of the historic gardens. Site Interpretation Plan
Garden 15	Char Bagh Padshahi	
Status of Existence : Lost Current Use: Agricultural Protection Status :NA		
Garden 16	Bagh-i-Bisht	
Status of Existence : Lost Current Use: Agricultural Protection Status :NA		
Garden 17	Bagh-i-MehtabPadshahi	
Status of Existence :Exists Current Use: Garden /Monument Protection Status :Protected		Planting of authentic plant species through phasing plans which phase out the inauthentic plant species Site Interpretation Plan Provision of parking and public amenities
West Bank Gardens		
Garden 18	Haveli of Khan-i-Duran	

Garden no.	River front Gardens/sites	Proposals
Status of Existence :Partially Exists Current Use: Haveli, Gateway Protection Status :Unprotected		1.Conservation of remains of the garden 2.Adaptive reuse of the structure 3.Improvement of accessibility from the Taj Mahal - East corridor to the interior of the gardens 4.Afforestation in the area 5.Development of eco-trails 6.Site Interpretation 7.Landscape Improvement of East Corridor 8.Nullah to be integrated in the landscape design 9.Development of View point of Taj
Garden 19	Haveli of Agha Khan	
Status of Existence :Structure Exists Current Use: Temple trust Protection Status :Unprotected		1.Conservation of remains of the gardens 2.Afforestation in the area 3.Nullah to become part of the landscape 4.Development of View point of Taj
Garden 20	Rauza of Shah Jahan (Taj Mahal)	
Status of Existence : Exists Current Use: Garden/ Monument Protection Status :ASI Protected		Preparation of Site Management Plan (as per the recommended norms for World Heritage Site)
Garden 21	Bagh-i-Khan-i-Alam	
Status of Existence : Exists Current Use: Garden/ Monument Protection Status :ASI Protected		1.Conservation of the historic garden elements which include the water channels, water systems, and historic plantation scheme. 2.Improved visibility and accessibility from the West gate of Taj Mahal throughsignage 3.Site Interpretation 4.Promote it as an extension to Taj Mahal to understand the waterworks of the Taj Mahal
Garden 22	Haveli of Aslat Khan	

Garden no.	River front Gardens/sites	Proposals
Status of Existence :Lost Current Use: Shahjehan park Protection Status :NA		1.Interpret the gardens in the land-scape by emphasising the footprints of the various historic gardens and their ruins in the area through landscape design to enhance the experience of the visitor 2.Scientific investigation to include GPR surveys and other exploration techniques 3.Site Interpretation Pla
Garden 23	Haveli of Mahabat Khan	
Status of Existence : Partially Exists Current Use: Shahjehan park Protection Status :Unprotected		
Garden 24	Haveli of Hoshdar Khan	
Status of Existence : Lost Current Use: Forest Land Protection Status :Unprotected (Protected by Forest Department)		
Garden 25	Haveli of Azam Khan	
Status of Existence : Lost Current Use: Forest Land Protection Status :Unprotected (Protected by Forest Department)		1.Interpret the gardens in the land-scape by emphasising the footprints of the various historic gardens and their ruins in the area through landscape design to enhance the experience of the visitor 2.Scientific investigation to include GPR surveys and other exploration techniques 3.Site Interpretation Plan
Garden 26	Haveli of Mughal Khan	
Status of Existence :Lost Current Use: Forest Land Protection Status :Unprotected (Protected by Forest Department)		
Garden 27	Haveli of Islam Khan	
Status of Existence : Lost Current Use: Forest Land Protection Status : Unprotected (Protected by Forest Department)		
	Paradise Park	
		Plant groves of indigenous trees known to have been planted in Mughal period to evoke the memory of the lost land-scape
Garden 28	Agra Fort	
Status of Existence :Exists Current Use: Monument Protection Status :ASI Protected		1. Preparation of Site Manage-ment Plan (as per the recommended norms for World Heritage Site)
Garden 29	Haveli of Dara Shikhoh	

Garden no.	River front Gardens/sites	Proposals
Status of Existence : Structure Exists Current Use: Monument Protection Status :ASI Protected (Structure protected)		1.Conservation of haveli 2.Improve accessibility to Haveli 3.Efficient solid waste management system to be adopted to recover the historic nullah 4.Site Interpretation by enhancing the footprints of the garden through design of floorscape to evoke the memory of the lost garden 5.Adaptive Reuse 6.Open space in front of Dara Shikohto be developed as a community open space 7.Urban Design Guidelines 8.Planting of indigenous trees along the river edge to recover the imagery of lost riverfront gardens when viewed from across the river 9.Change material of the road along the stretch to capture the footprint of the garden
Garden 30	Haveli of Khan-i-Jahan Lodhi	
Status of Existence : Lost Current Use: Residences Protection Status :NA		1.Urban Design Guidelines for facade fronting the river 2.Planting of indigenous trees along the river edge to recover the imagery of lost riverfront gardens when viewed from across the river
Garden 31	Haveli of Hafiz Khitmadgar	
Status of Existence :Lost Current Use: Residences Protection Status :NA		1.Urban Design Guidelines for facade fronting the river 2.Planting of indigenous trees along the river edges to recover the imagery of lost riverfront gardens
Garden 32	Haveli of Asaf Khan	
Status of Existence : Structure Exists Current Use: Residence Protection Status :Unprotected		1. Urban Design Guidelines for facade fronting the river 2. Planting of indigenous trees along the river edges to recover the imagery of lost riverfront gardens
Garden 33 Garden 34 Garden 35	Haveli of Alamgir	

Garden no.	River front Gardens/sites	Proposals
Status of Existence :Lost Current Use: Residence Protection Status :NA		1.Urban Design Guidelines for facade fronting the river 2.Planting of indigenous trees along the river edges to recover the imagery of lost riverfront gardens
Garden 36	Haveli of Sasat	
Status of Existence : Lost Current Use: Residence Protection Status :NA		1.Urban Design Guidelines for facade fronting the river 2.Planting of indigenous trees along the river edges to recover the imagery of lost riverfront gardens
Garden 37	Haveli of Jafar Khan	
Status of Existence Lost Current Use: Residence Protection Status :Partially Protected		1.Urban Design Guidelines for facade fronting the river 2.Planting of indigenous trees along the river edges to recover the imagery of lost riverfront gardens
Garden 38	Rauza of Sasat, tomb of Shaista Khan	
Status of Existence : Lost Current Use: Residence Protection Status :NA		1.Urban Design Guidelines for facade fronting the river 2.Planting of indigenous trees along the river edges to recover the imagery of lost riverfront gardens
Garden 39	Haveli of Wazir Khan	
Status of Existence : Lost Current Use: Multiple Use : Residences offices, industrial Protection Status :NA		1.Urban Design Guidelines 2.Planting of indigenous trees along the river edges to recover the imagery of lost riverfront gardens 3.Johns Mill area needs to be developed as a public amenities area and a major node of the city with restaurants, crafts centre and recreation without compromising on the spatial and visual integrity of the site and its significance as an outstanding example of industrial heritage. 4.Improve access
Garden 40	Haveli of Mukim Khan	
Status of Existence :Lost Current Use: Multiple Use : Residences offices, industrial Protection Status :NA		
Garden 41	Haveli of Khalil Khan	
Status of Existence : Lost Current Use: Multiple Use : Residences offices, industrial Protection Status :NA		
Garden 42	Bagh-i-Rai Shiv Das	
Status of Existence :Lost Current Use: Multiple Use : Residences offices, industrial Protection Status :NA		
Garden 43	Bagh-i-Hakim Kazim Ali	
Status of Existence :Lost Current Use: Water works area Protection Status :NA		1.Urban Design Guidelines for facade facing river 2.Planting of indigenous trees along the river edges to recover the imagery of lost riverfront gardens
Garden 44	Rauza of Zafar Khan	

Garden no.	River front Gardens/sites	Proposals
Status of Existence :Partially Exists Current Use: Tomb and Mosque , Gaushala along the river Protection Status :ASI Partially Protected		1.Urban Design Guidelines for facade facing river 2.Planting of indigenous trees along the river edges to recover the imagery of lost riverfront gardens
Garden 45	Chattri of Jaswant Singh	
Status of Existence :Exists Current Use: Monument Protection Status :ASI Protected		1.Site Interpretation Plan - signage and interpretation 2.Prohibit use of riverfront as a garbage disposal ground

43. In Taj Dharohar kshetra, not the land use but the historic significance needs to be taken up for delineation the character zones to formulate multi-nodal precinct structure. The nodes to vary from ecological precincts encompassing Baghs and nurseries, craft and cultural districts, existing non-historic residential localities and protected monuments and view corridors/vantage points. Each zone needs to then identify the key imageble component followed by edge relation with other distinct nodal zones.

44. Within Taj Ganj, the four katras to be considered as multi-nodal functional zones which can enhance the experience based on the historic function of each katra such as perfume manufacturing, Pachchikari, etc.

45. Re-instate the visual continuity and physical integrity of the river-edge so that the riverfront is read as one cohesive entity. Restoring the gardens would help enhance the imagery of the historic river front as a garden district.

46. The heritage structures within Shahjahan Park need to be conserved and interpreted to bring back the memory of the river facing gardens.

47. Indigenous and historically authentic species need to be planted in Paradise Park to enhance the historic character, increase the green cover and improve the imageability of the riverfront

48. Urban Design guidelines need to be framed for the Belanganj facade area, to preserve the character of the riverfront.

49. Delineation and revision of Taj Heritage Precinct based on ground conditions through a detailed survey, while incorporating the already existing Taj Dharohar Kshetra demarcated in the Master Plan.

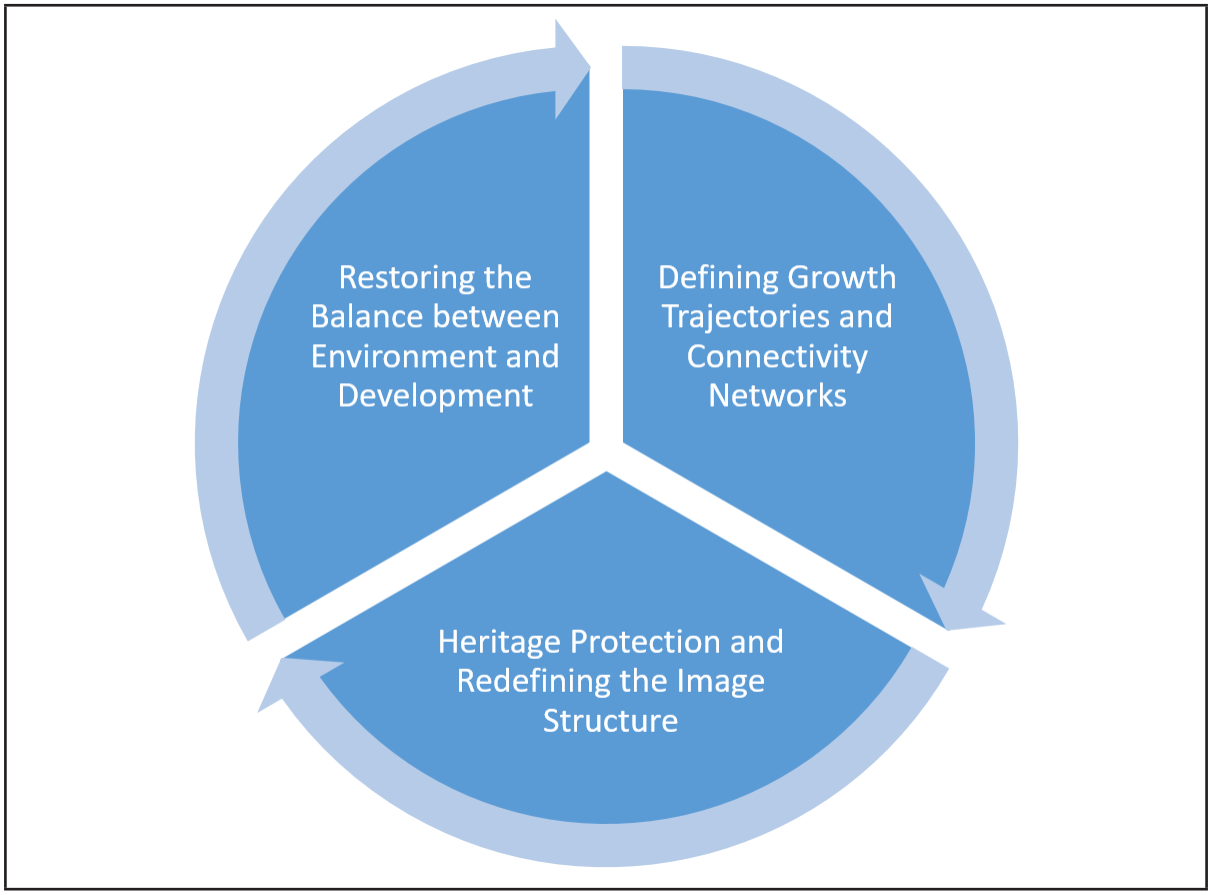
50. Identified different character zones in the Precinct and proposing area specific development guidelines.

51. Pedestrian oriented development with local and sustainable modes of transport should be encouraged.

52. Conserving the unique building and spatial typologies in the entire precinct portraying a distinctive image and character of the neighborhood and its communities.
53. Detailed urban design and conservation guidelines to accommodate historicity and contemporary urban development in the precinct. The regulations and guidelines must be contextual and differ as per the nature, history and socio-economic profile of the settlement.
54. A differential character zone and must be maintained as per the location and context throughout the demarcated heritage precinct and provisions for place making and detailed urban design guidelines must be included in the statutory documents such as master plan and Building regulations.
55. Any recommendation for existing settlements falling under Taj Heritage Precinct must be contextual and must consider each settlement's valid and legitimate histories, socio-economic profile and differential tenurial rights.
56. A shift in focus is required from tourism to a wholistic and balanced approach towards the precinct and its surrounding.
57. More viable, practical and innovative solutions must be provided to deal with water pollution in Yamuna.

5.5 Comprehensive Action Plan

The Taj Trapezium Zone has been declared as sensitive zone , especially with respect to air pollution. It is thus necessary to monitor all activities that can cause air pollution in the area. The Zone has within it World Heritage Sites and is also of rich cultural significance with the Braj Region forming a large part of it. The resident population of the area depends on the potential that these resources offer. With population growth and natural resource degradation and depletion, the following would be the key anchors for actions that need to be addressed:



The action plan brings together multiple strategies and recommendations presented in the report. This is also an exercise to bring multi-sectoral issues under an umbrella to formulate one specific action into clearly defined step. Each action is thus an interdisciplinary approach to set in processes of change either at Regional, Agra city or Taj precinct scale. The actions are proposed for primarily three time frames short(1-yrs), Medium(3-7 yrs), Long(7+ yrs) along with different possible agencies involved to carry out the task. It is further categorised under various aspects such as Legal, Policy, Planning, Implementation, Monitoring, Design, Education, Documentation etc. to create a better understanding of the nature of action.

Table 5.5 Comprehensive Action Plan

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
Regional Scale						
1	Strengthening of TTZ Authority - creation of departments to address all aspects (Air and Water Pollution, Waste management, Forest, Built Heritage, Land Use, Building regulations, Industries, Roads and Transport, Irrigation and Flood Control, Ground Water, Health, Education etc.). Authority to have Zonal branch offices at each District Head Quarter for better coordination with Local Government.	Central and State Government	Legislative	■		
2	Demarcation of area upto 30km radius from Taj Mahal for intensive air pollution control – actions to be decided after scientific study	Central and State Government	Legislative, Planning, Design, Implementation and Monitoring	■		
3	Carrying Capacity Studies to be undertaken to establish holding capacity of towns, tourist destination and heritage sites	Central and State Government	Legislative, Planning,	■		
4	Control and Monitoring of Air Pollution in TTZ by setting up new monitoring stations	Central, State and Local Government	Planning, Design, Implementation and Monitoring	■		

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
5	Promotion of Clean and green Fuel in Urban and Rural Areas	Central, State and Local Government	Legislative, Planning, Design, Implementation and Monitoring	■	■	
6	Control and Monitoring of Polluting Industries in TTZ	Central, State and Local Government	Legislative, Implementation and Monitoring	■	■	■
7	Rejuvenation of River Yamuna through control of pollution and eco-restoration and maintenance of environmental flow	Central, State and Local Government	Legislative, Planning, Design , Implementation and Monitoring	■	■	■
8	Demarcation and Protection of Yamuna flood plain in the TTZ region	Central, State and Local Government	Legislative , Planning Implementation and Monitoring	■	■	■
9	Restoration of existing and construction of Ground Water Recharging structures in urban and rural areas	State and Local Government	Legislative, Planning, Design , Implementation and Monitoring	■	■	

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
10	Reclamation of saline and alkaline lands	State and Local Government	Legislative, Planning, Design , Implementation and Monitoring	■	■	
11	Promotion of Agro Forestry, Social Forestry along the major roads(NH, SH etc.),canals, village and common lands and shelter-belts near industrial estates.	State and Local Government	Planning Implementation and Monitoring	■	■	■
12	Creation of windbreaks to control dust laden winds	State and Local Government	Legislative, Planning, Design , Implementation and Monitoring	■	■	
13	Preparation of Protected Area Management Plan for Keetham Sanctuary	State and Local Government	Planning Implementation and Monitoring	■		
14	Capacity building , and Skill Development under Green Skill Development Program (GSDP) for protection of environment	Central. State and Local Government	Legislative, Planning Implementation	■	■	■

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
15	Prepare GIS based database of built heritage resources, creative industries, water and vegetal heritage resources in the TTZ region (both state protected and ASI protected) through documentation, mapping and detailed inventories, Grade all the heritage assets inventorised based on their significance and values to enable different protection regimes and norms.	Local Government	Documentation Conservation	■		
16	Heritage precincts need to be delineated based on a comprehensive data base compilation and concentration of heritage assets, and notified through Master plans as special areas in all the settlements and integrated with the Master plan proposals	Local Government	Legislation	■		
17	An Urban Heritage cell for conservation of historic buildings and precincts should be set up within each municipality. The task of conservation of heritage to be shared by all urban governance bodies and coordinated and monitored by the Heritage Cell.	Central, State and Local Government	Policy, Planning	■		
18	Heritage centric, site specific byelaws and urban design guidelines need to be framed for these heritage precincts.	Local Government	Legislation	■		
19	Special byelaws and guidelines need to be framed for prohibited and regulated zones around ASI protected sites as per the regulations of the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010.	Central and State Government	Planning, Legislation	■		
20	Capacity building of the urban local bodies to tackle heritage related issues in a sensitive manner needs to be enhanced through workshops, training and outreach programmes	State and Local Government	Policy, Education	■	■	■

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
21	Environmental impact assessment and Heritage Impact assessment to be done of the existing and proposed development around these ecologically sensitive heritage sites and mitigation measures proposed.	Central and State Government	Planning	■	■	■
22	All historic gardens, baghs and bagichis in the region encompassing ASI protected, State protected and unprotected sites, have to be conserved using internationally established norms as spelt out in the ICOMOS Florence Charter on Historic gardens.	Central. State and Local Government	Conservation	■	■	
23	Social and physical infrastructure within and around the identified heritage precincts needs to be improved to improve quality of life of the communities residing within and around these precincts. Infrastructure to include provision of public amenities, proper solid waste management practices, street furniture, lighting, walkways, signage and interpretation.	State and Local Government	Planning Design	■	■	
24	Capacity building and promotion of cultural entrepreneurship among local community such as site interpreters, tourist guides at heritage precinct level and along identified heritage trails.	Local Government	Policy Education	■	■	
25	Neglected and relatively unknown heritage sites need to be developed with tourist information centres/kiosks, interpretation centres and promoted to help attract visitors	Local Government	Design	■	■	■
26	Edge treatment plan and urban design guidelines for demarcated historic core, character zones and riverfronts	Local Government	Design	■		

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
27	Preparation of urban design guidelines and streetscape for major movement corridors	Local Government	Design	■		
28	Preparation of TTZ Freight Transport Plan	Local Government	Planning Design	■		
29	Preparation of Comprehensive Mobility Plans for all settlements with population 1-5 lakhs and Low Carbon Mobility Plans for all settlements with population >5 lakhs	State and Local Government	Planning Design	■		
30	The identified potential tourist circuits in the region must ensure accessibility to all key destinations through well-organized electric public transport modes.	State and Local Government	Planning Design	■		
31	Segregated primary pilgrimage routes and retrofit the roads with equal or higher priority for pedestrians by developing pedestrian friendly walkways.	State and Local Government	Planning Design	■		
Agra City Scale						
1	Preparation of integrated Master Plan for Agra	State Government and Local Government	Planning, Design, Implementation and Monitoring	■	■	■

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
2	Formulation of Heritage Development Plan in sync with the Master Plan of the City and Tourism Infrastructure Plan	State Government and Local Government	Planning, Design, Implementation and Monitoring	■		
3	Encouraging Creative and household Industries like petha, stone inlay, zardosi, etc.	State Government and Local Government	Planning, Design, Implementation and Monitoring	■		
4	Setting up of new Air monitoring stations as per Land use and activity.	State Government and Local Government	Planning Implementation and Monitoring	■	■	■
5	Setting up of new Water monitoring stations at outflow of drains.	State Government and Local Government	Planning Implementation and Monitoring	■	■	■
6	Adoption of Decentralized Water management system in areas where STP are not present. – Constructed wetlands and bioremediation systems	State Government and Local Government	Planning Implementation and Monitoring	■	■	■
7	Development of Greenways for Landscape enhancement.	State and Local Government	Planning Implementation and Monitoring	■	■	■

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
8	Decentralized Solid Waste Management , E-waste management, CD waste management and Adoption of Recycling and Reuse systems	State and Local Government	Planning Implementation and Monitoring	■		
9	Desilting of storm water drains	Local Government	Implementation and Monitoring	■		
10	Assessment of Biodiversity Index of Agra to facilitate conservation of biodiversity	Local Government	Conservation	■		
11	The historic core of Agra needs to be nominated as a World Heritage City by UNESCO. This would require legal and management systems to be developed as required for the nomination dossier.	Central, State and Local Government	Conservation	■	■	
12	Within the city of Agra various heritage precincts with different thematic content need to be delineated and protected. Special byelaws and development guidelines need to be formulated for identified heritage precincts which maintain their character Urban Design Guidelines for the identified character zones.	Central, State and Local Government	Planning Legislation	■		
13	Site Management Plans for the World Heritage Sites need to be prepared.	Central, State and Local Government	Conservation	■		

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
14	Carrying capacity of all heritage sites need to be conducted in order to plan out heritage trails.	Central, State and Local Government	Planning, Conservation	■	■	
15	Build capacities of local communities residing in the vicinity or within heritage precincts as tourist guides at heritage precinct level for identified trails in heritage precincts		Policy Planning Education	■	■	■
16	Given the quantum of heritage in Agra different hierarchies of trails need to be planned out and itineraries worked out for various time spans available to tourists. Trails have to be designed at both pedestrian and vehicular scales.	State and Local Government	Planning	■	■	
17	Revision of Development control regulations responsive to city context, character zones, historic core, Taj heritage precinct etc.	State and Local Government	Planning, Legislation	■		
18	Streetscape Improvement Plan for the City starting with Historic core and other character zones	State and Local Government	Planning, Design	■		
19	Conservation of Yamuna river and design of identified public access points	State and Local Government	Planning, Design	■	■	■

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
20	Building norms must have mandatory provision of parking at each individual's house.	State and Local Government	Planning Legislation	■		
21	Advocate and promote vehicles using clean and environment friendly fuels like electric and hydrogen to decrease the environmental footprint from transport modes. In the initial stage the existing public transport fleet needs to be replaced with electric buses. Further, hop-on-hop-off tourist buses (buses) must be introduced covering the other less explored tourist spots. The requisite charging infrastructure for electric vehicles must be developed parallelly.	State and Local Government	Planning	■	■	
22	Restrict heavy vehicular/truck movement within the city centre by relocating the exiting wholesale/mandi activities to the outskirts or other settlements of Agra district. Internal movement of goods should be restricted to LCV's and small pickup cargo vehicles at specific times of day and night.	State and Local Government	Planning	■		
Taj Precinct Scale						
1	Detailed Local area plan of the heritage precinct with specific focus on creating an integrated and inclusive public realm and infrastructure with robust community participation and public awareness programmes	State and Local Government	Planning, Design, Education	■	■	
2	Comprehensive plan and design for creating diverse livelihood opportunities and integrating traditional livelihoods of the community at Tajganj	State and Local Government	Planning, Legislation	■		

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
3	Preparation of urban design guidelines for conservation/retrofitting and redevelopment of heritage building and spatial typologies at Tajganj and other residential neighbourhoods	State and Local Government	Design	■		
4	Streetscape improvement plan and urban design guidelines for all the major movement corridors to create a safe and inclusive environment	State and Local Government	Planning, Design	■		
5	Other heritage sites within the precinct need to be conserved and interpreted to take visitor pressure off Taj. The various heritage sites along the river front precinct need to be developed as nodes to accommodate various functions of the city which includes development of open spaces as community open spaces and interpretation for visitors.	State and Local Government	Design	■		
6	More shade giving indigenous trees need to be planted along the newly designed east gateway entrance axis.	State and Local Government	Design	■		
7	Tourist guides from the local community need to be trained and imparted with knowledge of Mughal gardens and plants to be able to conduct heritage walks in these sites.	State and Local Government	Policy Education	■	■	
8	The historic gardens BulandBagh, ZaharaBagh, ChinikaRauza, Bagh e Wazir Khan, Bagh e Sultan Parvez, partly converted to nurseries need to be developed as centres of Mughal plant industry for sale and marketing of Mughal plants as a tourism product.	State and Local Government	Policy Design Education	■	■	

S. No.	Actions	Agencies	Action Type	Time Frame		
				Short (1-3 yrs.)	Medium (3-7 yrs.)	Long (7+ yrs.)
9	Access to river front heritage sites needs to be improved and parking provided.	State and Local Government	Planning Design	■	■	
10	Prevention of densification of Civil Lines and Cantonment areas.	Central, State and Local Government	Legislative Planning Implementation and Monitoring	■	■	■
11	Delineated Taj Precinct zone should be developed as a pedestrianized zone, The pedestrian walkways should be shaded and as per the guidelines including provision for universal accessibility with clearly demarcated zones i.e. static pedestrian activity areas along shops, multi-utility areas for street furniture, amenities like toilet blocks, drinking water, information kiosk etc. and designated cycling infrastructure.	State and Local Government	Planning Design	■		
12	Mobility in this zone should preferably be pedestrianized and at places restricted movement only through electric IPT's and cycling be allowed. Further designated parking infrastructure also needs to be provided.	State and Local Government	Planning Policy	■		



D

Part D - Review of Existing Projects & Proposals

6. Review of Existing Projects and Proposals

The Ministry of Environment, Forest and Climate Change has made submissions before Hon'ble Supreme Court w.r.t Management of environment in TTZ emphasizing the need of sustainable development in the light of basic prinicples of environmental protection viz., "Precautionary Approach" and "Polluters Pay Principle" duly recognized by the Hon'ble Supreme Court in various landmark judgements for protection of Taj Mahal and its environs with the view to achieve sustainable development.

The Ministry has also submitted before Hon'ble Supreme Court that keeping in view the social and economic needs of the people in the TTZ and assessing environmental carrying capacity of the region, the industries/activities which are non polluting in nature may be allowed with precautionary pollution controlling measures as already directed by the Hon'ble Court in its judgement dated 30-12-1996 and based on scientific assessment.

In view of this, the following projects need to undertake Environmental Impact Assessment as applicable and as per the prevailing notifications and rules.

Table 6.1 Project Appraisal

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
AGRA														
1	Agra Smart City Proposal Prepared by : Agra Municipal Corporation		Section 4 Strategic Focus and Blueprint: This section elaborates on the strategic blueprint of the city for its development over 5-10 years as follows: Sustainable Heritage Tourism enabling inclusive economic growth, Robust Infrastructure provision of basic services (water, sanitation, SWM, Electricity and Housing), Mobility along with safety and Smart, Transparent and accountable Government.				√							
2			Section 5. City Vision and goals: Vision Statement for the city: City of Taj where history is preserved, environment is pristine, infrastructure is world class and opportunity is plenty – safe place to live, great place to tour.				√					√		The brand identity of Agra has been promoted for Taj Mahal since ages. Agra needs a new identity focusing more on the environment and people rather than Taj Mahal.
3			Section 5.City Vision and goals: For heritage of the city, the goals are envisaged for the revival and beautification of the existing 48 ASI sites in the city by 2021 along with formulating and implementing urban design guidelines for area around the monuments.				√					√		The tangible heritage of Agra is not limited to the ASI protected structures. There are more than 100 unprotected sites as part of the cultural narrative of the city beyond Taj Mahal.
4			Section 10 Approach and Methodology The area based proposals are structured around : Element # 1 Agra Fort and its vicinity Element #2 Taj Mahal and Tajganj Area Element # 3 Fatehabad Road connecting inner ring road.				√							
5			Section 11. Key Components Theme #1: Reconnecting Taj Mahal and Agra Fort				√					√		The construction of sky walk between Agra Fort and Taj Mahal will change the visual integrity of the place while adding one more element to the skyline of Agra.
6			Section 11. Key Components Theme #2 Integrated Development of Taj Ganj Area				√							Urban Design guidelines to be formulated should be formulated following the existing character of the area. Implementation of standard guidelines would be detrimental to the specific character existing in the different areas of the city.
7			Section 11. Key Components Theme # 3 Enhancing connectivity to Taj Mahal through Fatehabad Road				√							Street-scaping proposal from Mall road to inner ring road (a 6.5 kms stretch Fatehabad road) should follow the urban design guidelines and maintain the colonial character of the road.
8			Section 12 Smart Urban Form: Revival of Taj Improvement District through re-defining urban morphology by controlling development by urban design guidelines (to be drafted). Preservation of tangible and intangible heritage, renewal of public realm spaces such as markets and vending zone, adaptive reuse of private heritage buildings and turning of nine pillared houses into tea terraces will transform the place.				√					√		While drafting the Urban design guidelines it is recommended to carry out character study of the city in different areas.

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
9	Agra Smart City Proposal Prepared by : Agra Municipal Corporation		Section 12 Smart Urban Form: Rejuvenation of green public spaces, which includes Shahjahan Park, redesign of Taj Nature Walk.				√							Use of indigenous tree plantation should be promoted.
10			Section 12 Smart Urban Form: Up-gradation of 50 houses in Taj Improvement District				√					√		
11			Section 12 Smart Urban Form : Revival of heritage and facilities to promote tourism through façade improvement of 500 houses and development of tourist facilities such as Mughal Museum, Taj Orientation Centre and International Café street with parking capacity of 300 vehicles				√							The façade improvement requires a detailed assessment of the building façade followed by proposal for improvement. It requires careful implementation on ground so as not to transform the character of the streetscape completely. No demolition activities should be recommended in the historically significant area in order to accommodate the proposal for development of proposed tourist facilities.
12			Section 12 Smart Urban Form : Revival of Taj Improvement District - Development of 5 multi skill development centres to promote traditional knowledge of Zardozi and stone in-lay work.				√							
13			Section 16. Essential Features Achievement Plan : Three heritage circuits are designed in TID : Circuit 1 covers 1 kms stretch including 4 major katras – Resham, Jogidas, Fulel and Umerkhand. Circuit 2 covering 1.2 kms stretch including Shiv Temple, Anaj Mandi, Basai Kala, Billochpura, Kali Masjid, Chowkin Tara, 9-pillared house and street market place that displays traditional zardozi and stone in-lay works . Circuit 3 covering 1.5 kms includes Agra Fort, Jama Masjid and old city area adjacent to Agra Fort.				√							
14			Reconnecting Taj Mahal and Agra Fort • Development of tourist walkway between Taj Mahal and Agra fort • Creation of a visitor centre and provision of well-equipped e-battery cars mobile vans • for publicity and assistance to tourists. • Development of livelihood activities in the proposed route											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
15	Agra Smart City Proposal Prepared by : Agra Municipal Corporation		Integrated development of Tajganj area • Rebuilding livelihoods and upgrading 22 slums along with improved infrastructure. • Provision of solar roof top for rehabilitated houses • Improvement of the vicinity of lesser known heritage monuments such as Diwanji-ka-maqbara and Kali Masjid • Development of Mughal Museum and Taj Orientation centre • Building resilient infrastructure: 24x7 water supply in the pilot zone,100% underground drainage system, creation of 100% waste management Tajganj ward, 100% coverage of closed storm water drainage, construction of 285 individual and upgradation of 5 community toilets, conversion of cremation ground into electric-crematorium, 18 kms. of underground cabling duct, one state-of-art fire station, 11 rain-water harvesting tanks of 14.98 lakhs capacity each, smart grid and metering • Provision of tourist and mobility facilities: 100 wi-fi spots, smart signages at various locations, 25 tourist kiosks ,3 km. of heritage trails, 120 public e-toilets, 125 km. of pedestrian walkways, 40 e-rickshaws, and 25 km of cycle tracks.											
16			a. Soft components such as organizing Taj Mahotsav, hot air ballooning festival, evening cultural shows at Agra Fort, drafting of urban design guidelines for development in the vicinity and façade improvement viz- painting white colour to buildings and adaptive re-use of 49 traditional heritage built structures. b. Revitalization of green spaces: Upgradation of Shahjahan park, organizing Taj nature walk, development of Taj park, scaling up of “My Tree” project for development of heterogenous forest and plantation on 20km of road. c. Sustainable livelihood development: Construction of three skill development centres and development of streets for showcasing stone inlay, zardosi, flower markets etc. which would aid preservation of urban morphology. Designing of one night bazaar and a digital literacy centre.											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
17	Agra Smart City Proposal Prepared by : Agra Municipal Corporation		• Social Infrastructure and Safety/Security: Conversion of 2350 streetlights to LED, construction of one Quick response centre for incident management, Development of Women Distress centre-"SHE" centre, installation of CCTVs at important location, construction of five smart police kiosk, upgradation of two Municipal Schools and college.											
18			Enhancing connectivity to Taj Mahal through Fatehabad road Street-scaping and beautification from Mall road to Inner ring road- 6.5 kms stretch of Fatehabad road.											
1	Smart City - Smart Urban Form		Taj Improvement District (TID) would be revived and redefined by the following urban forms:											
2			• Re-defining the urban morphology: Urban design guidelines would be drafted to regulate the development in the TID. Elements such as preservation of tangible and intangible heritage, renewal of public realm spaces such as markets and vending zones, adaptive reuse of private heritage buildings and other spaces such as turning of nine-pillared house into a tea-terrace will transform the place.											
3			• Seamless connectivity: 25 km of cycle trail and 125 km of footpath would ensure continuous connectivity between Agra Fort and Taj Mahal. Tourist kiosks, e-rickshaws, and 3 heritage trails through lesser known monuments will be planned in the TID zone.											
4			• Rejuvenation of green public spaces: TID has 248 acres of green space. Existing parks such as the Shahjahan park, and the Taj nature walk will be redesigned to be harmonious with the proposed development of TID. The project "My Tree"- donating/ planting a tree in the name of beloved ones, would be revived to accentuate walkways through roadside plantation.											
5			• Dense neighbourhood: TID is a densely populated area with more than 22 bastis and 4 Katras. There are 3345 households in these sttlements with a population of 22,746. The proposed project of in-situ upgradation of 50 houses and construction of 254 affordable houses in TID would ensure optimum densification of the area with better access to basic infrastructure.											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
6	Smart City - Smart Urban Form		• Walkability: TID is characterized by intricate pattern of narrow lanes which are more amenable to non-motorised transport. All the major roads would be designed to have footpaths and walkways. The bylanes would be paved with cobbled stones to enhance walking experience.											
7			• Revival of Heritage and facilities to promote tourism: facade improvement of roughly 500 houses and buildings will help in attracting tourists. Other tourist facilities such as the Mughal Museum, Taj Orientation Center and International Cafe street will create avenues for tourists to see and understand the local history, culture and art. These tourist facilities will have a total car parking capacity of 300 to ensure congestion free roads.											
8			• Development of multi-skill development centers: 5 multi-skill development centers to promote traditional knowledge of Zardosi and stone in-lay work will be set up.											
1	AMRUT Projects	2017	Provision of infrastructure at city level		√									The report is informative and well-defined. But implementation status of project not know. It should be a beneficial project.
HATHRAS														
1	AMRUT Projects	2017	Provision of infrastructure at city level		√									The report is informative and well-defined. But implementation status of project not know. It should be a beneficial project.
MATHURA VRINDAVAN MC														
1	Mathura Slum Free City Action Plan	2018	Housing and provision of houses for slum dwellers		√									The report is informative and well-defined. But implementation status of project not know. It should be a beneficial project.
2	AMRUT SAAP	2016-17	Provision of infrastructure at city level		√									The report is informative and well-defined. But implementation status of project not know. It should be a beneficial project.
3	AMRUT SLIP	2015	Water supply to Mathura Municipal Corporation which will benefit around 44829 Households.		√									
BHARATPUR														

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
1	Projects Under AMRUT	2018	Sewage work (SAAP) of benefiting 16185 Households, with STP of capacity 5 MLD		√									The report is informative and well-defined. But implementation status of project not know. It should be a beneficial project.
1	HRIDAY CDP a. A project of MOUD, Government of India b. City Anchor: Braj Foundation	2017	Historical narrative											Historical narrative is identified period wise upto 550 AD and post that there are structures identified in various period. There is a huge gap between 550 AD and 1300 AD. The tangible assets identified in different periods are also not comprehensive and limited to Vishram ghat , Jama Masjid, Museum and Refinery. A comprehensive historical research is required to identify various typologies and structures built in different periods. Though it is later done in chapter 3 which is not linked with historical research.
2			Forest and Biodiversity											The document identifies the historic vans of Vrindavan as forest and biodiversity, which therefore could lead us to a very sensitive outcome, that management of layers of historic assets are mandate of various departments and associations and not confined to protected monuments by ASI.
3			Identification of typologies: tangible and intangible assets											
4			PROPOSALS Chapter 7 and 8.1 identification of heritage zones and chapter 8 has zone wise proposals for accessibility, electricity, streetscape, Revitalization and development, Tourist Amenities, Infrastructure.											The plan details components extensively where as there are few loop holes such as the proposal of preparation of mobility plan is essential. Though a holistic understanding of the road networks, historic assess, street scape and character of the lanes is important. The plan has to be prepared by transport planners in consonance with the urban designers, environmental planners and conservation architects to avoid any negative implication and implementation on ground.
5												√		Parking is proposed behind the Potra kund and at the proposed tourist hub, where as the plan does not talk about the existing use, surroundings, character of the spaces allocated, which is why rationale of selection of the areas is not clear.
6			PROPOSALS Chapter 7 and 8.1 identification of heritage zones and chapter 8 has zone wise proposals for accessibility, electricity, streetscape, Revitalization and development, Tourist Amenities, Infrastructure											Proposals of E-rickshaw , trams etc for the internal routes is positive but the internal areas have a huge loading unloading processes in commercial areas. There are private residences and no alternative and compatible ways are proposed to manage the traffic with in the internal areas of Mathura. With narrow lanes in core city, trams will not address the issues.
7														Similarly the underground electric lines are recommended in few areas which are of high archaeological significance where it is important to undertake such excavations under supervision of an archeologist and note if any archaeological remains are found it has to be recorded.
8			Chapter 9 Creation of shelf projects based on strategies											
9			1. Accessibility and Transportation (All zones compiled)											
10			Strategies : To provide and increase the carrying capacity of the exiting roads (Zone 1)											The streets of the inner city, specially heritage zones have historical character to them, increasing capacities could lead to road widening and introduction of modern systems making traditional systems dysfunctional.
11														The proposal to increase capacity might not be a value addition for the sites, the holding capacities of sites are also limited.

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
12	HRIDAY CDP a. A project of MOUD, Government of India b. City Anchor: Braj Foundation		Strategies : To provide adequate parking facilities for floating and non floating population. (Zone 1)											The proposal is more adequate for the Zone 2 being residential and commercial area but not included in zone 2 strategies
13			Strategies : To increase multi level parking (Zone 1)									√		To bring cars to the inner core of Potra kund and Jamam Bhumi precinct should be minimized. More infrastructures would encourage more vehicular traffic, which might impact the sites and historic streets, as carrying capacity is low in these places.
14			Strategies: To facilitate alternate methods of transport with in the city such as tram and E- rickshaws (Zone 1)				√							To facilitate the alternative methods of transportation is good.
15												√		The mobility plan needs to detail out the pick and drop points as well as should segregate them from pedestrian routes
16			Strategies: To eliminate rail crossings to avoid conflict (Zone 1)									√		To avoid rail crossings is adequate but alternative methods are not suggested. These crossings are in historic areas therefore provision of flyovers might not be recommendable
17			Strategies: To Ease Pedestrian and vehicular conflict on the street (Zone 2, 3)				√							
18												√		Appropriate measures not specified.
19			Strategies : To reduce nuisance of animals on the street (Zone 2)				√							
20			Strategies : To organize new parking facilities for the residents (Zone 2)				√							
21												√		Being historic precinct it is important to introduce these facilities but with heritage sensitive guidelines.
22			Strategies : To facilitate access to persons with restricted mobility (Zone 2, 4)				√							
23			Strategies : Provision of cattle traps at marked locations (Zone 2)				√							
24												√		The proposal is equally valid for the Zone 1 and especially for the ghats area zone 3 but not included in zone 1 and zone 3 strategies
25			Strategies : Provision of ramps for persons with restricted mobility and resurfacing of the street (Zone 3 and 4)				√							
26												√		The proposal is equally valid for the Zone 1 but not included in zone 1 strategies
27			Strategies : To provide new organized facility for the visitors (Zone 3)									√		There could be a common parking for the ghats and Chatta Bazaar on the peripheral road. Dedicated parking for only ghats and another being proposed for Chatta Bajaar and Potra Kund might lead to multiple parking areas within a short distance.
28			Strategies: To reduce traffic bottle necks caused by encroachments (Zone 3)				√							To reduce traffic congestion because of encroachments is adequate
29												√		There is no clarity on if the encroachments are proposed to be removed, as the implication of the same can be undertaken in several ways which can be detrimental to historic facades, street characters and the community.
30			Strategies: To provide safe crossings at railway line (Zone 4 and 5)				√							

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
31	HRIDAY CDP a. A project of MOUD, Government of India b. City Anchor: Braj Foundation		Strategies : To provide convenient means of access to Shiv Tal Kund				√							
32												√		Precinct of Shiv Tal is a historic precinct and cannot be accessed by vehicle. By providing ease of access implication on ground could be road widening, provision of vehicular access, which has detrimental impact on the character of the settlement as well as the structure.
33			Strategies: Provide proper Traffic management									√		Lack of clarity
34			Strategies: To provide consistent design (Zone 5)									√		Lack of clarity
35			Strategies: Provision of revamping of existing footpaths along with proper road curbs				√							Adequate
36												√		Footpaths have been lately added and have been encroached upon by the shop-keepers. The design is not adequate to accommodate the number of pilgrims during peak season on the pathway. It requires to be dove-tailed with an elaborate pilgrim movement plan with in mobility plan.
37			Proposal: To prepare a comprehensive mobility plan of the zone (Zone 1 and 5)				√							
38												√		The proposal is equally valid for the Zone 2, 3 , 4 and 6 as well but not included in the strategies for other zone
39			Proposal: Design and Development of surface parking area as earmarked in the plan (Zone 1, 2)									√		The identified areas for parking do not detail on the current use, character therefore no rationale of selection of the areas could be determined.
40			3. Tourist Amenities											
41			Strategies: To provide and increase the potential of pilgrim, religious, heritage based tourism (Zone1, 2)									√		The potential of tourism to the pilgrim and tourist destinations is embedded in the significance of the site. The plan does not specify the measures and need of increasing the potential when tourist footfall is already immensely high.
42			Strategies: To develop the areas in and around the heritage sites, kunds, ghats, temples of high tourism potential and religious significance (Zone1, 2)									√		The word “Development” has been used previously in several reports and has led to interventions such as embankments of kunds, beautification and providing amusement parks around the kunds and vans. Edges of the kunds need to be specifically retained as soft scape. No development should be encouraged around the vans. Minimal interventions so as to conserve these historic precincts and settlements in their pristine state are recommended.
43			Strategies: To provide adequate infrastructure facilities like basic amenities in and around such sites. (Zone1, 2)				√							
44												√		There is no proposal to formulate guidelines for these interventions
45			Proposal: Provision of two toilet complexes with facilities for disabled in the zone (Zone 1)				√							
46			Proposal: Provision of resting shelter (Zone1)				√							
47			Proposal: Provision of 2 tourist information kiosks on either side of the site (Zone1)				√							
48			Proposal: Provision of public addressal system and a public display system at Deeg Gate (Zone1)				√							

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
49	HRIDAY CDP a. A project of MOUD, Government of India b. City Anchor: Braj Foundation		Proposal : Integrated development of a tourist hub with integrated facilities of conveniences, interpretation center, souvenir shops and cafeteria (Zone1)									√		The tourist footfall is because of the cultural assets of Mathura which have been listed in the document previously. The local informal souvenir shops are part of that cultural destination of the city. Addition of formal souvenir shop and interpretation center as tourist hub might lead to creation of another huge infrastructure with massive interventions impacting tangible an intangible assets.
50			4. Street Scape											
51			Strategies: To provide and increase the potential of pilgrim, religious, heritage based tourism (Zone1,2,3,4)									√		Same as tourism proposal. Inadequate intervention for streetscape
52			Strategies: To develop the areas in and around the heritage sites, kunds, ghats, temples etc (Zone1,2,3,4)									√		Same as tourism proposal. Inadequate intervention for streetscape
53			Strategies: To provide adequate infrastructure facilities within all the prime streets connecting the heritage assets of the city. (Zone1,2,3,4)									√		Same as tourism proposal. Inadequate intervention for streetscape
54			Strategies: To provide an identity to the 4 chowks.									√		Same as tourism proposal. Inadequate intervention for streetscape
55			Proposal: Shop front upliftment – Development and design of a new false façade in front of the adhoc row of shows on the opposite side of the temple. (Zone1)									√		Shops might be historic shops and have layers of interventions, which can be restored or can be consolidated adopting conservation principles. Addition of a façade is not recommended and superficial interventions are not recommended.
56			Proposal: Provision for re- surfacing of the pedestrianized street making it disable friendly and using local materials of bricks and stone cobbles. (Zone1,2,3,4)				√							
57			Proposal: Provision and providing street furniture- benches, bollards at 2 locations, tree guards & signages. (Zone1)				√							
58			Proposal: shop front upliftment –conservation of existing building facades. (Zone2,3)									√		Shops might be historic shops and have layers of interventions, which can be restored or can be consolidated by conservation principles. Addition of a façade is not recommended and superficial interventions are not recommended.
59			Proposal: Provision of directional & informational signage. (Zone2,4)				√							
60			Proposal: Chowk beautification, redesign of chowk center (Zone5,6)									√		Beautification and development have led to loss of historical footprint and remains for ever. These terms also lead to massive interventions which are detrimental for street character and historic structures.
61			Proposal: Graphic art an existing facades of the buildings depicting various Krishna Themes (Zone5,6,)									√		
62			Proposal: Provision of seats and benches as resting points (Zone5,6)				√							The proposal does not talk about the historic facades, elements, height restrictions, authenticity and integrity f the spatial character.
63			Proposal: Provision for bollards and railing for demarcation. (Zone5,6)				√							
64			5. Upgradation											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
65	HRIDAY CDP a. A project of MOUD, Government of India b. City Anchor: Braj Foundation		Strategies: To conserve, restore, heritage buildings, sites, kunds, tilas, kilas, ect..(Zone 1,2,3,4)				√							
66			Strategies: The conservation strategy recommendation will be in sufficient detail to inform decisions and direct the conservation plan (Zone 1,2,3,4)									√		Lack of clarity
67			Strategies: Minimal intervention should be the guiding principle for all conservation work. (Zone 1,2,3,4)				√							
68			Proposal: Rejuvenation of Potra kund (Zone 1)											
69			Conservation of the historic fabric				√							
70			Improve access to the kund				√							
												√		That there is no impact during implementation on historic fabric by providing vehicular access and undertaking road widening, it is important to include it in the proposal.
71			Adaptive reuse									√		Adaptive reuse needs to be supported by the permissible uses to avoid any mis-interpretation such as water sport activities and recreational activities to be introduced around the structure, destroying it.
72			Water recharge and maintenance of water levels				√							
73			Interpretation and information units (in and around the kund after appropriate archeological and historic research)				√							
74			Improved jali design									√		Design needs to be sympathetic with the historic fabric and use.
75			Improved pavement and pedestrian movement with public amenities surrounding the kund along the edge of the kund				√							
76			Proposal: Upgradation of building facades to preserve heritage character- (Zone2)											
77			Conservation of the historic fabric				√							
78			Adaptive reuse									√		Adaptive reuse needs to be supported by the permissible uses to avoid any mis-interpretation such as water sport activities and recreational activities introduced around the structure, damaging its inherent values.
79			Interpretation and information units (in and around the kund after appropriate archeological and historic research)				√							
80			Proposal: Upgradation of built structure on ghats and interface (Zone3)											
81			Conservation of the historic fabric				√							
82			Interpretation and information units (in and around the kund after appropriate archeological and historic research)				√							
83			Proposal: Upgradation of Shiv Tal Kund- (Zone4)											
84			Conservation of the kund water body				√							
85			Restoration of kund structure				√							

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
86	HRIDAY CDP a. A project of MOUD, Government of India b. City Anchor: Braj Foundation		Adaptive reuse									√		Adaptive reuse needs to be supported by the permissible uses to avoid any mis-interpretation.
87			Lighting scheme design									√		
88			Interpretation and information units (in and around the kund after appropriate archeological and historic research)				√							
Firozabad-Sikohabad Master Plan			Sewerage:											
1		2031	Proposal of Sewerage Treatment Plant	√					√					Measure to abate pollution during
2			Proposal of Sewerage Network						√					Construction
3			Drainage:											
4			Covering up of Drains	√										
5			Avoiding Disposal of Solid Waste in Drains	√										
6			Solid Waste Management:											
7			Stopping Disposal of Waste in Drains	√										
8			Placing of Dustbin at Various Spots	√										
9			Water Harvesting:	√										
10			Developing area around Water Bodies as Cultural Sites	√										
11			Geological/ Hydrological Analysis of area before any new construction to know about it recharging capacity	√										
12			Plantation of Trees and Plants (Less Water Consumption) along Roads and Parks	√										
13			Rooftop Rain Water Harvesting											
Firozabad – Shikohabad Master plan 2031			Historical Background				√							Historical narrative includes the history of Raja Todar Mal, Colonial and glass industries of Firozabad.
1		Till 2031										√		It lacks the Mughal period details. History also doesn't lead to identifying historical structures areas and precincts, which should be integral part of the planning.
2			3.8 list the sites of tourist importance which includes the Dargah and temples									√		The variety of heritage in Firozabad should be generated from the historical narrative, and detailed inventories to include all layers of history as cultural tourism destinations.
3			Tourist infrastructure									√		The plan identifies Firozabad as a city on periphery of Agra and Mathura, which are high tourist footfall areas. Therefore there is a land allocated for the hotels for overnight stay in Firozabad.
4														Firozabad has huge glassware industry, with improved condition of the craftsmen the industries can be more formal and Firozabad in itself can be developed as trade center for glassware and a halt point to Agra and Mathura.

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
5			3.5 Industries Proposals for natural gas and other remedies for the glass industries. TERI report on use of substitute materials for running of industries				√							
1	Bharatpur master plan Bharatpur Master Plan 2023 Prepared by : Nagar Niyojan Vibhag , Rajast-han, Jaipur	2023	Section 4.5(1): The master plan identifies Jama Masjid, Lohgarh Fort, Sujan Ganga (moat around the fortification wall of Lohgarh Fort), Laxman Temple and Ganga Mandir as tourist attraction that can be developed.				√					√		The city has a varied range of built heritage structure within the fortified settlement such as gates, street, havelis, palaces, bastions, ghats etc. for which a database is required to be generated through mapping and inventorization.
2			Section 5.2 : The market street inside the fortification wall from Kumher Gate to Mathura gate, Bada Bazaar, Atalbandh mandi, Anah Gate market streets are designated as main CBD area where in main historic structures identified in the proposed landuse plan 2023 are Jama Masjid, Laxman Man-dir, Ganga Mandir, Hospital area and Gol bagh area .				√					√		The development of the market street as main CBD area of the town should not encourage the road widening activities in the historic core areas and market street.
3			Section 5.4(2): No development is proposed in the State Reserved Area of Sewar Fort on Sevar road and Kanjauli on Deeg Road.				√							The fort to be protected as a heritage structure.
4			Section 5.6(5): significant archaeological, historic, religious structures need to be designated as protected monuments and area around them to be developed for tourism infra-structure.				√					√		A heritage impact assessment should be carried out before commencing any tourism infrastructure development works around the protected as well as unprotected sites.
5			Section 5.7(3): road widening activity is proposed in the main market areas by removing encroachments on the road such as platforms, ramps etc.									√		The market street of Bharatpur has high concentration of the heritage structure, it is recommended that the structures should not be demolished for the road widening proposals.
														Need for traffic management plan to be developed in a holistic manner without undermining the historic fabric and character of the streets.
6			Section 6.1: No construction/development is allowed over the water bodies, canals, drains, and slopes etc. even if the water body has dried up.				√							GIS based documentation, mapping and inventorisation of the historic water man-agement system that includes water bodies, moat, canal, drains etc.
1	Bharatpur Munici-pal Corporation	NA	Green Space & Park Works,											Implementation status of project not know. It should be a beneficial project.
2			Development & beautification of E.W.S. Quarters parks		√									
1	Agra Master Plan Prepared by : Agra Develop-ment Authority	2021	1.2. Historical narrative				√							The historical narrative of Agra mentions history from 11thC encompassing Lodhi, Mughal, colonial layers in Agra.
2												√		The history is confined to personalities and periods where as structures of significant period should emerge out of the history which should be integral part of the city planning.

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
3	Agra Master Plan Prepared by : Agra Develop-ment Authority		2.5 Bazaar Street									√		There is a proposal of road widening in several areas with in historic precinct such as in front of water works chowk, which was part of historic gardens on west bank, Lohamandi which has several historic structures. Already there are gardens where road traverses through the garden, further road widening can lead to loss of heritage forever.
4			2.5 Reallocation of wholesalers from Lohamandi and Jama Masjid Area.									√		There is a proposal of reallocation of wholesalers from the historic areas of the town. These wholesalers cater to retail shopkeepers of Raja Mandi Market area. These shopkeepers might be here since decades and this reallocation would impact the traditional management systems as well as the cohesive culture of the core town. There should be a detailed listing of tangible and intangible asset. Each asset has a particular significance, which adds to the character of the historic precinct. The occu-pations if listed and add to historic character of the space should not be reallocated.
5			2.9 Tourism – proposal for linking the river front structures through adequate movement plan and road network				√							To reduce the impact of tourism on Taj it is necessary to provide access to other significant sites of the Taj precinct.
6			2.9 Tourism – Provision of Barrage on down stream.									√		Provision of barrage is not the most appropriate way to bring water in front of Taj precinct. This is detrimental to the spatial integrity and has visual implications on the sites along river front. More over there are surrounding settlements downstream, which will be impacted by this intervention. There are natural ways such as afforesta-tion to make the precinct and the river more robust.
7			2.9 Tourism – Provision of Barrage on down stream and provision of water entertainment and recreational activities									√		Providing any recreational and tourism activities in the river might attract more number of tourist which is hazardous for the natural and cultural resources of Agra city and its surroundings.
8			2.9. Tourism – Proposal of national parks on north of the Taj to make it tourist attraction.									√		Specific areas are not designated. The proposals for each garden on the north of the Taj is to be site specific so that no garden remains are damaged in process of afforestation.
9			2.9 redevelopment and beautification of Taj Ganj Area to make it a handicraft and cultural center									√		The proposal of redevelopment and beautification might lead to massive inter-ventions such as road widening, pavers, inauthentic interventions on chowks and chaurahas.
10			2.9 redevelopment and beautification of Taj Ganj Area to make it a handicraft and cultural center											The Taj Ganj area should be proposed as an Urban Conservation Area. It requires a holistic approach integrating urban design, conservation, traffic management adher-ing to sustainable development and cultural tourism models.
11			2.9 redevelopment and beautification of Taj Ganj Area to make it a handicraft and cultural center											The mapping of tangible and intangible assets, provision of adequate amenities, conservation of remains and interpretation of the Taj Ganj area, Community aware-ness and outreach programs, inclusive development to be included as part of urban conservation.

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				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
12	Agra Master Plan Prepared by : Agra Development Authority		2.10. Protected Monument and Heritage zone				√							The heritage structures such as city gates as well as the historic residential and commercial areas are mentioned in the master plan and identified as part of heritage zone
												√		It is important to list these structures and notify unprotected structures by a law under local government. It mentions that historic settlements had narrow lanes; therefore these narrow lanes are part of historic character of the city and have historic structures should not be allowed for the road widening. Only ASI protected monuments are listed in the plan.
13			2.10 Taj Heritage Zone: Proposal 1 : Reallocation of commercial entities from the heritage zone.									√		The commercial structures are proposed to be reallocated. The commercial activities in many of these areas are identified as of high historical significance and are economic drivers of the city.
														To 'Reallocate' these activities is intervening in the traditional system of city functioning. The spaces in historic areas address the activities in a very subtle way and the relation of these spaces with activities are important to be mapped and identified rather than reallocation of the commercial activities.
														There are few commercial activities, which are impacting the historic spaces and functioning which can be considered for reallocation.
14			2.10 Taj Heritage Zone : Proposal 2 : The residential areas are not suggested to be removed from the zone.				√							
15			2.10 Taj Heritage Zone : Proposal 2 : As these residential areas are in heritage zone there have to be guidelines for development for these areas				√							
16			2.10 Taj Heritage Zone : Proposal 2 : ASI restricted and prohibited zone of 100mt and 300 mts need to be demarcated on ground.				√							
17			2.10 Taj Heritage Zone : Proposal 2: with in ASI demarcated prohibited area, structures not more than 3.75 mt height to be permitted in residential areas and in the rest of the zone not more than 7.5 mt height should be permitted				√							
18			2.10 Taj Heritage Zone : Proposal 3: reclamation of river and the river bank by construction of barrage.									√		Reclamation of riverbank and reviving the river is significant. But constructing a barrage will impact the spatial integrity and visual connectivity of the structure. More over the villages and settlements on down stream will be impacted. The river can be revived by other means such as afforestation around river, desilting, solid waste management.
19			2.10 Proposal 4: Mehtab Bagh to be developed as park									√		The plan proposes the historic garden to be developed as park. The garden needs landscape conservation including the excavations, plantation of original species, removal of additions and alterations post detailed surveys and analysis. The term "park" might be considered as any contemporary park which can be detrimental to the site

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20	Agra Master Plan Prepared by : Agra Development Authority		2.10. Proposal 6: To revive water in Yamuna along Taj by making a barrage and to provide water sports and boating as recreational activities									√		Providing water sports is other way of encouraging more people with in the heritage precinct. The footfall of the precinct is already very high. Threshold capacities of the areas need to be worked out. Other than this, providing the tourist recreational activities will require more infrastructure and amenities where as these areas need to be retained with green plantation and minimal construction and hardscape areas.
21			2.10 Proposal 7 Heritage zone needs to be connected by a road network to make the entire zone accessible by the tourist									√		On one hand where the proposed circuit to connect the whole area is important, but it requires a detailed transport management and mobility plan, where the city is analyzed in detail to identify pedestrian connectivity. The interventions should promote maximum pedestrian movements and BOVs. Segregation of traffic is mandatory. With proposal of connectivity, road widening and cutting through historic areas can be detrimental for the residential heritage and the remains of the gardens.
22			2.10 Proposal 8 : the issues of congestion and lack of management in the Taj Ganj historic area adjacent to Taj Mahal should be addressed to promote tourism and most of the routes should be retained as pedestrian routes				√							The pedestrian routes and addressing the lack of management is appropriately listed in the master plan.
23												√		Where as to encourage tourist should not be the focus of the intervention. Cultural tourism also is about the people and the assets a space holds. The interventions should aim at improving the living conditions and enabling the traditional skills for better livelihoods of the residents. Tourism can be considered as a by-product of the benefits of these holistic interventions.
24			2.10 Proposal 9 : Proposal 9 of the heritage zone proposes to tap the nallahs of the city and empty them into the river after the barrage which is proposed downstream									√		The proposal is extremely detrimental for the settlements and the villages downstream. This proposal is encouraging the cumulative impact of pollution of Agra to get into the other settlements downstream as well. The idea of protecting Agra and Taj with such interventions might impact the villages at regional level and the impact because of the tourism, lack of solid waste management, lack of afforestation schemes, lack of STPs functioning and many more will be seen on environment and health of many more districts and cities.
25			2.12. Entertainment and open areas: Proposal 2.12.5 area across the river form Taj Mahal is proposed to be developed as National Park, and with an objective to provide recreational activities									√		Area across the river from Taj Mahal is highly sensitive area for archaeology and heritage. From Gyarah Sidhi to Mehtab Bagh there are several remains along the river and few found in excavation just along the Mehtab Bagh to the north. The area cannot be identified to be used as national park with no guidelines and detailed analysis. Appropriate heritage impact assessment, heritage management plans and detailed conservation plans are required for any kind of interventions in these areas.
1	Mathura - Vrindavan Master Plan – 2021 Part A Mathura- Vrindavan	2021	Section : Main historic sites of Mathura : Shri Krishna Janmasthan, Vishram Ghat, Dwarikadheesh Mandir, Gita Mandir, National Museum				√							Mathura and Vrindavan, the two significant settlement of the Braj Mandal has diverse repositories of the cultural heritage beyond the identified sites which needs to be documented, mapped and listed.
2			Main historic sites if Vrindavan : Shri Banke bihari Temple, Shri Ranji Mandir, Radhavallabh Temple, Nidhivan, Seva Kunja, Madan Mohan Temple, Gopinath Temple, Govinda Deo Temple.											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
3	Mathura - Vrindavan Master Plan – 2021 Part A Mathura- Vrindavan Prepared by : Mathura Vrindavan Development Authority		Section 3.11.2: Protection and Conservation of delineated Heritage Zones of Mathura and Vrindavan have been identified in the master plan.				√							
4			Heritage Zone of Vrindavan includes Banke bihari Temple, Radha Krishna Temple, Madan Mohan Tempek, Jugal Kishore Temple, Govinda Deo Temple, Shriji Temple, Shri Ranji Temple, Jagannatha Temple, Shahji Temple, Nidhivan, Ranapat Ghat, Govinda Ghat, Kalia Dah ghats, Chir Ghat and Keshi Ghat including other temples located in the area.				√							Identification of heritage is limited to temples and ghats. Integration of havelis, vernacular houses, dharamshalas, gardens, mathas etc.
5			Section 3.11.2: Vrindavan Heritage Zone - Proposal for detailed Conservation and Revitalization plan of the historic sites located within and outside the heritage zone while removing the encroachments and maintenance upkeep of the monuments.				√							Conservation and Revitalization should not be misinterpreted to carry on beautification works compromising the authenticity and integrity of the character of the site.
6			Section 3.11.2: Vrindavan Heritage Zone-Maintenance and up-gradation of the ghats located in the heritage zone				√					√		Architectural character and material integrity of the historic structures should not be compromised.
7			Section 3.11.2: Vrindavan Heritage Zone - Conservation and Protection of the architecturally significant built heritage.				√					√		Conservation should not be misinterpreted to carry on beautification works compromising the authenticity and integrity of the character of the site. Architectural character and material integrity of the historic structures should not be compromised.
8			Section 3.11.2: Vrindavan Heritage Zone -Provision and Up gradation of infrastructure facilities in the heritage zone				√					√		Need of Urban design guidelines
9			Section 3.11.2: Vrindavan Heritage Zone-Pedestrianisation of the streets network and provision of parking on the periphery of the heritage zone at appropriate location				√					√		Need of Urban design guidelines
10			Section 3.11.2: Vrindavan Heritage Zone- Conservation of open spaces in the heritage zone, plantation of trees and provision of visitor amenities.				√							
11			Section 3.11.3: Proposal for Conservation and Development control through Preservation, Renovation , Improvement and Environmental up gradation (tree plantation)				√							
12			Section 3.18 : Water Harvesting				√					√		The historic Kunds in Mathutra and Vrindavan were also part of the historic water conservation and recharge system following indigenous knowledge system of the drainage networks and slope analysis.
13			Mapping, Protection and conservation of the natural water bodies, ponds, and pokhars.											
														It is recommended that these historic kunds should also be identified, mapped and protected along the natural water bodies. The conservation of these kunds should be sensitive towards the architectural character, design and material authenticity. For example Brahma Kund has been completely transformed from its historic design.

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
14	Mathura - Vrindavan Master Plan – 2021 Part A Mathura- Vrindavan Prepared by : Mathura Vrindavan Development Authority		Development of recreational area around these water bodies for public use.											The development around the water bodies for recreational purpose requires sensitive design development, indigenous plantation scheme , brick on edge paving or stone paving (as recommended in master plan)
15			Section 3.26 : Disaster mitigation				√							The master plan only identifies that the area falls under the earthquake prone region and is located in the flood prone area.
														Risk preparedness plan needs to be prepared for Mathura and Vrindavan
1	Mathura - Vrindavan Master Plan – 2021 Part B Kosi Kalan, Chata, Chaumuhan, Nandagaon Prepared by : Mathura Vrindavan Development Authority	2021	Kosi Kalan- Ratnakar Kund , Bhabhai Kund, Gomti Kund and Mikhiya Kund, Sarai Shahi, and Market, Animal Fair every tuesday				√					√		
2			Chata – Sarai constructed by Sher Shah Suri or Akbar											
3			Chaumuhan – Kos Minar , Kund, Brahma Temple											
4			Nandagaon – Nanda Rai ji Temple, Narsingha Temple, Gopinatha Nityagopal Temple, Girdharinandan Temple, Nanda Nanadan Temple, Radha Mohan Temple, Mansa Devi Temple, and Yashoda Nanadan Temple, Udhav Kyari, Pawan Sarovar, Kokila Van.											
5			Section 4.9 Water Harvesting				√							Though the identification and conservation of water bodies is proposed in the master plan, the mapping of water bodies is needed to inform the future development in the areas while addressing the water supply needs in the city.
			Recommendation for :											Conservation works should be undertaken by technical experts to ensure the fabric, character and edge of the water bodies are developed without compromising the ecological significance.
6			- Identification and conservation of natural water-bodies, reservoir and ponds and prohibition on change in land use.											The development around the water bodies for recreational purpose requires sensitive design development, indigenous plantation scheme , brick on edge paving or stone paving (as recommended in master plan)
7			Development of recreational area around these water bodies for public use.											It is advised that while undertaking plantation of trees, the indigenous species to be preferred with high water holding capacity.
8			It is proposed to undertake Geological and Hydro-geological Surveys before commencement of the new plan in the area.											Implementation of these recommendations on ground is needed.
9			Proposal for plantation scheme.											
10			Section 4.10 Tourism				√					√		While Nandagaon is identified as an important historic settlement with increasing tourist footfall from 1,486,355 in 1998 to 1,654,266 in 2002 (Source: Tourism office, Mathura) the other settlements such as Kosi , Chata and Chaumuhan also have points of interest that can be developed as part of sustainable rural tourism.

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
1	Mathura - Vrindavan Master Plan – 2021 (Part C) Goverdhan – Radhakund Part I Prepared by : Mathura Vrindavan Development Authority	2021	Section 1.1.3 Historical and Religious Background									√		The section identifies few significant historic structures as well as the intangible heritage
2			Goverdhan – Giriraj Parwat, Hari Gopal Temple, Dauji Temple, Punchari ka Lauta Temple, Nansi Ganga, Kusum Sarovar, Narad Kund											
3			Radhakund - Radha Kund and Shyam Kund with ghats											
4			Section 4.7 Ashram , Matha and Religious use									√		Ashrama and Mathas were the historic infrastructural facility developed for the pilgrims. The old and historic ashramas and mathas with other infrastructural facilities which are in ruinous state of conservation needs to be identified and restored to cater to the increasing demand of the pilgrims, hence setting an example for adopting a sustainable approach for development.
5			169.02 Hectare of land (10.47% of the proposed master plan area) is allocated for the development of Ashram, Mathas and religious use.											
6			Section 4.9.2 Forest Area and Section 4.9.3 Green Cover				√							
7			104.38 hectare land is kept reserved for the forest.											
8			No construction is permitted in the existing green cover between Goverdhan Parvat and Parikrama marg.											
9			Section 4.13 Water Harvesting				√					√		Though the identification and conservation of water bodies is proposed in the master plan similar to Part A and Part B of the master plan, the mapping of water bodies is needed to inform the future development in the areas while addressing the water supply needs in the city.
														The development around the water bodies for recreational purpose requires sensitive design development, indigenous plantation scheme , brick on edge paving or stone paving (as recommended in master plan)
														It is advised that while undertaking plantation of trees, the indigenous species to be preferred with high water holding capacity.
														Implementation of these recommendations on ground is needed.
10			Section 4.14 Archaeologically Significant Sites									√		Two State protected monuments Govardhan ki Chattriya and Kusumvan Sarovar with Chattriya are mentioned as archaeologically significant sites. There are more than 300 tangible and intangible heritage in Govardhan and Radhakund which requires to be mapped and integrated with the master plan and other development proposal to protect the heritage assets as well as to promote tourist destinations within these two settlements.
1	Hathras Master Plan 2021	Till 2021	1.2.3. Historical narrative				√							Encompasses Ancient, Jaat, Mughal and British history in Hathras.
												√		Where as the history should lead to identification of historic areas and precinct and the significant areas should be integrated into master planning.

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
2	Hathras Master Plan 2021	Till 2021	3.4.1.Bazaar Street Proposal									√		Proposes road widening from Clock tower to Karbala almost 13-09 Hectare area is designated for the same. The road is a historic precinct with several heritage structures having facades of high architectural value. The road widening will lead to losing these significant structures.
3			3.9. Proposal of Khetriya Park				√							83.86 hectare area is designated for park development in the extensions proposed in Hathras.
4												√		Hathras is known as city of Bagichi and the historical narrative of master plan also mentions the same briefly. These are not listed in the master plan in detail. These areas add to form a big chunk of green space with in dense settlement. To develop these areas as green open spaces for community should be included as proposal of parks in Hathras
5			3.15. Ponds and kunds should be identified and should not be put to any use									√		The plan proposes to retain the ponds with in district boundaries. The complete listing of kunds and ponds has not been undertaken which could be part of process of identification of these ecological resources.
6			3.15 area around pond is to be put to entertainment and recreational use									√		Largely such spaces are interpreted to be used as amusement parks and tourist hub, which is detrimental for the ponds and kund. These ponds and kunds are water recharge systems and then soft scape around then needs to be protected. The ponds with surrounding spaces should be identified as ecological spaces, which can act as green areas for the community serving as recreational and leisure spaces.
7			7 Proposal for Plantation: roads and parks and open spaces should be planted with trees that require less water and help in developing green belt				√							The proposal of plantation is ecologically very sensitive
8												√		The master plan should include the name of the trees which should be planted and the criteria should be indigenous trees, which have good foliage and are either fruit bearing or key species such as jamun, mango, neem.
9			Tourist infrastructure									√		The plan identifies Hathras as a city on periphery of Agra and Mathura, which are high tourist footfall areas. Therefore there is a land allocated for the hotels for overnight stay in Hathras.
10														Hathras was a huge trade center and still has cultural industries such as hing, colors production and brass industries, which can be an incubator of livelihoods and trade for the city. There are several Bagichi, temples which could be a halt point for people going to Agra and Mathura and the people who are associated with Hathras for trade.
GOVARDHAN & RADHAKUND														

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
1	Mathura Vrinda-van Master plan G (Govardhan and Radhakund)	2021	Proposed built up area of 75.84 Ha		√									Should be a beneficial project.
2			Proposed Parikrama Marg		√									Should be a beneficial project.
3			Proposed Commercial center		√									Should be a beneficial project.
4			Proposed Office area of 6.53 ha which accounts to 0.4% of land use.		√									Should be a beneficial project.
5			115.26 ha proposed land for Public Semi Public land use		√									Should be a beneficial project.
6			Proposed 195.68 ha land for transportation						√					Transportation area should not affect the natural resources
7			Proposed 169.02 ha land (10.47%) for Ashrams/Maths and Pilgrimage.		√									Proper demarcation of areas with parking facilities.
8			Parks and Open Spaces: 380.98 Ha proposed land		√									Should be a beneficial project.
9			Other facilities like Tourist centers (9.6Ha), forest area (104.38 ha), Green belt of 4.5 m along bypass, Camp and parking area in festive season (88.96 ha)		√									Should be a beneficial project.
1	Govardhan Pashupalan Yojna (Animal Husband-ry scheme)	2018	Helping local economy through animal husbandry		√									Should be a beneficial project.
1	Gobar Dhan Yojna	2018	Generating fuel from animal waste, Galvanizing bio-organic resources		√									Should be a beneficial project.
1	Mathura Slum Free City Action Plan	2018	Housing and provision of houses for slum dwellers		√									The report is informative and well-defined. But implementation status of project not know. It should be a beneficial project.
1	Housing Projects like Hi-Tech City	2017	High rise housing project							√				Housing is the need in Mathura and Vrindavan. But there are many high rise housing projects that are coming up in between Mathura-Vrindavan towards Kosi Kalan. This will hamper the aesthetics of the place.
1	Rehabilitation and beautification work between Raman Reti Tiha-re till Vrindavan parikrama in Janpath Mathura under HRIDAY	2017			√									Good Project
TUNDLA														
1	Augmentation of Mathura Tundla Pipeline (MTPL)	2017 (30 months project)	Augmentation of Mathura-Tundla oil pipeline has been envisaged.		√					√				The project has been initiated would bring economy to the city and the region but the environmental concerns are very high. An EIA should be the first step followed by monitoring on the standards and regulations being maintained as per environmental rules and regulations of the country.

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
2	Implementation of Tundla - I mega lift irrigation scheme on 1235.53 acres of land (source:p-ppindia.gov)	2013-17	The project involves implementation of Tundla - I mega lift irrigation scheme under Cluster No. XIV in Kalahandi district. The scope of work includes lifting of water from intake well-constructed inside the river or reservoir mechanically by high capacity pump.							√				Exploitation of ground water resources.
3	PMKVY Franchise In Tundla, Uttar Pradesh	2015	Pardhan Mantri Kausal Vikas Yojna, skill and training program		√									Should be a beneficial project.
FATEHPUR SIKRI														
1	Adopt a Heritage-'Apni Dharohar, Apni Pehchaan'	2017	Project for Development of Tourist Friendly Destinations		√									Should be a beneficial project.
2	Swadesh Darshan Scheme (Source: TOI)	2017	Under the central government's Swadesh Darshan scheme, the district administration is considering proposals to start a helicopter service between two world heritage sites, i.e. Agra and Fatehpur Sikri.							√				Not beneficial
3	Report of Committee related to Assessment of Industrial Pollution and Environmental Issues in TTZ	Dec-16	Emission from Mathura Refinery and glass industries should continue their efforts in keeping their emission within the prescribed limits	√										Reduction of Air Pollution
4			Stagnation of river water and disposal of solid wastes and untreated waste water into the river causing water pollution should be avoided											Clean Water Bodies
5	Air Quality Assessment and Source Apportionment Study in Firozabad	Apr-16	Controlling dust emission from furnaces in the glass industry through techniques like Fuel Gas Recirculation (FGR) and Low NOx Burners and bag filter system	√										Environmental Protection
6			Regular Ambient Air Monitoring should be carried to assess the level and tracking the reduction in pollutants levels	√										
FIROZABAD MC														
1	27 projects on underground drainage and road	2013			√									Beneficial but very slow progress
1	Comprehensive Environmental Management Plan for Taj Trapezium Zone(TTZ) Area		Section 3.2.2.2 Water Availability in TTZ									√		Having high water level at the river edge of the Taj Mahal, without addressing the serious issue of water pollution in the river is not recommended.

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
2	Prepared by : CSIR-National Environmental Engineering Research Institute (NEERI) December 2013		The project for construction of Agra Barrage about 8km upstream of Taj Mahal has also been proposed by UPJN which has not been started yet. This has been guided by the Hon'ble											
3			Supreme Court order. The barrage has been proposed to help the authorities in controlling											First and foremost the outflow of sewerage into the river needs to be controlled. Only treated water from STPs to be discharged in the river which requires adequate no. of STPs in working condition with well connection sewer network in the city.
4			the water level in river Yamuna downstream, which is said to be desirable for safety of the											Cleaning of riverbed requires dredging and de-silting which will help in addressing the water pollution and will also help in increasing the water retention capacity in the river naturally as the de-silting will help in increasing the depth of the riverbed.
5			Tajmahal.											Internationally there are examples wherein countries are demolishing the barrages and dams to adopt an ecologically sensitive development approach for the restoration of river[1] to protect the natural ecosystem, biodiversity, flood management and landscape development.
6			3.3.2.2 Policy Decisions											
7			- A barrage be constructed downstream of Taj so that Yamuna river retains water and the river is used for the recreational purposes.											Implementation of the recommendations on ground is very critical.
8			- River Yamuna should be made pollution free by establishing treatment plants.											
9			- In order to reduce the water losses during distribution, the network needs to be improved and worn out/rusted pipes needs to be replaced											
10			- The sewer flowing in drains be treated at suitable locations and the treated sewage discharged downstream											
11			- As far as possible on both the sides of open drains a three metre wide strip be reserved for tree plantation											
1	Environmental Post Evaluation of the Projects under the schemes in Taj Trapezium Zone (NEERI)	May-10	Road Related Project:											
2			Construction of new roads, widening of existing roads and construction of missing links	√					√					
3			Storm Water Drainage System:											
4			Development of a proper sewerage system	√					√					Measures to abate pollution during construction
5			Prevention of solid waste dumping into storm water drains											
6			Construction of Cross Drainage work	√										
				√					√					

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
1	Development of New Industrial Estate for Shifting of Polluting/ Non-Conforming Industries at AGRA (Progress Report)	Jun-09	Recommendations as per Layout plan which is not available	-					-					-
1	City Development Plan (CDP) - Agra	Aug-06	Water Supply:											
			Extending Water Supply Network						√					
			Arrest and Reduce unaccounted for water to permissible limit of 15% by undertaking leak detection study	√										
			Adopt preventive maintenance rather than break-down maintenance											
2			Sewerage:											
			Extending Sewerage network to un-serviced areas	√					√					
			Rehabilitating existing sewers											
			Provision of Public Toilets in the Slum Area											
3			Storm Water Drainage:											
			Increase Capacity of Drains											
			To repair dilapidated drains											
			Construction of tertiary drain						√					
4			Solid Waste Management:											
			Waste Segregation and Reuse	√										
			Adequate collection and transportation facilities											
			Maintenance of collection bins	√										
5			Road and Transportation:											
			Improvement of Road Geometrics, Internal Road Network and Transport Facilities											
6			Environment:											
			Sustainable Riverfront Development	√										
			Preservation and Conservation of water bodies and development of new parks											
			Conservation of Ground water resource by adopting Rainwater-Harvesting Technique	√										

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
1	Environmental Management Plan	Jan-02	Heritage Corridor:											
			A suitable Greenbelt around each of the monument at least 100 meters	√										
			Cultural Zones to be created within heritage corridor											
			Pedestrian zones within each core activity area and adequate parking areas for each core area											
2			Old Residential Areas in the Central City:											
			Improvement of the building exterior											Measures to abate pollution during construction
			Improvement of Physical Infrastructure	√					√					
3			Industrial Area:											
			A suitable greenbelt around each industrial area to the extent possible.	√										Extension of Green Area
			Greening up to 25% of the total area	√										
4			Road Network:											
			A network of new roads is proposed, including bypass roads						√					Measures to abate pollution during construction
5			DG Sets:											
			The usage of fuels other than 0.05% S for DG Sets should be banned in the city	√										
6			Drainage and Sewerage:											
			Drains should be tapped through trunk sewers and treated at downstream of Taj Mahal. Branch sewers should be laid connecting these truck sewers.											
			Green Belt should be built along major drains											
7			Solid Waste:											
			Residential societies to ensure collection and disposal to the collection center	√										
			Adequate collection bins to be placed within the reach of people											
			Frequency of collection and disposal to be improved through additional vehicles.											
1	Report of Expert Committee on Environmental Impact of Mathura Refinery	Dec-97	Efforts should be made to minimize the existing pollution from sources close to the monument	√										

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
2	Report of Expert Committee on Environmental Impact of Mathura Refinery	Dec-97	Replace the present coal based locomotives with diesel based locomotives											
3			Industries should not be located on north-west of the Taj Mahal and relocation should be done in an area south east of Agra beyond the Taj Mahal											
AGRA CITY LEVEL:														
1	Rail based Mass Rapid Transit System in Agra-AGRA METRO	NA	i. Sikandara to Taj East Gate- 14 kms											
			ii. Agra Cantt. to Kalindi Vihar- 16 kms											
2	Residential plot scheme 2017	NA	Under this scheme, the authority is offering total 128 different categories residential plots											
3	Uttar Pradesh Pro-Poor Tourism Development Project	Dec 2017 to Dec 2022	UN funded project adopted by UP Tourism department											
4	'Adopt a Heritage' scheme	NA	NA											
5	"Development of Solar Cities" programme by the Ministry of New and Renewable Energy (MNRE),	NA	NA											
6	Riverfront development by tourism department	NA	The stretch from Rambagh downstream to the proposed rubber check dam site at nagla pema , with area covering breath of 75m along one bank.											
7	SCADA system	NA	UP Jal Nigam has introduced SCADA system providing real time information regarding pressure and water flow and alerts on leakages.											
8	Roshan Agra Yojana,	NA	Under Roshan Agra Yojana, 72,000 new connections have been provided for EWS and slum residents.											
9	Water Supply Scheme for Agra City	2016-17 ti 2019-20	AMRUT											
10	Sewerage Scheme for Agra City	2016-17	AMRUT											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
11	AMRUT Projects	2017	(i) Convergence to achieve objective of universal coverage of WS and WW services. (ii) INR 105 Crore will be dove-tailed through AMRUT for implementing 24x7 smart WS for Taj Improvement District area. (iii) INR 153 crore will be dovetailed through AMRUT to implement 100% sewerage network and coverage.											
12	Aasara	NA	In-situ housing upgradation and construction of affordable housing will be taken up by the SPV along with DUDA under the Housing for All scheme.											
13	Swachh Bharat Mission (SBM), MoUD	NA	(i) SBM's objective of 100% door-to-door collection and scientific disposal of waste will be achieved. (ii) Agra Smart City SPV along with Agra Nagar Nigam(ANN) will assist in designing and rollout of the project.											
14	Tajganj project by U.P Tourism	NA	sewerage, pathways, cobble-stone streets, street lighting, street benches, police check post, landscaping, toilets and underground cabling. The project is being implemented at a total cost of INR 197.2 crore.											
15	International street cafe project by Agra Develop-ment Authority	NA	International street cafe project is developed by ADA with estimated investment of INR 35 crore . The project includes development of 2 international restaurants, 1 pavilion ad 8 food stalls											
16	Solar City Mission	NA	UPNEDA is assisting ANN in conducting energy audit and piloting the solar power project in the TID zone under the solar city mission, funded by MNRE.											
17	Taj Orientation Center	NA	UP Tourism constructing state-of-the-art 'Taj Orientation Centre' (INR 231.8 crores). It will house auditorium, open air theatre, waterbody, museum, crafts shops, permanent/ temporary exhibition spaces and parking.											
18	Mughal Museum by U.P Tourism	NA	UP Tourism building 'Mughal Museum' (INR 141.9 crores) showcasing Mughal history, culture, cuisine, performing arts, handicrafts, literature, administrative, manuscripts, and weaponry.											
19	Development of park and painting of buildings funded by Agra Development Authority(ADA)	NA	ADA has been working at developing Tajganj. Some of its recently completed, ongoing and proposed initiatives include development of a park at Trident Tiraha (INR 2 crore) and painting all buildings in vicinity of the Taj Mahal white, to achieve architectural harmony and reduce visual clutter (INR 0.34 crore).											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
TTZ/ Braj Region World Bank Projects – Key Components														
	Construction of Work for Rehabil-itation of Banke Bihari Temple Area, Vrindavan		Redevelopment of Kalideh Parking											
1			Male and Female toilets											
2			Toilets for drivers with separate access											
3			Inquiry counter and an information centre											
4			Administration and management room											
5			Locker Room											
6			Shoe Racks											
7			Open courtyard											
8			Multipurpose store room											
9			Guard room											
10			Provision for water ATMs											
11			Redevelopment of Daruk Parking											
12			Male and Female toilets											
13			Toilets for drivers with separate access											
14			Toilets for differently abled persons											
15			Inquiry counter and an information centre											
16			Administration and management room											
17			Locker Room											
18			Shoe Racks											
19			Multipurpose store room											
20			Guard room											
21			Courtyard with food kiosks											
22			Provision for water ATMs											
23			Treatment of Streets and Drains Leading to Banke Bihari ji											
			A- Street Treatment Type 1: Rubber Moulded Paver Blocks											
			Total Length to be covered: 8.4 Kms											
			Average width: between 3 to 6 mts width											
24			B- Street Treatment Type 2: Concrete Road with Tre mixing With Side Walks and Drain Covers-											
			Total Length to be covered :1.2 Kms											
			Average width: between 4.5 to 6 mts											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
25			Development of Community Open Green Area Behind Banke Bihari Ji Temple											
26			Improvement Signage and Awnings											
27			Urban Design Guidelines for Parikarma Marg											
1	Rehabilitation Of 09 Kunds In Braj Region		Entrance gate,											
2			Brick on edge paving for pathway (Length Approx. 450 rmt.)											
3			Storm Water Drainage (Length 224 rmt.)											
4			Cobble Stone Paving (391sqm)											
5			Edge wall repairing with removing and redoing plastering, with painting (663 sqm)											
6			Railing with edge wall (912 rmt)											
7			Cattle Pyau (Size 6.56m x 2.26m)											
8			Drinking Water Pyau (1 No.)											
9			Rest shelters (Kunj) (1 No.)											
10			Tyala (Seating Platforms around Tree) (16 Number)											
11			Toilet with Septic Tank (1 number of toilet block of following size (Size 11.45 x 6.85. Gents 2 WC,1 Bathroom 5 Urinals, 2 wash Basins, 1 for Specially abled. Ladies 3 WC, 2 Bathrooms, 3 Wash Basins, 1 Diaper changing station, 1 for especially abled.)											
12			Monitoring Room and caretakers room (1 Structure having two rooms Size 4.05 x 6.0 m)											
13			Jal Mahal external wall repairing with plaster and painting (521 sqm)											
14			Landscaping (Grassing area - 2328 sqm)											
15			Lighting and electrification around the kund											
16			Bio remediation & aeration											
17			Repairing of Ghats (steps to approach water Body) around Kund (Length of Ghat 25rmt)											
18			Bore Well (1 No.)											
	Revitalization of Kachhpura And Mehtab Bagh Area,		Mehtab Bagh Visitor Parking Facilities											
1			Total area for parking is 5168.2 sqmt including area of 387 sq.mt for landscaping.											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
2	Revitalization of Kachhpura And Mehtab Bagh Area,		Provision for 07 buses											
3			Provision for 62 cars											
4			Provision to park / dock bicycles: and 2 wheelers which includes 16 bicycle and 33 two wheelers											
5			Utility block											
6			Total 35 Nos. of Street Lights are required for appropriate lighting in the parking area.											
7			Approach road and side walk to Mehtab Bagh											
8			Paving of Pedestrian Access to Kachchpura Through Fields											
9			Access route is 5 meter wide											
10			Rehabilitation of 4 Community Chowks											
11			Urban Design Guidelines for façades, Street furniture, Signage and public spaces in the village and Kachhpura Village Walk Brochure											
1	Report for Revitalization of Shahjahan Park Walk Way Between Taj Mahal And Agra Fort		Traffic Calming of Amar Singh, Jalkaari Baai, Purani Mandi Junction (Traffic Calming at Grade, Traffic Lights and Crossing at Main Junctions)											
2			Entry Gates Access Organization and Hop On-Hop Off											
3			Natural Path to Agra Fort (Total length: 158 m)											
4			Re Organisation of Circulation & Furniture on Pathway											
5			Development of Pedestrian and Perimeter Pathways											
6			Development of Natural Play, Lake, Forest and Meadows Loops											
7			Signage, Lighting and Street Furniture											
1	Riverfront Connectivity, Interpretation and Basic Services Provision to Communities from Ram Bagh to Taj Mahal													
2	Visitor Centers in Vrindavan, Govardhan And Barsana		Interpretation Facilities, Braj Haat, Centers for Living Traditions											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
3	Interpretation Facilities Braj Haat		Car parking											
4	Centers for Living Traditions		Visitor facility center											
5			Rehabilitation of Community Shops & Vendors											
6			Vehicular Management											
7	Construction of Sewerage Treatment Plant at Kachhpura		.											
8	Construction of Braj Haat/ Canter for Living Traditions		Interpretation Facilities, Braj Haat, Centers for Living Traditions											
9	Building Upgradation of Food Craft Institute													
10	Transportation and Communication Equipments for Tourist Police (visitor safety)													
11	Interpretative Signage, exhibition Design and supervision of Production and installation of all artifacts													
1	Vision Of Up Tourism:		Air Connectivity of Agra – Civil Enclave.											
2			Heli Rides Over Agra & Mathura											
3			River Front Development											
4			Promotion Of Accommodation Facilities											
5			Increase Of Tourist Facilitation Centres											
6			Improving Number Of Convention Centres											
7			Promoting Eco Tourism Sites											
8			New Tourist Circuits											
9			Conservation Of Kunds											

S.no	Name Of Document	Time Frame	Project - Key Components	Positive Impact					Negative Impact					Remark
				EP	UP	TP	HC	UD	EP	UP	TP	HC	UD	
10			Improvement Of Govardhan Parikrama Marg											
11			Promotion Of Wild Life Tourism											
12			Focus On Adventure Tourism											
13			Focus On Medical Tourism											
14			Focus On Sports Tourism											
15			Promotion Of Traditions & Culture											
16			Focus On Theme Based Parks											
17			To Improve Signage Facility											
18			Improvement Of Public Convenience At Major Tourist Destinations											
19			Sel Shows At Various Sites											
20			Improvement Of Public Transport											
21			Theme Based Welcome Gates At City Entry Points											
22			Thematic Beautification & Landscaping Of Cities											
23			Ropeway At Barsana/Radha Rani Temple											
	Project Coordinator State Project Co-ordination Unit UP Pro-Poor Tourism Development Project Department of Tourism Lucknow		Pro-poor Project:											
1			Sub-project 1: Visitor Center and Parking Rehabilitation at Taj Mahal West Gate, Agra											
2			Sub-project 2: Revitalization of Kachhpura and Mehtab Bagh Area, Agra											
3			Sub-project 3: Revitalization of Shah Jahan Park Walkway between Taj Mahal and Agra Fort, Agra											
4			Sub-project 4: Rehabilitation of Banke Bihari Temple Area, Vrindavan											
5			Agra Trade Centre at Village Singhna											Located within 1km of Soor Sarovar Sanctuary ESZ.

Table 6.2 Summary of projects

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Air Environment	Improvement in electric supply at Agra	Centre-State Partnership		1999	2001	9.11	9.11	1 Electrification of 754 nos. of unelectrified, codified villages and 95 numbers of slum 2. At least 14 hrs./ day energy supply in the rural areas		a. Reduction in use of DG Sets b. Supply hours/day is not mentioned c. PM, SO_2, NO_x, HC and CO emissions in rural areas of Agra and Fatehpur Sikri had reduced by 89, 83, 1263, 100.8 and 273 Kg/h respectively. c. Reduction in - SPM: 27-41%; SO_2: 70-82%; NO_2: 46-74% in year 2002-03 in comparision to 1996-98.
	Improvement in Electric Supply in & Around the rural areas of Agra and Fatehpur Sikri									
	Widening of Agra By-Pass			1999	-	0.75	0.75	1. 19.9 km long Canal Patri road to b widened from existing 3.72m to 4.72m	Completed (length - 19.9km)	a. Reduction of pollutant emissions CO, HC, NOx, CO_2 and PM by 1.431, 2.548, 10.067, 726.495 and 1.637 Kg/h and hydrocarbons, benzene, 1-3 butadine, formaldehyde, total aldehydes and total PAH by 1002, 95, 145, 23, 234 and 4423 mg/h considering 100 vehicle mix per hour on the road.
	Construction of a part of Agra By-Pass					10.65	26.91	Construction of 20 Km road parallel to existing 4.7m wide canal road	Completed	Reduction of pollutant emissions; CO, HC, NOx, CO2 and PM by 14.4, 3.2, 3.8, 639 and 0.02 Kg/h respectively and other hydrocarbons, benzene, 1-3 butadine, formaldehyde, total aldehydes and total PAH by 1007, 96, 146, 23, 235 and 4445 mg/h respectively considering 100 vehicle mix per hour on the road.

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Air Environment	Improvement of Master Plan of Roads of Agra City					21.22	21.22	Construction of missing link in the master plan	Completed	Link Location Length (in Km) Mau-Ram Mohan Vihar - 0.53 Rishi marg- Maruti Estate - 0.45 Maruti Estate-Avadhpuri - 0.45 Avadhpuri-Bichpuri road - 0.29 Kabir nagar-mphan vihar - 0.28 Shastripuram-UPSIDC road - 0.55 Shastripuram-NH2 - 1.5 Shastripuram - Fatehpur sikri road - 3.435 Transport nagar-NH2 - 0.07 Kothi meena bazar - 0.3 Rammohan vihar-Kabir nagar-poiya Ghat - 8.36 Construction of 2 new roads a. Shamsabad-Fatehabad 125' wide road (4 Km away from Taj) b. Shamsabad-Fatehabad 100' wide road via Nehru enclave (2 Km away frm Taj)
										Reduction of pollutant emissions CO, HC, NOx, CO2 and PM by 20.888, 3.727, 9.335, 863.152 and 0.997 kg/h and hydrocarbons, benzene, 1-3 buta-dine, formaldehyde, total aldehydes and total PAH by 1126, 127, 158, 28, 257 and 4505 mg/h in Agra considering 100 vehicle mix per hour.
	Development of new industrial estates for shifting of polluting / non-confirming (including petha industry) approx. 8 Ha.	JNNURM	ADA	2008	2011	4.83				

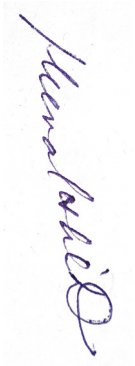
Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Water Environment	Gokul Barrage	Centre-State Partnership		1999	2001	12.5	92.20	1.Increase ground water table in area 2. Reduce salinity levels. 3. Barrage is designed to store about 13,017 acre-foot (23.94 million cubic meters) of water.	Completed	a. Ground water levels have fallen over the years between 2003 and 2009. b. Dissolved oxygen meets the CPCB classification D c. Fails to meet the BOD level d. Presently around 30 cusec (73.5 MLD) and 115 cusec (282 MLD) is supplied at Mathura and Agra
	Storm Water Drainage System (Agra)	JNNURM		1999	2009	6.6 all over (5.65 granted)	4.5 (Incurred)	Improvement of water quality (not clearly mentioned)	62 percent of work is completed. The work stopped as per the directions of monitoring committee.	UPJN has constructed four drains in Agra city in coordination with the ANN and Agra Development Authority (ADA)
									100% completed	Bhim Nagar Area - 6.25 km
									95% completed	Naval Ganj Area - 4.73 Km
									92% completed	Sikandra Area - 2.30 Km
									_	Mustafa Quarter Area - 5.35 Km
		JNNURM		1999	2007	94.62 lakhs (Granted)	94.48 Lakhs (expenditure)	Maintenance of Storm Water Drainage System	Completed	Desilting of Paliwal Park drain: 0.980 km Desilting and repair of Mantola drain: 1.770 km Desilting of Bhairon drain: 0.483 km Desilting of Taj East Gate drain: 1.260 km Sub Total: 4.493 km

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Water Environment	Water Supply Reorganization of existing water works (Rehabilitation of Water Works - I)	JNNURM	U.P.Jal Nigam	2007	2008	11.3				
	Distribution network: Replacement of damaged rising main, Replacement of damaged distribu-tion mains			2007	2008	13.45				
	Storage Improve-ment / enhance-ment: Repairing of existing CWR & OHT's			2007	2008	2.15				
	Reduction of UFW: Provision for Unac-counted for Water Woks			2007	2008	2.69				
	Construction of Pumping station , treatment plant			2008	2012	134.02				
	Water Works storage Capacity enhancement			2007	2008	4.31				
	Ganga Jal Project			2008	2012	731.04				
	Test Laboratory			2007	2008	1.08				

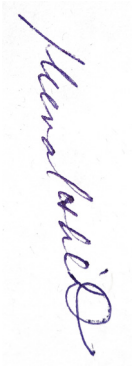
Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Water Environment	Augmentation of Sewerage System Providing 129 Km. new sewer lines 3 Nos. major & 5 Nos. small pumping stations in Central Sewerage District		U.P.Jal Nigam	2007	2007	98.70				
	255 Km. sewer line; 4 major and 4 small SPS and 105.00 MLD STP in Western Sewerage District			2007	2009	148.97				
	61.40 Km. sewer line, 3 major and 3 small SPS and 26.00 MLD STP in Eastern Sewerage District			2009	2009	72.35				
	147 Km. sewer lines 2 Nos. major and 10 nos. small pumping station and 38.00 MLD S.T.P. in Northern Sewerage District			2009	2010	94.56				
	63.40 km. sewer line, 2 major and 6 small SPS and 29.00 MLD STP. in Southern Sewerage District-I			2010	2010	79.01				

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Water Environment	30.20 km. sewer line, 1 major and 1 small SPS and 29.00 MLD STP. in Southern Sewerage District-II			2010	2010	47.40				
	342 Km. sewer line, 4 major & 7 small pumping stations and 37.00 MLD STP in Tajganj Sewerage District			2011	2012	221.08				
	Purchase of Modern Equipment for Desil-ting of sewers			2007	2007	1.05				
	Repair of Existing drains Phase I		U.P.Jal Nigam	2007	2009	80.94				
	Repair of Existing drains Phase II			2007	2012	52.50				
	Construction of new drains Phase III			2008	2012	32.90				
	Purchase of Equip-ment for Desilting of drains			2007	2007	2.10				
Aesthetics	Solid Waste Man-agement	Centre-State Part-nership	AMC	1999	2003	7.49 (7.14 utilized)	0.34 (returned)	Improvement of overall aesthetics and environment of the city		a. Slight improvement in MSW b. Agra ranked 437 out of 1000 which is fair category.

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Aesthetics	Uttar Pradesh Pro-Poor Tourism Development Project Subproject Title: Revitalization of Shahjahan Park Walkway Between Taj Mahal And Agra Fort Subproject location (area/district/site): The subproject is located along the Yamuna Riverfront between the two World Heritage Sites- Taj Mahal and Red-fort in Agra city, U.P.	JNNURM	Agra Development Authority (ADA)	Screeing on 7th November 2016				Subproject scope of work: • Traffic Calming of Amar Singh, Jalkaari Baai, Purani Mandi Junctions • Natural Path to Agra Fort • Re Organisation of Circulation & Furniture on Pathway • Development of Pedestrian and Perimeter Pathways • Development of Natural Play, Lake, Forest and Meadows Loops • Signage, Lighting and Street Furniture		



Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Aesthetics	Project for infra-structure improve-ment in Taj Environs (upto 500m outside ASI boundary) for improving the roads, footpaths, railings, signages, street lights, monument description 3boards, public conveniences, public telephone booths, information kiosks, vehicular parking, garbage bins, landscaping, street furniture, etc.	JNNURM	ANN	2007	2009	22.34				



Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Aesthetics	Project for Improving other Heritage protected Sites (upto 500m) or improving the roads, footpaths, railings,signages, street lights, monument description boards, public conveniences, public telephone booths, information kiosks, vehicular parking, garbage bins, landscaping, street furniture, etc.	JNNURM		2007	2009	30.16				
	Purchase of SW transport equipment & tools	JNNURM		2008	2009	35.03				
	Development of Storage points			2007	2008	13.99				
	Compost plants			2007	2008	27.98				
	Land fill site development	JNNURM		2007	2007	9.45				
	Capacity Building			2007	2007	1.05				
Roads & Transportation	Sky Bus From Sikandara to Taj Mahal	JNNURM	ADA			997.90				

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Roads & Transportation	Multi Storied / underground Parking-5 nos. Pahgwara crossing, Kinari Bazaar, Raja ki mandi, Loha mandi, Shahganj		ANN	2009	2012	107.63				
	Up gradation of existing bus terminals at Idgah and Fort		PWD	2007	2008	2.15				
	Development of new bus terminals (6 nos.)		PWD	2009	2010	13.31				
	Up gradation of workshop		RTO	2007	2009	2.15				
	Purchase of CNG buses		RTO	2008	2012	73.10				
	Widening and strengthening of main roads in urban areas		ADA, N.H.A.I., PWD	2009	2012	569.99				
	Construction of remaining master plan Roads under Master Plan		ADA	2009	2012	823.77				
	Proposed construction of 100m wide Ring Road		N.H.A.I	2007	2012	1409.61				
	Construction of Rail Over Bridge/Rail Under Bridge		UP Bridge Corporation	2009	2012	415.13				

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Roads & Transportation	Development of internal roads	JNNURM	ANN	2007	2009	390.69				
	Development of parking areas in the city		ANN	2007	2009	20.99				
	Development of approach road to Taj & other heritage sites		ADA	2007	2009	34.98				
	Improvement in street lighting		ANN	2007	2009	10.76				
	Intersection Signaling		RTO	2007	2007	2.63				
	Improvement of road geometrics & street furniture		ANN	2008	2011	18.41				
	Footpath improvement		ANN	2008	2011	12.47				
	Foot over Bridges/ Pedestrian underpasses		ANN	2009	2012	24.32				
	Construction of Fly over (Water Works chauraha, Khangari chauraha, Rui ki Mandi)		ADA/ANN	2007	2010	20.37				
Environment	River Front Development	JNNURM	ADA	2008	2012	45.65				
	Improvement and beautification of existing parks		ANN	2008	2012	54.83				
	Development of new parks		ADA	2010	2011	18.69				
	Protection of forest area/ Aforestation		Forests	2008	2009	16.95				

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Environment	Rain water harvesting in state government & ANN properties and select locations as identified by U.P. Jal Nigam	JNNURM	ADA/ANN	2007	2009	12.29				
	Restoration and beautification of water bodies		ANN	2007	2009	33.26				
	Construction of weir across river Yamuna downstream of Taj		State Irrigation Department	2008	2012	73.10				
Urban Renewal Projects in Inner City	Selected road widedning	JNNURM	ANN	2008	2010	49.11				
	Replacement of water and sewer lines		U.P.Jal Nigam	2008	2010	52.84				
	Laying of new water and sewer lines		U.P.Jal Nigam	2010	2012	66.58				
	Construction of public toilets & urinals		ANN	2007	2007	8.40				
	Night Shelters		ANN	2007	2007	1.58				
	Community Centre/ Hall		ANN	2007	2007	2.1				
Capacity Building	Capacity Building	JNNURM	ANN	2007	2012	11.60				
Urban Poverty and Slum	Development and improvement of basic services	JNNURM	DUDA	2007	2012	480.85				
	Construction of community toilets and bath			2007	2012					
	Construction of community rooms/ child care centre			2007	2012					

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Urban Poverty and Slum	Construction of about 8500 houses / Financial assistance for improvement of shelter	JNNURM	DUDA	2007	2012					
	Provision of security tenure			2007	2012					
Water supply works: Executed /Ongoing / Sanctioned/ Proposed Projects in Agra: U.P Jal Nagar Nigam										
Water Supply	Water Supply	TTZ	UP Jal Nigam, Agra	2000	2004			419.05 km distribution system 10 nos. overhead tanks 11 nos. clear water reservoir	Executed	
	Water Supply	Trans Yamuna Immediate Relief water supply scheme		2013				16 nos. tube well 1 nos. clear water reservoir 17.55 km rising main	Executed	
		JNNURM		2008				437 km distribution system 08 nos. overhead tanks 05 nos. clear water reservoir 01 no. intake well	Ongoing	
	Agra Water Supply house connection scheme (phase I)	AMRUT		2015	2016			27263 nos. water supply house connection	Ongoing	
	Agra Water Supply house connection scheme (phase II)			2016	2017			27263 nos. water supply house connection		
	Agra Water Supply scheme (phase III)			2016	2017			85 km distribution system 03 nos. overhead tanks 03 nos. clear water reservoir 9461 nos. water supply house connection		
	Agra Water Supply scheme (Shahaganj area phase IV) Part I	AMRUT		2017	2020			89 km distribution system 04 nos. overhead tanks 02 nos. clear water reservoir 11121 nos. water supply house connection		
Project Under Smart City										
ABD Area Project (Area based development)	Development of Street Vending Zone	SMART CITY	Work order issued on 22/6/18			3.33		This project will availed facilities and designated place for the street vendors as well as tourist to enhance the experience of Agra streets and food, flowers, and other markets)		Near Amar Hotel: 80% work completed, Defense estate officer has raised objections; permission from Ministry of Defense under Progress

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
ABD Area Project (Area based development)	Public E-Toilet		Work order issued on 5/10/18			4.07		Toilet with its intelligence, keep hygiene even with improper usage of occupants. Toilet has luxurious interiors and touch-free operations: The travelers prefer the comfort of their home toilets because of its neatness, hygiene, convenience and safety they enjoyed inside. Toilets give a world class experience of hygiene in public toilets. Self-Cleaning using pressure jet spray. It ensures minimum user contact and thus maximum hygiene.)		-Toilet at Taj west gate location – Proposal after approval from Competent Authority was sent to National Monuments Authority, New Delhi. They have given following comments 1. Clearance from Committee on Taj Mahal set up by Honorable Supreme Count. 2. Clearance from ASI regarding aesthetics 3. Comparative Statement with earlier world bank project. To be included in the vision document to be given by UP Government to Honorable Supreme Court
	Improvement of vicinity of Lesser Known Heritage Monuments		Work order issued on 5/10/18			3.46		(Development of Heritage walk:) This Project discusses the lesser known heritage monuments heritage walk which will create awareness among tourists about the city and its people from cultural perspective. The heritage walk is proposed to be conducted around the old market area comprising of the little known as well as the must-visit landmarks of Agra such as Fatehpur Masjid Kali Masjid, Lal Bhukhari and Gates.		Proposal after approval from Competent Authority was sent to National Monuments Authority, New Delhi. They have given following comments 1. Clearance from Committee on Taj Mahal set up by Honorable Supreme Count. 2. Clearance from ASI regarding aesthetics 3. Comparative Statement with earlier world bank project. To be included in the vision document to be given by UP Government to Honorable Supreme Court
	Junctions Improvement Ph-1 (Civil) Ph-2 (Signage)		For civil work order issued 22/6/18 and for signage work order issued on 27/6/18			7.67		This all junctions includes Signages, Pavement marking, Median, Roundabout Landscaping, Signals, Channelizer, earth work wherever required.		Junction at Basai Police Chowki, TDI mall, Mariott hotel, Taj east road Tiraha, J.P. crossing require NOC from Forest Department, online application submitted on 25/8/2018

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
ABD Area Project (Area based development)	Intensive Beautification of Heritage walk within 2 km Radius around Taj Mahal (civil and illumination works).		Work order issued on 28/8/18 and for illumination work LOI issued on 23/7/18			9.32		Preparation of a Detailed Concept Plan to beautify the area around 2 km radius of Taj Mahal for Agra under smart city mission for the ABD area (Area based development). This project cover Heritage walk and illumination works at Taj east gate and west gate other roads for beautification to enhance the experience to explore the area around Taj mahal. Streets, Drains, Underground electrical poles, tree shape pruning, pavement marking, water kiosk, tourist kiosk, street furnitures, wall painting, illumination of trees, smart police kiosk, toilets.		Proposal after approval from Competent Authority was sent to National Monuments Authority, New Delhi. They have given following comments 1. Clearance from Committee on Taj Mahal set up by Honorable Supreme Count. 2. Clearance from ASI regarding aesthetics 3. Comparative Statement with earlier world bank project. To be included in the vision document to be given by UP Government to Honorable Supreme Court
	Beautification and Street scaping of Fatehabad Road		Work order issued on 28/8/18			105.88		To relieve congestion, To provide better linkage to the radial arterial roads,, To provide improved access to Taj Mahal, To connect the new urban nodes outside/nearby)		The stretch of Fatehabad Road from Mughal Puliya to Ramada plaza require NOC from Forest Department, online application submitted on 25/8/2018
	Facade improvement of Traditional Houses along Daresi road.		Work ordedr issued on 28/8/18			0.99		This area has a lot of traditional houses, the façade improvement has been proposed in certain houses of near daresi roads approximately 50 houses identify at this location		NOCs from Household owners in progress
	Rehabilitation of Major Roads		DPR submitted and approved.			112.84		To relieve congestion and beautify the area, To provide better linkage to the minor roads, To provide improved access to vehicles and pedestrian, To connect the new urban nodes and tourist sports outside/nearby, Street designing		NOC from ASI obtained, NOC from cantonment Board for concerned areas in progress

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
ABD Area Project (Area based development)	Rehabilitation of Minor Roads		DPR submitted			171.77		The proposed project includes the development of existing roads in Agra. The major roads have more significance than merely serving as a connecting road to the city. The prime o0bjectives of the proposed section of the ABD roads, Agra are: • To relieve congestion and beautify the area • To provide better linkage to the minor roads. • To provide improved access to vehicles and pedestrian • To connect the new urban nodes and tourist sports outside/nearby. Street designing		NOC from ASI under process
	Solar Installation		Online submission of bid is on 11/10/18			26.54		Implementation of this project will lead to significant reduction of conventional fuel and help in reduction of carbon emissions also. It will also lead to substantial reduction in power bills of the building owner		
	Micro Skill Development Centre and women SHG center		Work order issued on 5/10/18			2.01		Micro skill centers for imparting training, related to local art such as in-lay, sculpting and zardosi work, Development of five micro skill development centers would fuel the area's employability, creating livelihood and employment options for youth annually		NOC from ASI in process

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
ABD Area Project (Area based development)	Provision of Municipal Health Centre, Women Distress center, Anganwadi		Nit issued on (second call) 1/10/18			5.29		Planned to retrofitting of municipal health center and giving all basic facilities like beds, manitainance of rooms, toilets, etc. here we also proposed woman distress center which can be help for the cluster group of women to solve their problems financially or any other. Proposed option of smart healthcare kiosk. Out of these options will go for the best economical and quality option based upon the community of the citizens. Options are smart health care kiosk look like ATM machine, Healthcare kiosk with medicine vending machine or cubical first aid kiosk for citizens.)		NOC from ASI obtained, Land dispute in one location at Jachha Bachha Kendra
	Upgradation of Municipal Schools		LOI issued			1.30		During site visit for the various components proposed under the Smart City Proposal, visited both Nagar Nigam Inter College and Nagar Nigam Girls High School and mostly buildings requires maintain and basic facilities like R.O plant, Toilets, Playground improvements, Landscaping, classroom development, library development		NOC from ASI obtained
	Provision of Quick Response Centre, Smart Police Kiosks, Digital Literacy Centre		Work order issued on 20/9/18 (Rs.0.61 Cr)			8.68		For Digital Literacy center one location will be in municipal high schools after retrofitting/ redevelopment of the library building in school		
	Waste Management		NIT issued on 29/9/18			3.83		This project cover waste generation demand and its solution for its dumping at open scientific land. It includes processing, segregation, transferring, compressing, and dumping or recycle of that waste.		

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
ABD Area Project (Area based development)	Pilot 24x7 water supply (Metering, SCADA system), Fire Hydrant.		DPR submitted approval is in process			134.07		Providing 24x7 water supply system to the Area Based Development (ABD) is part of the Smart City Project. The objective is to ensure the 100% coverage of water supply system in the ABD since Taj Mahal and its surroundings are significant tourist destinations and are state priority with SCADA system		NOC from Supreme Court appointed monitoring committee in progress
	Taj East Drain Improvement Plan		Financial bid approval is in process			26.10		Taj East Drain Improvement in the Area Based Development (ABD) is part of the Smart City Project. The objective is to ensure pollution freee drainage in the ABD since Taj mahal and its surroundings are significant tourist destinations and are state priority		NOC from Supreme Court appointed monitoring committee in progress
	Sewerage network		DPR submitted, approval is in process			145.42		Providing sewerage system in the Area Based Development (ABD) area is part of the Smart City Project. The objective is to ensure the 100% coverage of sewerage system in the ABD since Taj mahal and its surroundings are significant tourist destinations and are state priority. It is important to improve the sanitation conditions in area, both to enhance its tourism potential, and to protect the area from environmental degradation.		NOC from Supreme Court appointed monitoring committee in progress
Pan City Projects	MSI-ICCC (Integrated command and control center and Covers all ICT and IT components as per smart city proposal)		Work order issued on 29/8/18			282.65				
	Bus shelters.		Online bid submission on 25/10/18			20		To provide smart bus shelter in Agra)		

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Pan City Projects	Junction Improvement-II:			Phase-1 : Last date of online sub on Bid on 24/10/18		23.86		This all junctions include Signages, Pavement marking, Median, Roundabout, Landscaping, Signals, Channelizer, earth work wherever required		
	Multilevel car Parking			DPR is in process/ in search of Land		144.97		To ease traffic congestion and for ease of tourists and local residents, it has been proposed to establish 9 multilevel car parking facilities with 2700 car parking facility in the entire city Pan City proposals.		NOC for Land availability in process
	Purchase of Electrical Buses							Faster Adoption and Manufacturing of Electric Vehicles (FAME), by Ministry of Heavy Industry and Public Enterprises. Agra plans to procure 50 hybrid buses for hop-on and hop-off service. As per the smart city proposal)		FAME Scheme Proposal
Details of Projects covered under CONVERGENCE	Improvement of west, east and south gate corridor around Taj Mahal					197.27				
	Underground Cabling Duct					0.61			Projects completed	
	Rainwater Harvesting Pits					6.70				
	Beautification and street scaping of Fatehabad road					3.90				
	Provision of e-Rickshaws					0.20				
	Agra Etawah Lion Safari Cycle Highway					4.20				
	Conversion of street Lights of LED					7.05				
	White Scheme-Painting buildings-White color					0.34				

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Details of Projects covered under CONVERGENCE	Development of Museum (to showcase history of Mughal and culture of Agra)		UPRNN (45% work done)			141.90				
	Conversion of Samshanghat to e-Shamshanghat		ADA (85% work done)			30				
	Development of Shahjahan Park		ADA (20% work done)			21.00				
	In situ house upgradation, (Provide affordable houses for the slums)		PMAY, ASRA, 7302 total HH, 2200 HH allocate funds and 1602 HH work started			116.30				
	Development of Taj Orientation Centre					231.80				One component Parking complex finalize but this project on hold by supreme court
	International Café		ADA (30% work done)			30.00				This project on hold by supreme court
	Toilets (IT,CT)		SBM: CT (72% completed (9140 nos), IT (57% completed) (8662 nos)			0.32				
	Taj Park		ADA			2.40				
	Green walkway along Yamuna kinara road		Horticulture Dept. ASI			1.95				
Projects Under Agra Municipal Corporation										

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Solid Waste	Solid waste management Municipal Solid waste management							Municipal Commissioner, Agra that waste to energy plant under solid waste management is proposed to be established in Agra. PPA has been done with UP Power Corporation Ltd. to sale them 15 MW electricity generated from 750MT waste in the city. In the meeting held on TTZ Authority, permission/clearance to the plant in question has been granted with the condition to obtain approval from the MoEF&CC, Govt. of India in this regard. It was directed that only guidelines will be issued by MoEF&CC and according to which no objection may be issued by TTZ Authority.		NOC for Waste to Energy Plant be given by the TTZ Authority at the earliest.
	Waste to energy plant.							To make a compost from the flowers used in various temples and wedding spots in the city, Rajnagar has been prepared to make a compost with 2 flowers and is working		
								The collection of Door-to-Dry waste collection in 100 words will be completed by 31.12 18. For the disposal 500 TPD Solid Waste from Agra city with the approval of the government for the generation of electricity, contract with SPARC Brihan Pvt. Ltd. was expired on date 06.10.2017. Proposal for the operation of the plant is already presented on 12.02.2018. The TTJ committee has forwarded with its recommendation for non-objection to the Ministry of Environment, Forest Climate Change Government of India. In relation to the above, Director, Niti Ayog was also directed to set up the plant during Agra excursion on 12.13.18.		

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Solid Waste	Plastic waste to fuel plant				October 2018			A total of 4240 cleaning workers are being provided with cleaning facility in 100 wards by the municipal corporation in Agra city and Decantation of municipal solid waste through 293 vehicles. Apart from this, the work of Door-to-Door Garbage collection by Agra Municipal Corporation is being done through 5 Agencies		
PROJECTS UNDER UP NEDA(Uttar Pradesh New and Renewable Energy Development Agency)										
Renewable Energy	Solar Street Light Mathura	DRDA	UP NEDA	08.2018	31.01.2019		1.06 Released- 0.77	For Street Lightening	Financial Expenses- 70% Physically implement -39%	
	Solar RO Water in Primary Schools	UP NEDA	UP NEDA	20 -09-2018	20.01.2019		2.65	Mathura, Goverdhan, Nand Gaon, Farah		
Minor Irrigation Mathura										
Ground Water	Check Dam Construction Village- Thenuah Tehsil- Noajhil									
	Check Dam Construction Village- Bamuli Tehsil- Farah									
	Check Dam Construction Village- Theravalli Tehsil- Farah									
Projects Under Pwd										

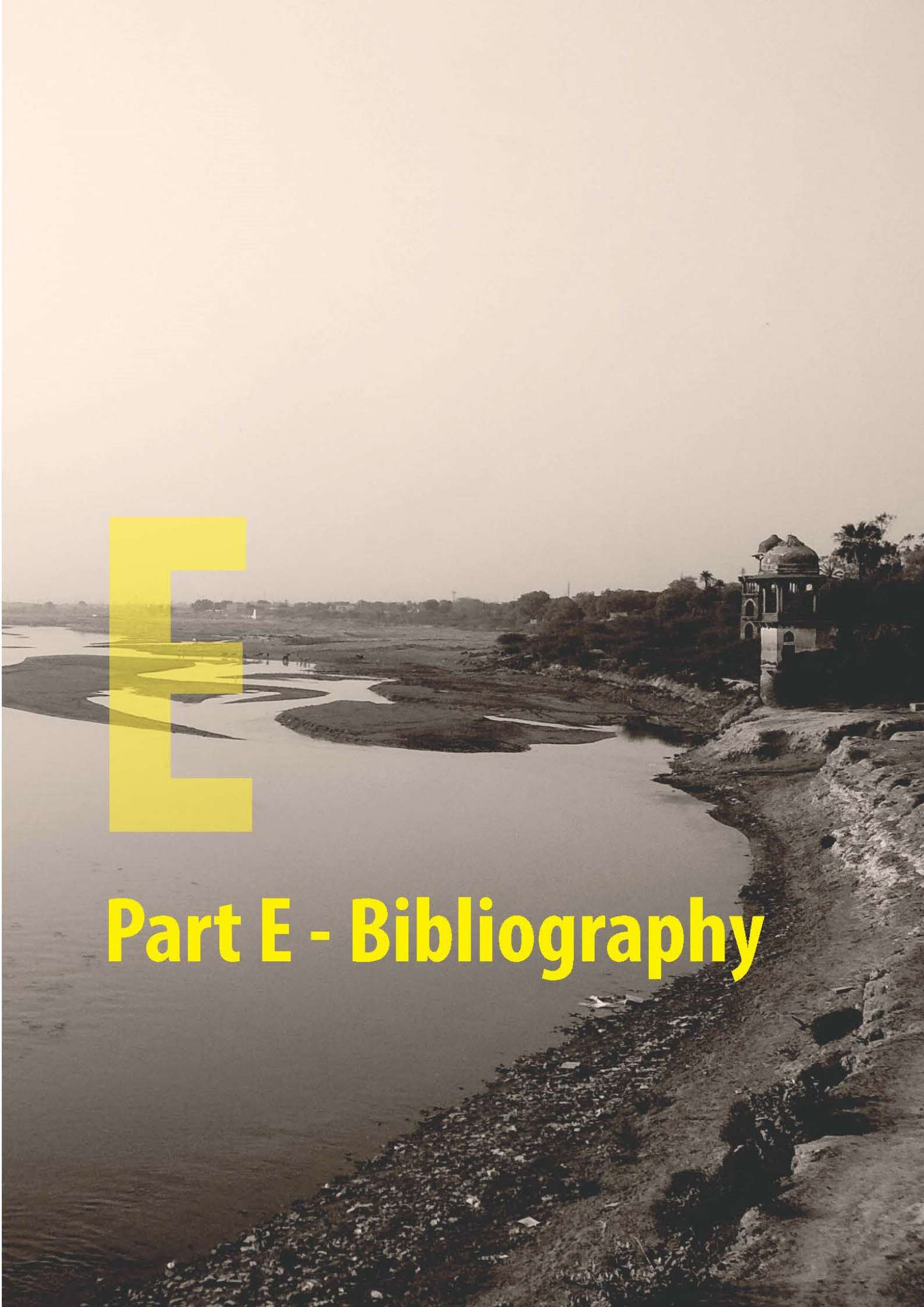
Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Infrastructure Agra	Road Widening Agra- 9.9 KM 20km 19.45 km 8.8 km 13.6 km 5.25 km 4.5 km 4.42km 11.4 km 8.62 km		PWD				9921 Lacs 3045 lacs 2236.28 lacs 2719.89 lacs 3221.43 lacs 654.63 lacs 701.3 lacs 772.39 lacs 977.79 lacs 1067.32 lacs		60% 37% 30% 23% 22% 22% 20% 23% 21% 19%	
	Over bridge on Rail line 0.759 KM 0.29 km 0.911 km 16.521 km 10.074 km			30.11.18 31.10.19 30.06.19 31.12.20 31.03.21			2232.66 lacs 1957.55 lacs 3290.81 lacs 7086.24 lacs 6009.21 lacs		99% 50% 45% 8% 0%	
Infrastructure Mathura	Road Widening 18.4 km 10.95 km 25.463 km 86.913 km						4812.37 lacs 1841.43 lacs 13841.3 lacs 50571.77 lacs		24% 90% 10% 8%	
	Road Construction 10 .4 km						7147.32 lacs		5%	

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Infrastructure	Road Widening									
Firozabad	16.85 km						3424 lacs		40%	
	Railway Over Bridge									
	0.693 km						2419.63 lacs		99%	
	0.761 km						2918.95 lacs		75%	
	0.715 km						2686.04 lacs		75%	
	0.743 km						3628.82 lacs		35%	
	0.765 km						3624.7 lacs		0%	
	0.763 km						3363.49 lacs		0%	
Infrastructure	Road Widening									
Etah	2.5 km						411.71 lacs		50%	
	14 km						1194 lacs		75%	
	7.45 km						646.78 lacs		45%	
	6.7 km						829.19 lacs		50%	
Infrastructure	Road Widening									
Hathras	0.5 km						67.18		100%	
	17.3 km						2229 lacs		87 %	
	Railway Over Bridge									
	6.995 km						3171.07 lacs		0%	
	0.577 km						2357.71 lacs		6%	
	Road Construction									
	124.49 km						165020 lacs		74%	
Proposed Projects Under Irrigation Dept. Firozabad										

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Water Environment	Sirsa Sanger river rejuvenation and restoration projects									
	Firozabad Canal System Concrete limning of Rajawali Minor 6.48 km length			2018-19						
	V.R.B/D.R.B construction									
	Newly construction of office for irrigation dept.									
Projects Under Namami Gange										
Water Pollution	Mathura Sewerage Scheme (HAM)- 67.5 MLD Capacity STP			17-02-2017	May 2018		204.97			
	Project for Rehabilitation / Renovation of Agra Sewerage Scheme (Interception and Diversion Works)- , including operation and maintenance cost for 15 years.						857.26			
Pradhan Mantri Awas Yojna										
Agra Housing	PROJECT PROPOSAL BRIEF for EWS Houses under AHP Vertical (Pradhan Mantri Awas Yojna)		Agra Development Authority				12539.52			
Projects Under Hriday (Cdp)										
Heritage Mathura	Historical narrative A City Anchor: Braj Foundation	Project of MOUD, Government of India		2017			40			

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Heritage Mathura	Forest and Biodi-versity									
	Identification of typologies: tangible and intangible assets									
	Rehabilitation and beautification work between Raman Reti Tihare till Vrindavan parikrama in Janpath Mathura under HRIDAY									
Projects Under UP Tourism										
Tourism and Heritage	Construction Of Mughal Museum Is In Progress						RS. 141.89 Cr			
	'Revitalization Of Shahjahan Park Walk Way Between Tajmahal And Agra Fort, Agra'' Under Propoor Dev. Scheme Are In Progress						RS. 18.05 Cr			
	'Revitalization Of Kachhpura And Mehtab Bagh,Agra Under Propoor Dev. Scheme Are In Progress						RS. 17.87 Cr			
	Tourist Facilitation Centre At Vrinda-van(Mathura) Is In Progress						RS.935.76 LAKHS			

Aspects	Projects Name	Funding Agency	Implementing Agency	Starting Year	Year of Completion	Estimated Budget (in Cr.)	Approved Budget (in Cr.)	Objectives	Status	Achieved/Remarks
Tourism and Heritage	Beautification And Renovation Of Four Kunds-Theme Park Akbarpur, Jai Kund Jaint, Chandra Sarovar, Krishna Sarovar In Mathura Under Prasad Scheme Is In Progress						RS.15.62 CR			
	Beautification And Renovation Of 9 Kunds-Balbhadra Kund Bathain,Balbhadra Kund Adeeg,Mahdar Kund, Ratan Kund, Pandav Ganga,Krishna Kund, Chandra Kund, Shahi Talab, Pai Sarovar In Mathura Is In Progress						RS.1101.04 LAKHS			
	Tourism Development Of Nagla Chandrabhan, Mathura Is In Progress						RS. 498.00 LAKHS			



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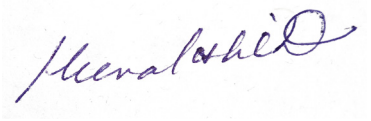
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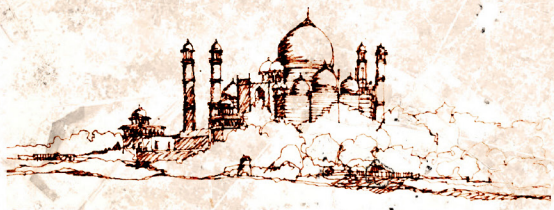
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