Assessing the Role of Zoning Regulations and Floor Area Ratio on Urban Land Pricing in Bhopal City

MASTER OF PLANNING

(Urban Planning)

by

ARJUN SINGH

(Sch. No. 24209011121)



MAULANA AZAD

NATIONAL INSTITUTE OF TECHNOLOGY,

BHOPAL (MP) - 462003(INDIA)

JULY, 2026

MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL

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Abstract

This research aims to explore the impact of zoning regulations and floor area ratio (FAR) on land values within the context of urban planning for the city of Bhopal. As metropolitan cities experience rapid urbanization driven by population growth and increased employment opportunities, unplanned and scattered development has emerged, leading to leapfrog growth patterns. To encourage compact and mixed-use development, various policies have been implemented. Infrastructure development, particularly in affordable housing with mixed land use — zoning regulations and floor area ratio (FAR) —is essential to meet the needs of both existing and new residents.

The introduction of vertical development with increase FAR and zoning regulations significantly alters land use dynamics and affects surrounding land values, playing a crucial role in urban development. Historically, cities grew organically and unplanned, resulting in congestion and inadequate infrastructure to meet current demands. In response, the emphasis on land use planning has intensified, particularly with the affordable housing and economic zones policy for employment. These policies facilitate a reorganization of land use, aligning it with infrastructure improvements and contributing to rising land values.

Also understanding the development options available when a land parcel in falling within the Influence Area of the high commercial zone and high rise building. Implication of the regulation affects the development and how collaborative approach could be taken to address this improvement. This study employs various methodologies and case studies from both national and international contexts to analyze these impacts. The findings will be invaluable for urban planners, Real Estate professionals and government agencies as they assess the implications of current and future requirement, underscoring their significance in contemporary urban development promoting compact and sustainable development.

सारांश

इस शोध का उद्देश्य भोपाल शहर के शहरी नियोजन के संदर्भ में भूमि मूल्यों पर ज़ोनिंग नियमों और फ्लोर एरिया रेशियो (FAR) के प्रभाव का पता लगाना है। जनसंख्या वृद्धि और रोजगार के बढ़ते अवसरों के कारण महानगरों में तीव्र शहरीकरण हो रहा है, जिसके परिणामस्वरूप अनियोजित और बिखरा हुआ विकास हुआ है, जिससे तीव्र वृद्धि के पैटर्न उभर रहे हैं। सघन और मिश्रित उपयोग वाले विकास को प्रोत्साहित करने के लिए विभिन्न नीतियां लागू की गई हैं। बुनियादी ढांचे का विकास, विशेष रूप से मिश्रित भूमि उपयोग वाले किफायती आवासों के क्षेत्र में - ज़ोनिंग नियम और फ्लोर एरिया रेशियो (FAR) - मौजूदा और नए निवासियों दोनों की जरूरतों को पूरा करने के लिए आवश्यक है।

बढ़ते FAR और ज़ोनिंग नियमों के साथ ऊर्ध्वाधर विकास की शुरुआत से भूमि उपयोग की गतिशीलता में महत्वपूर्ण परिवर्तन होता है और आसपास की भूमि के मूल्यों पर प्रभाव पड़ता है, जो शहरी विकास में महत्वपूर्ण भूमिका निभाता है। ऐतिहासिक रूप से, शहर अनियोजित और स्वाभाविक रूप से विकसित हुए हैं, जिसके परिणामस्वरूप भीड़भाड़ और वर्तमान मांगों को पूरा करने के लिए अपर्याप्त बुनियादी ढांचा है। इसके जवाब में, भूमि उपयोग नियोजन पर जोर बढ़ा है, विशेष रूप से किफायती आवास और रोजगार के लिए आर्थिक क्षेत्र नीति के साथ। ये नीतियां भूमि उपयोग के पुनर्गठन को सुगम बनाती हैं, इसे बुनियादी ढांचे में सुधार के साथ संरेखित करती हैं और भूमि मूल्यों में वृद्धि में योगदान देती हैं।साथ ही, उच्च वाणिज्यिक क्षेत्र और ऊंची इमारतों के प्रभाव क्षेत्र में आने वाली भूमि के विकास विकल्पों को समझना भी इस अध्ययन का उद्देश्य है। नियमों का विकास पर क्या प्रभाव पड़ता है और इस समस्या को दूर करने के लिए सहयोगात्मक दृष्टिकोण कैसे अपनाया जा सकता है, इस पर भी विचार किया गया है। यह अध्ययन इन प्रभावों का विश्लेषण करने के लिए राष्ट्रीय और अंतर्राष्ट्रीय संदर्भों से विभिन्न पद्धतियों और केस स्टडी का उपयोग करता है। इसके निष्कर्ष शहरी योजनाकारों, रियल एस्टेट पेशेवरों और सरकारी एजेंसियों के लिए अमूल्य साबित होंगे, क्योंकि वे वर्तमान और भविष्य की आवश्यकताओं के प्रभावों का आकलन करेंगे और समकालीन शहरी विकास में उनकी महत्ता को रेखांकित करेंगे, जो सघन और सतत विकास को बढ़ावा देता है।

Acknowledgement

I would like to take this opportunity to express my heartfelt gratitude and acknowledge the contributions of all those who made it possible for me to complete and present this research work. First and foremost, I extend my sincere thanks to my guide, Dr. Seemi Ahmed for their expert guidance, constructive feedback, and unwavering support throughout the research process. Their patience and invaluable suggestions were instrumental in refining my ideas and methodology.

I am deeply grateful to our coordinator, Dr. Seemi Ahmed, for her insightful direction and consistent support throughout the research process. I also wish to thank all the faculty members of Maulana Azad National Institute of Technology, Bhopal, who offered their valuable advice and assistance at various stages of my research project.

I am also profoundly thankful to our Head of Department, Dr. Nakul Dhagat, for fostering a supportive and conducive environment that greatly contributed to the progress and success of our projects.

This work would not have been possible without the contributions of all these individuals, to whom I am sincerely thankful.

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CHAPTER 1
Introduction

Urban land pricing in Indian cities has emerged as one of the most critical issues shaping sustainable urban development, economic growth, and social equity. *Urban land pricing* refers to the process of determining the monetary value of land within urban areas, influenced by spatial location, accessibility, infrastructure provision, land use regulations, and socio-economic demand–supply dynamics. It represents how urban land markets capitalize on locational advantages and planning interventions to assign value to specific parcels of land. Land constitutes both a finite and immovable resource, yet its value is subject to dynamic forces such as population growth, urbanisation, migration, infrastructure expansion, and regulatory frameworks. In particular, zoning regulations and Floor Space Index (FSI), also known as Floor Area Ratio (FAR), represent core planning tools that determine how intensively a piece of land can be used.

In the Indian context, cities such as Mumbai, Delhi, and Bengaluru have witnessed how FSI restrictions or relaxations can alter land prices, housing affordability, and urban density. For instance, Transit-Oriented Development (TOD) policies in Delhi triggered significant appreciation in land values along metro corridors, while fungible FSI in Mumbai created speculative spirals in suburban markets. In contrast, Bhopal presents a unique case where zoning restrictions due to ecological sensitivity (Upper Lake, Van Vihar hills) coexist with liberal FSI in commercial corridors such as MP Nagar and Hoshangabad Road. This duality makes Bhopal an important laboratory for studying how zoning and FSI policies jointly shape land- market ,outcomes.

This report situates Bhopal within the broader debates of land economics and urban planning by assessing the mechanisms through which zoning and FSI affect urban land pricing. It builds on classical economic theories such as Ricardo's Rent Theory and Alonso's Bid-Rent Theory, and links them to contemporary urban practices in India and abroad. By exploring both theoretical foundations and empirical evidence, the study underscores the importance ofplanning regulations in achieving a balance between growth, affordability, and environmental sustainability.

BACKGROUND

Theoretical foundations of land pricing can be traced to Ricardo's Rent Theory (1817), which highlights land value differentiation based on fertility and location, and Alonso's Bid-Rent Theory (1964), which links accessibility to higher land values. Internationally, evidence shows that liberal FSI regimes (e.g., Tokyo, Hong Kong) foster denser and more vibrant cities, while restrictive regimes (e.g., Mumbai) create artificial scarcity. Indian cities such as Delhi, through Transit-Oriented Development (TOD) corridors, demonstrated price surges when FAR norms were relaxed. In Bhopal, limited research exists, though preliminary findings suggest zoning exerts significant influence on price differentials across corridors.

1.1. Need for the Study

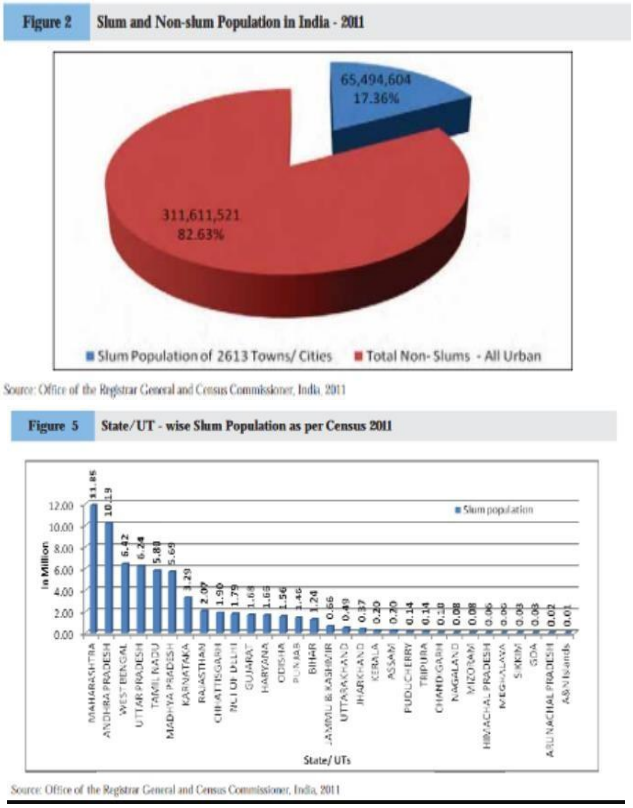


Figure 1 Slum Population *Source: Census of India*

As the global economy develops and social civilization progresses, urbanization has become the critical way forward for social development (Franklin 2013; Accetturo et al. 2014; Yuan et al. 2018). The rapidly developing country of india has shocked the world with the scale and speed of its urbanization over the last 40 years. Nearly 17% of people houses count in a slum area as shown in figure .Also Major slums include Dharavi (Mumbai), Bhalswa(Delhi), Nochikuppam (Chennai) developed due to increasing population.It is very necessary to study the land price of urban housing, because this issue is related to the increase in people's happiness in life. Land price change is considered the dominant factor affecting the direction and intensity of urban expansion. Therefore, studying the relationship between zoning regulations and floor area ratio and land price is helpful to guide the orderly and reasonable urban expansion. The purpose of this study is to clarify the detailed process of urban expansion and land price, so as to help policymakers to formulate corresponding policies in different links, and to combine the research conclusions with the process of making policy recommendations, in order to provide beneficial help for urban planners and decision-makers in urban planning and land price regulation policies.

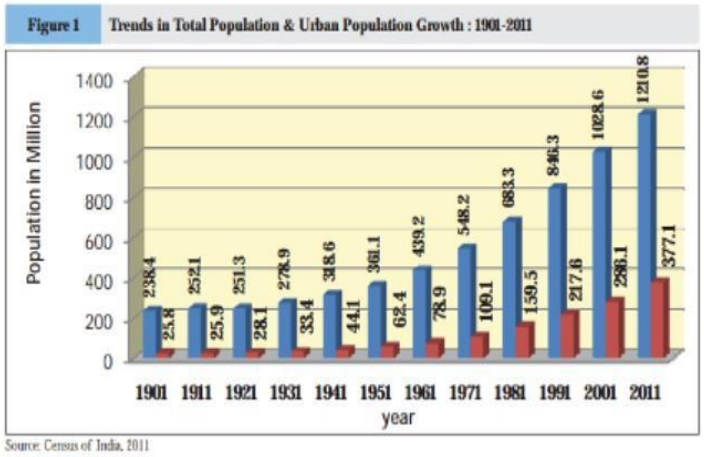


Figure 2 Urban Population Growth *Source: Census of India*

Inadequate enforcement of zoning provisions and rising speculative practices have further aggravated inequalities in access to land. While other Indian cities have employed tools such as land value capture, TDR (Transferable Development Rights), or premium FSI to regulate market.

academic gap but also to inform policymakers, urban planners, and municipal authorities. By applying a Hedonic Pricing Model to empirical land price data and linking it with zoning and FSI variables.

Bibliometric analysis

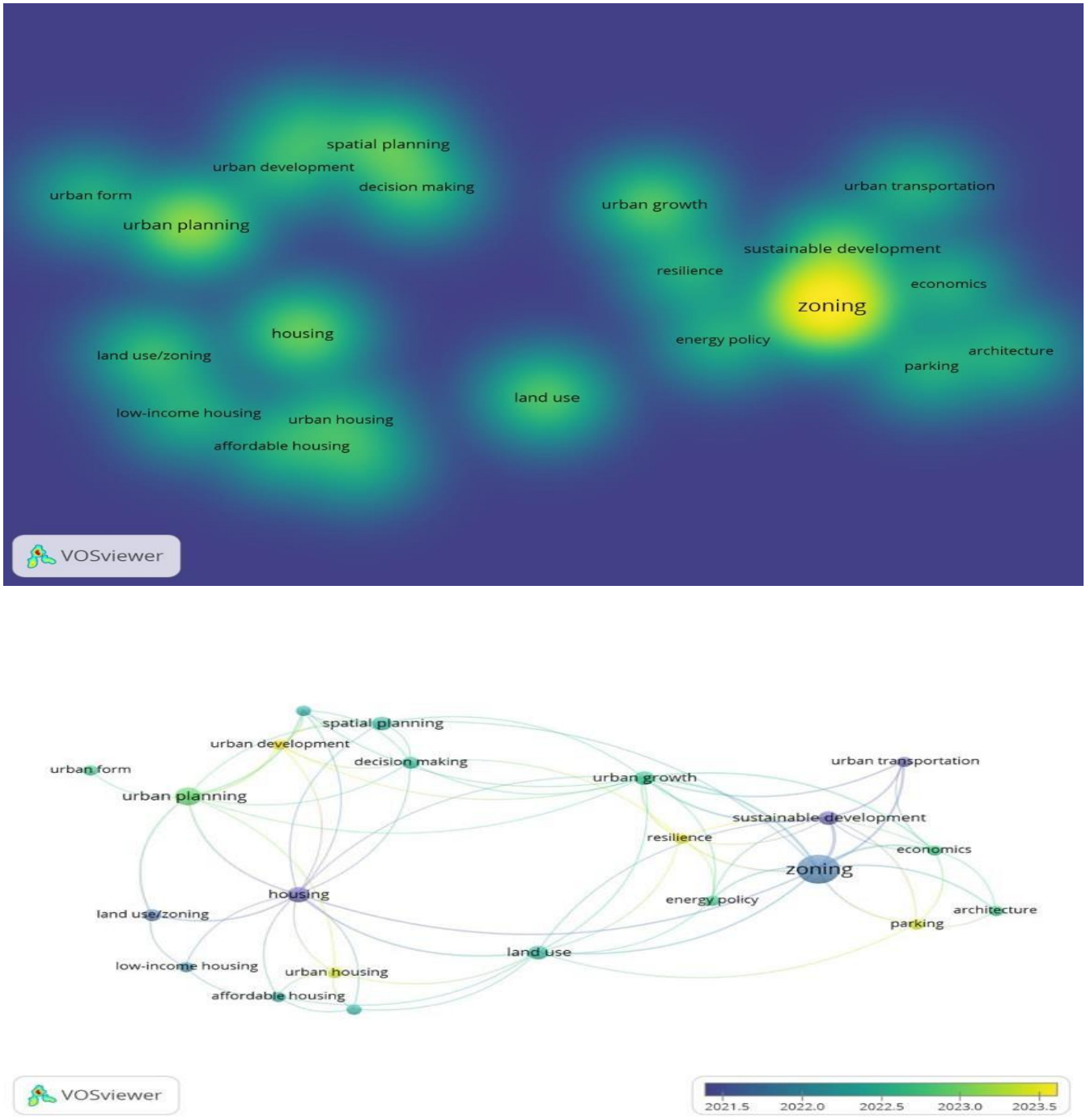


Figure 3 Bibliometric Analysis *Source: By Author*

Keywords :Land market,urban economy,urban growth,land use planning, ,economic development,urban policy,urban development ,floor space index,floor area Ratio,

1.2 Aim:

To evaluate the impact of Zoning Regulations and Floor Space Index (FSI) on Urban Land Pricing patterns and to establish planning regulations in achieving a balance between growth and affordability.

1.3 Objective

1.3.1 Phase 1

i) To understand the concept of zoning regulations and FSI mechanisms in urban planning
ii) Understand the concepts, theories & models related to land use and land values
iii) Identification of various tools & parameters based on the above objectives, which affect land use & land values
iv) Identification and study of national and international cases in the context of FSI and zoning impacts on land pricing.

v) To finalize the analytical tools used to analyze the parameters obtained from above objectives and finalizing the pilot study.

1.3.2 Phase 2

i) To map zoning and FSI distribution under Bhopal Draft Development Plan-2031
ii) Analyze the relationship between FSI variations and land values across different zones using appropriate tool.
iii) Compare restrictive vs liberal FSI areas and their impact on land pricing using different cases.
iv) To formulate planning and development framework for equitable land pricing by implementing suitable zoning regulations and FSI distribution.

1.4 Scope & Limitations

1.4.1 Scope

• The study area focuses on key corridors in Bhopal including MP Nagar, Hoshangabad Road, Kolar Road, Ayodhya Bypass, and Bhojtal region
• The study will analyze both commercial and residential land pricing patterns under different zoning and FSI regimes

1.4.2 Limitations

• Restricted access to transaction-level data from registry offices
• Reliance on secondary datasets from online platforms and Jantri rates

• Evolving policy changes during the study period may affect consistency
• Limited availability of historical FSI data for trend analysis

1.5 Assumptions & Expected Outcomes

1.5.1 Assumptions

• Registry prices reflect market realities with reasonable accuracy
• Zoning and FSI regulations are consistently enforced across study areas
• Infrastructure availability is uniform within each zone category

1.5.2 Expected Outcome

• Empirical evidence linking zoning and FSI variations with land price differentials
• Zone-wise land price gradient maps
• Policy recommendations for equitable and sustainable land governance
• Quantification of speculative impacts of FSI relaxations

1.6 LITERATURE REVIEW

Understanding zoning regulations, Floor Space Index (FSI), and their impact on urban land use and land values is fundamental to urban planning. Globally, variations in regulatory frameworks—ranging from liberal FSI regimes in East Asia to restrictive zoning systems in Indian cities—have been shown to significantly influence land prices, development intensity, and urban form. The literature below synthesizes theoretical, conceptual, and empirical contributions across three domains aligned to Phase-1 objectives.

1.6.1 Zoning Regulations and FSI Mechanisms in Urban Planning

Concept of Zoning Regulations

Zoning is a land-use regulatory tool used by planning authorities to control the spatial distribution of functions—such as residential, commercial, industrial, and environmentally sensitive zones. (Tiesdell & Adams ,2011)

Urban Design in the Real Estate,zoning functions as a **regulatory instrument** shaping the "opportunity space" for development by prescribing land-use permissions, development controls, and compliance mechanisms.

Key purposes of zoning include:

- Orderly development
- Separation of incompatible uses (e.g., industries vs. housing)
- Infrastructure optimization
- Environmental protection
- Regulating development density

Types of zoning approaches globally:

- **Euclidean Zoning:** Fixed land-use separation.
- **Performance Zoning:** Based on outcomes/impacts.
- **Form-Based Codes:** Regulate built form instead of use.
- **Overlay Zoning:** Additional controls (e.g., TOD, heritage, coastal).

1.6.2 Floor Space Index (FSI) / FAR Mechanisms

FSI determines the **permissible built-up area** on a plot and acts as a principal tool for regulating urban density.

FSI influences:

- vertical growth vs horizontal sprawl
- housing stock & affordability
- land efficiency & compactness
- price premiums in high-FSI zones
- speculative activity when linked to market demand

International Comparisons:

- **Tokyo & Hong Kong:** Liberal FSI → high-density compact development; efficient public transit; lower land-price pressure due to supply elasticity.

- **Mumbai:** Historically restrictive FSI → artificial scarcity → exorbitant land prices, overcrowding.
- **Delhi:** TOD overlays increased FAR → land-value appreciation along metro corridors.

The literature consistently highlights that **FSI acts as one of the strongest levers in shaping land values**, due to its capacity to increase development potential.

1.6.3 Concepts, Theories & Models Related to Land Use and Land Values

Classical Economic Theories

a. Ricardo's Rent Theory (1817)

Land value depends on:

- location-based advantages
- productivity or accessibility
- differential rent

Urban application: central areas with superior access command higher prices.

b. Von Thünen Model

Explains concentric land-use patterns driven by transportation cost and economic rent gradients.

c. Alonso's Bid-Rent Theory (1964)

Land users (residential, commercial, industrial) bid for locations based on accessibility to CBD.
Higher accessibility → higher land value → higher density.

Urban relevance:

- describes price gradients along major corridors
- explains high land prices near transit nodes
- supports compact, transit-oriented policies

1.6.4 Urban Spatial Structure Models

a. Burgess Concentric Zone Model

Land values reduce radially from the center.

b. Hoyt Sector Model

Values follow transport corridors → relevant for cities like Bhopal with corridor-based growth.

c. Multiple Nuclei Model (Harris & Ullman)

Different centers influence spatial land pricing (e.g., MP Nagar, Kolar Road, Ayodhya Bypass).

1.6.5 Contemporary Theories in Land Economics

Hedonic Pricing Model

Used widely (Wang et al., Yang et al. 2023) to statistically determine how individual attributes (zoning, FSI, accessibility) contribute to land price variations.

Key finding from Yang et al. 2023:

There is a **two-way causality** between urban expansion and rising land prices. Higher prices influence compact growth, and urban expansion also influences pricing via supply/demand changes.

yang-et-al-2023-interaction-bet…

Urban Expansion Dynamics

According to Xian et al. (2019), urban expansion occurs via:

- **infilling**
- **edge expansion**
- **outlying expansion**

Higher infrastructure accessibility leads to rising land values; cross-boundary factors may intensify price pressures.

1.6.6 Tools & Parameters Affecting Land Use and Land Values

Planning & Regulatory Tools

Based on Tiesdell & Adams (2011), and standard urban planning frameworks, key tools include:

a. Zoning Regulations

- Use permissions
- Setbacks & coverage
- Height restrictions
- Land-use intensity

b. Floor Space Index (FSI/FAR)

Direct determinant of built-up potential; influences:

- developer profitability
- land bidding price
- market demand-supply dynamics

c. Overlays

- Transit-Oriented Development (TOD)
- Special Economic Zones
- Environmental sensitivity buffers (e.g., lakes, hills)

d. Development Control Regulations (DCR)

Shape built form; regulate parking, fire norms, mixed-use policies.

1.6.7 Market & Socioeconomic Parameters

From Yang et al. 2023 & other studies:

- **Population density** → increasing demand → higher land prices
- **Accessibility to transport corridors** → significant price premium
- **Proximity to public amenities (schools, hospitals)**
- **Infrastructure investment (ISFA)** increases land desirability
- **Speculative activities** influence land markets (seen in Mumbai & Chinese cities)

1.6.8 Spatial & Environmental Parameters

- Proximity to natural assets (lakefronts, hills) → price appreciation (evidence from China studies)
- Restrictions in eco-zones → controlled development → high-value preservation (similar to Bhopal's Upper Lake & Van Vihar)

1.7 Empirical Evidence From International & National Studies

1.7.1 Urban Expansion & Land-Price Interaction (China Studies)

Yang et al. (2023) found:

- **Strong bidirectional causality** between land prices and urban expansion
- Urban expansion increases residential land supply, sometimes restraining prices temporarily
- Rising land prices stimulate compact, vertical development

1.7.2 Sustainable Urban Expansion (Zhuhai Study)

Xian et al. (2019) demonstrated:

- Accessibility → primary driver of price changes
- Environmental considerations influence land use patterns
- Mixed expansion patterns indicate regulatory pressure + market demand

Toward a sustainable urban expa…

These findings support the assertion that **zoning and FSI should be aligned with both environmental and economic objectives** to avoid speculative or unbalanced expansion.

1.7.3 Lessons for Indian Cities

- **Delhi (TOD Policy):** Increased FAR along metro → land price surge → densification
- **Mumbai (FSI liberalization):** Market-linked FSI caused price escalations in prime zones
- **Pune:** Balanced zoning + infrastructure corridors resulted in moderated land price gradient
- **Bhopal:** Dual nature – restrictive eco-sensitive zones + liberal commercial corridors (MP Nagar, Hoshangabad Road)

These cases show that **FSI relaxations must be paired with strong public infrastructure to avoid unhealthy speculation**.

1.7.4 Critical Synthesis

Across studies, several cross-cutting insights emerge:

1. **Zoning + FSI are the strongest determinants of land values** due to their ability to influence supply elasticity.
2. **Land prices rise sharply in zones with enhanced accessibility** (corridors, transit, CBD proximity).
3. **Urban expansion is both a cause and effect of land price variation** (Yang et al.).
4. **Environmental constraints create scarcity**, increasing land price premiums (Bhopal's lake & hill zones).
5. **Regulatory clarity and enforcement** significantly alter developer behaviour and market dynamics.
6. **Hedonic models & spatial econometrics** are the most common tools to quantify such relationships.

1.8 Research Gap Identification

While global literature is extensive, **Indian mid-tier cities like Bhopal lack comprehensive studies** examining:

- interactions between zoning, FSI, and land price gradients
- corridor-level zoning impacts
- comparative FSI efficacy
- hedonic modelling of land prices in relation to planning regulations

1.8.1 Conclusion of Literature Review

The literature suggests that zoning and FSI are central to shaping urban land markets. Land values are influenced not only by regulatory mechanisms but also by socioeconomic, environmental, and infrastructural factors. Global and national lessons underscore the importance of aligning regulatory frameworks with market realities and urban sustainability goals.

1.9 Data collection framework

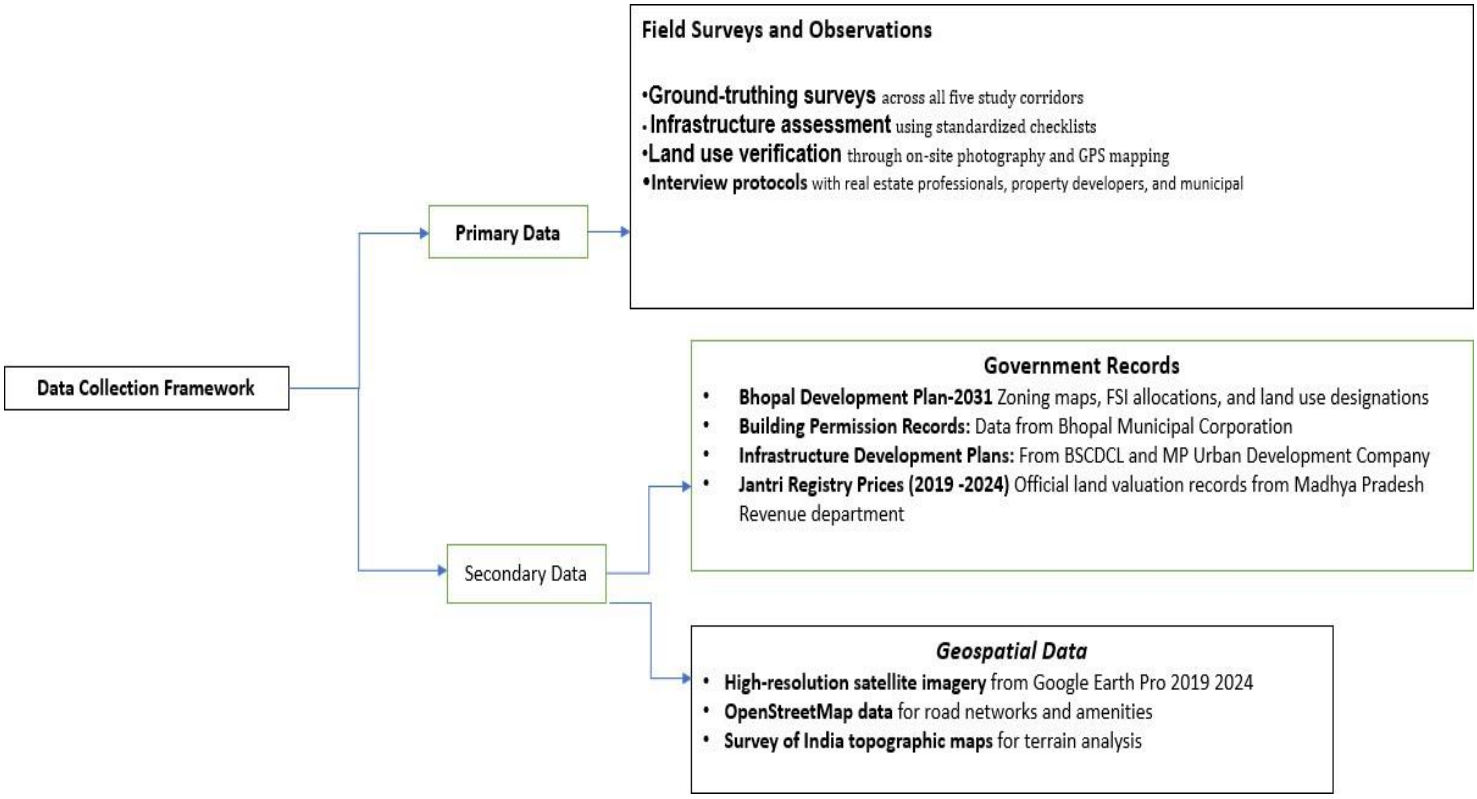


Figure 4 Data Collection Framework *Source :By Author*

1.10 Methodology

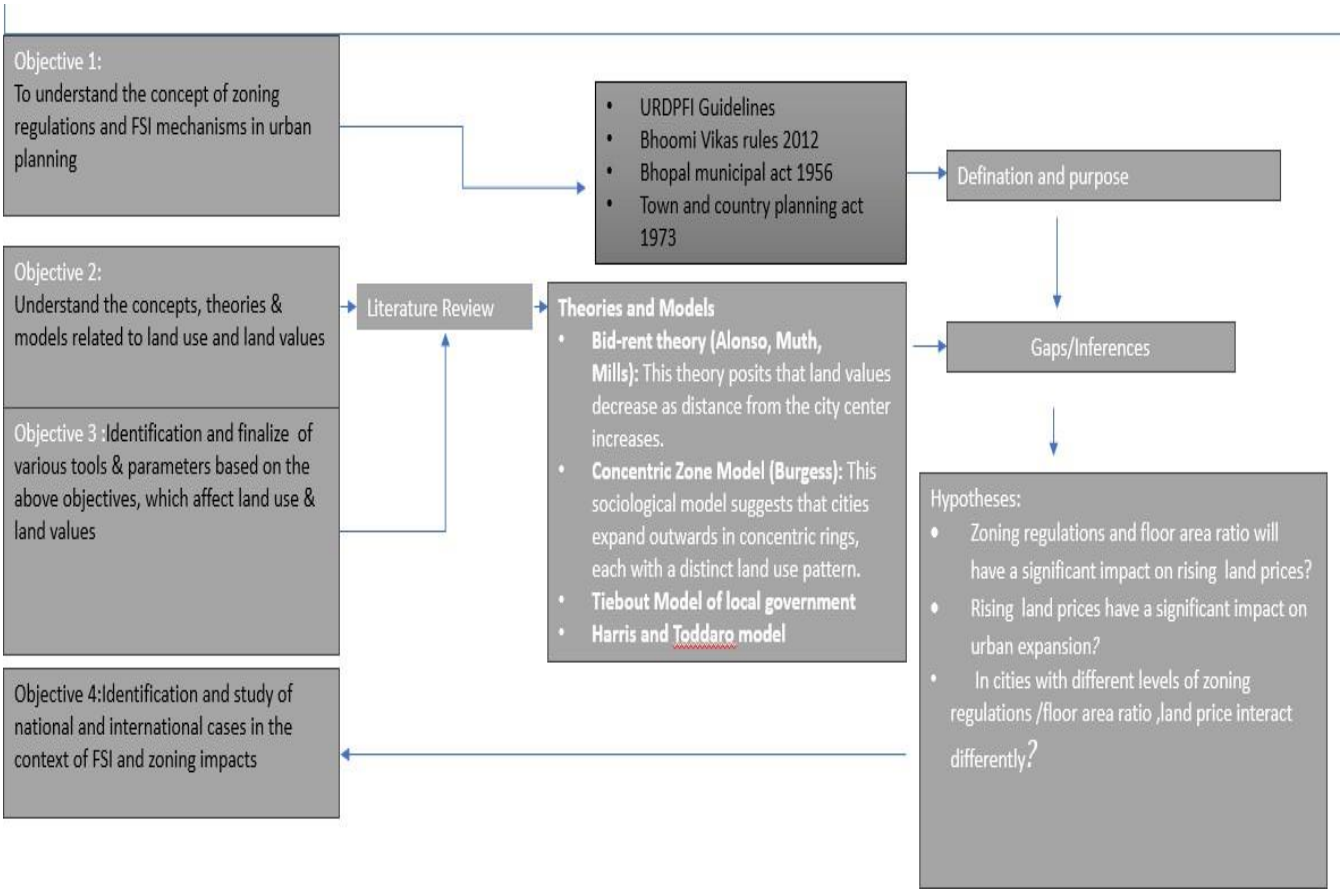


Figure 5 Methodology Source :By Author

Analytical tools & methods

1. Quantitative Phase – Estimation of the economic and spatial impact of zoning and FSI variations on land prices using advanced econometric and spatial models.

2. Qualitative Phase – Validation and interpretation of quantitative results through expert feedback using the Delphi method and hedonic pricing method.

This dual approach ensures both empirical accuracy and policy relevance, bridging statistical findings with planning practice insights.

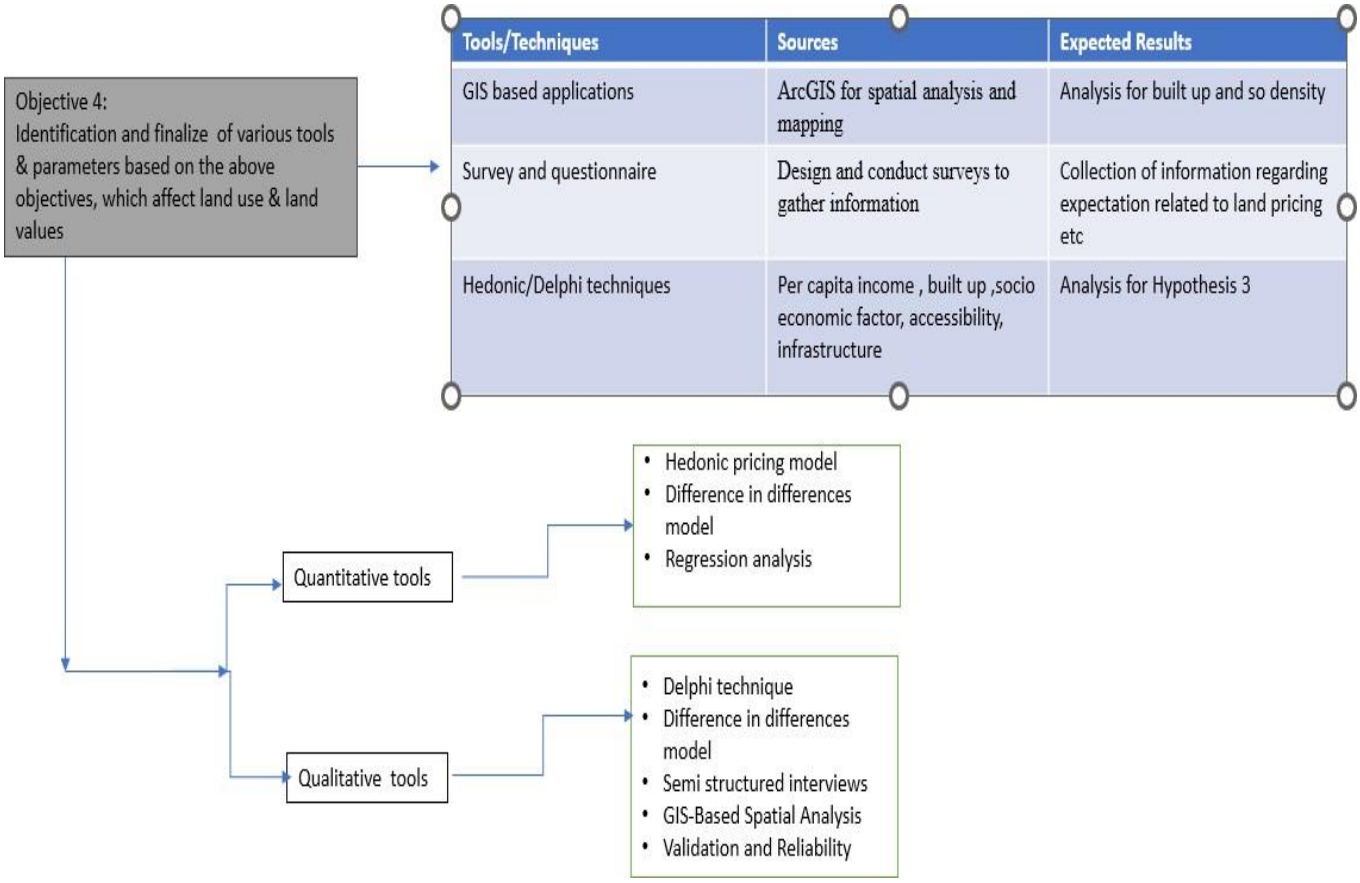


Figure 6 Tools and Technique *Source: (By Author)*

1.11 Take aways and Conclusion from Phase 1 to Phase 2

The detail case studies and methodology discussed provides us a reference for our study area . Below listed are some of the tools and techniques which were used in other cities to analyse the impact zoning regulation and floor area ratio on land values.

1. Zoning and FSI are primary determinants of urban land values

The Phase 1 analysis establishes that zoning regulations and FSI mechanisms significantly influence:

- development intensity
- built-up form
- speculative potential
- supply elasticity in the land market
- Higher FSI generally increases development potential, elevates land prices in well- serviced areas, and contributes to vertical growth, while restrictive zoning can create artificial scarcity leading to higher price gradients.

2. Classical and contemporary theories show strong spatial–economic relationships

The theories of Ricardo, Von Thünen, Alonso, and bid-rent dynamics confirm:

- land values are highest in accessible, centrally located areas
- transport corridors act as value escalators
- zoning overlays (TOD, commercial zones) intensify land prices
- environmental constraints generate premium zones through scarcity
- These models align with observed patterns in Bhopal's MP Nagar, Hoshangabad Road, and eco-sensitive Upper Lake zones**.**

3. Empirical studies confirm bidirectional causality between land prices and urban expansion

Insights from Yang et al. (2023) show:

- land prices influence urban expansion patterns

- expansion (new supply) temporarily moderates price escalation
- both land prices and urban expansion display strong inertia
- This supports the need for dynamic models such as the Hedonic Pricing Model in Phase 2.

4. Spatial parameters strongly influence land price differentials

- The reviewed studies highlight the importance of:
- accessibility to main roads, transit, and commercial corridors
- proximity to amenities and employment centers
- environmental buffers and regulatory restrictions
- infrastructure-led urban expansion
- These parameters will be incorporated into the FSI–Land Price correlation analysis in Phase 2.

5. Regulatory frameworks shape development outcomes

- Phase 1 analysis of zoning policies in Delhi, Mumbai, Pune, and Bhopal reveals:
- liberal FSI policies correlate with intensified redevelopment and rising prices
- restrictive eco-zoning preserves land but increases value due to scarcity
- inconsistent enforcement leads to speculative distortions
- This reinforces the importance of analyzing zoning maps and FSI distribution in Phase-2.

6. Identified tools for quantitative analysis

Phase 1 concludes that the following analytical tools are appropriate for Phase 2:

- Hedonic Pricing Model
- Delphi technique
- GIS-based mapping of zoning and FSI layers
- Correlation matrices for land values vs. FSI
- Comparative analysis of restrictive vs liberal zones
- Case-based evaluation of price escalation patterns

Chapter 2: Identification of Study Area

2.1 Comparative Policy Analysis — Delhi, Mumbai, Pune, and Bhojtal (Bhopal)

2.1.1 Delhi Master Plan 2041

- Delhi's MPD 2041 promotes **integrated land-use–transport planning**, **TOD-based densification**, and **conditional FSI release** tied to infrastructure readiness. The plan emphasizes public realm enhancement, green-blue network conservation, and compact city growth.

2.1.2 Mumbai DCPR 2034

- Mumbai's DCPR 2034 focuses on **redevelopment and regeneration**, leveraging **premium FSI and TDR mechanisms**. It introduces **road-width-linked FSI**, affordable housing incentives, and a transparent premium pricing structure. This market-oriented model facilitates high-density growth in select zones while balancing social obligations.

2.1.3 Pune Development Plan

- Pune's plan demonstrates the **integration of transit-oriented incentives and ecological protection**. FSI bonuses are tied to transit corridors, while ecological zones receive strict protection reinforced by TDR transfers. Pune effectively manages both densification and environmental conservation through its metropolitan institutional framework.

2.1.4 Bhopal Draft Development Plan 2031

- Bhopal's BDP–2031 defines zoning categories and FSI caps but lacks flexible mechanisms for transferring development potential or regulating growth through performance-linked FSI. The Bhojtal (Upper Lake) region is a critical ecological zone, requiring a delicate balance between conservation and urban pressure.

Corridor-Level Policy Comparison and Lessons

Table 1

• **Corridor**	• **Delhi Lesson**	• **Mumbai Lesson**	• **Pune Lesson**	• **Application for Bhopal**

• MP Nagar	• Conditional FSI linked to public realm upgrades.	• Road-width-linked FSI with infrastructure contributions.	• Encourage mixed-use commercial cores.	• Managed premium-FSI scheme tied to pedestrianisation and parking reforms.

• Hoshangabad Road	• TOD-based corridor development.	• Conditional FSI along arterials with redevelopment incentives.	• Transit FSI near rapid corridors.	• FSI bonus contingent on verified corridor infrastructure delivery.
• Kolar Road	• Flexible mixed-use zoning.	• Brownfield redevelopment with TDR incentives.	• Moderate density redevelopment with public benefits.	• Pilot redevelopment programs with public-benefit obligations.
• Ayodhya Bypass	• Phased urban expansion linked to infrastructure.	• FSI tied to road width and readiness.	• Controlled FSI growth near emerging transport nodes.	• Phased FSI release tied to service indicators to prevent speculation.
• Bhopal Region	• Strong ecological buffers.	• TDR for environmentally sensitive zones.	• TDR + Fund model for eco-protection.	• Implement Lake Protection Fund + TDR transfer mechanism.

•

2.2 Bhopal City Context

Bhopal, the capital of Madhya Pradesh, represents a unique urban laboratory for studying the relationship between zoning regulations, FSI policies, and land pricing. The city's distinctive geography, characterized by natural water bodies (Upper Lake, Lower Lake) and hills (Shyamla Hills, Arera Hills), creates distinct planning zones with varying development potential and regulatory constraints.

2.3 Study Area Selection Criteria

The selection of study areas was based on:

- Variation in permissible FSI across zones
- Mix of commercial and residential land uses

- Availability of land transaction data
- Representation of different planning contexts (CBD, suburban, ecological zones)

2.4 Zoning Framework Analysis

- The Bhopal Development Plan comparison table are as follow :
- ***Bhopal Master Plans Comparison (1995–2005–2031)***

*Table 2 **Bhopal Development Plan Comparison***

Aspect	Master Plan 1995	Master Plan 2005	Master Plan 2031	Key Changes / Implications
Planning Focus	Low-density expansion; focus on residential zoning	Shift toward mixed-use corridors and institutional zoning	Compact growth, TOD focus, environmental conservation	Transition from mono-functional zoning to integrated development
Permissible FSI	1.0–1.5 across zones	1.5–2.0; selective increases along arterials	0.5 (eco) to 3.0 (commercial); differentiated by corridor	Liberalization of FSI with ecological zoning limits
Zoning Policy	Static zoning; limited mixed-use	Introduced commercial corridors and institutional zones	Introduced flexible mixed-use and TOD zones	Stronger alignment with economic geography
Infrastructure Provisioning	Basic transport, low coordination	Start of corridor-based development	Integration with Bhopal Smart City and mobility plan	Increased linkage between infrastructure and zoning intensity
Ecological Protection	Weak legal enforcement	Introduced buffer around Bhojtal	Strict protection and eco-zoning	Strengthened regulatory control;

(Bhojtal, Van Vihar)			near Bhojtal and Kaliyasot	foundation for TDR
Policy Instruments (FSI / TDR)	None	Limited application in select areas	Introduced FSI incentives and transferable potential	Progressive inclusion of market-oriented instruments
Urban Growth Direction	North-South sprawl	South-East expansion (Kolar, Hoshangabad)	Multi-corridor expansion (MP Nagar, Ayodhya Bypass)	Diversification of urban growth patter

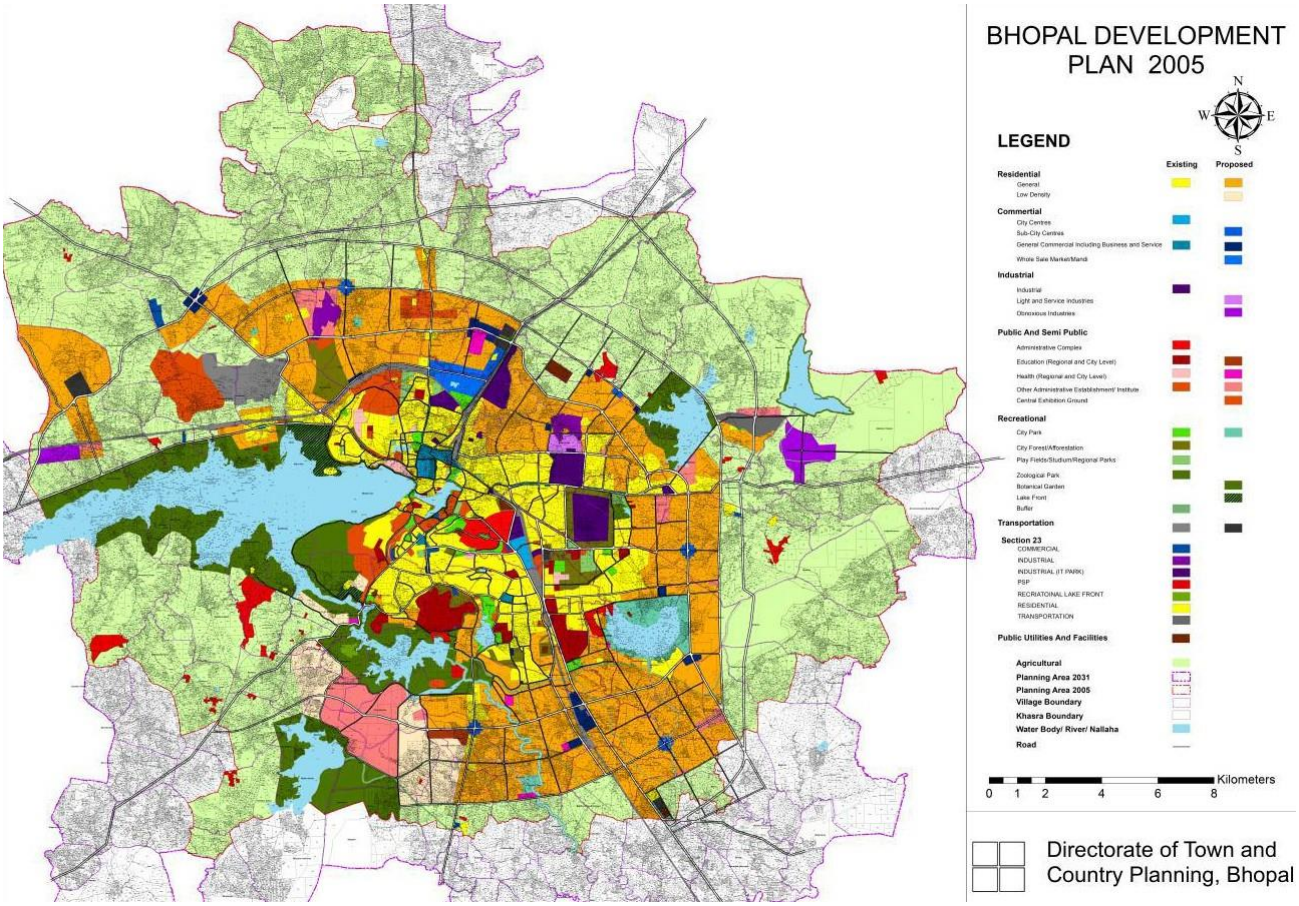


Figure 2.1 Bhopal Development Plan 2005 **Source– BDP 2005**

2.5 Analysis of Urban Sprawl with the help of Land use Land Cover Mapping in GIS

The Land Use Land Cover (LULC) mapping of Bhopal over three decades—2003, 2013, and 2023 using ArcGIS was conducted to analyze urban sprawl and its impact on the city's landscape. The study revealed significant changes in land use patterns, with a marked increase in urban and built-up areas, indicating rapid urban expansion (Figure 1.8 shows Land use Map of Bhopal Development Plan 2005). Agricultural land, open spaces, and forested areas have been progressively converted into residential, commercial, and industrial zones. The analysis showed a radial pattern of urban growth, particularly along major roads and city peripheries (Maps Figure and Graph Figure 1.1 to 1.7). The shift from green spaces to urban infrastructure highlights the growing pressure on natural resources and the need for more sustainable urban planning practices. This comprehensive LULC analysis provides a clearer understanding of the extent of urban sprawl in Bhopal and underscores the importance of managing future growth to preserve ecological balance and ensure sustainable development.

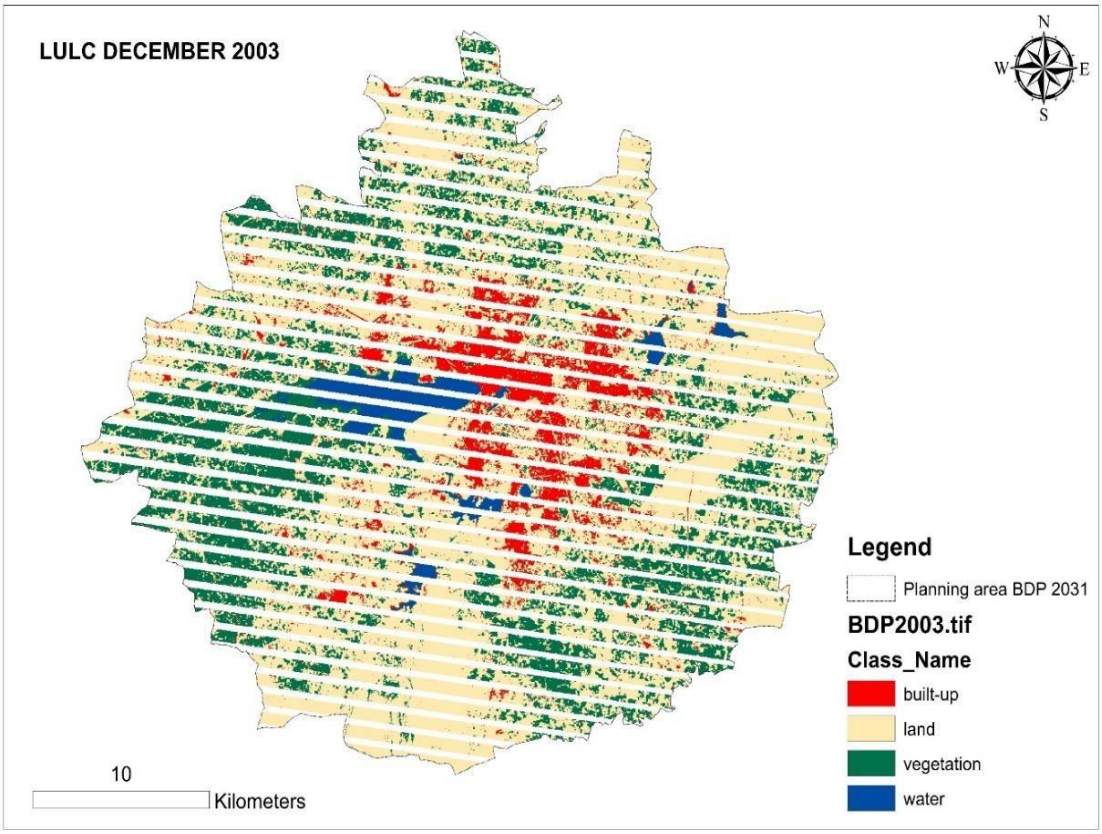


Figure 7 LULC 2003 *Source: By Author*

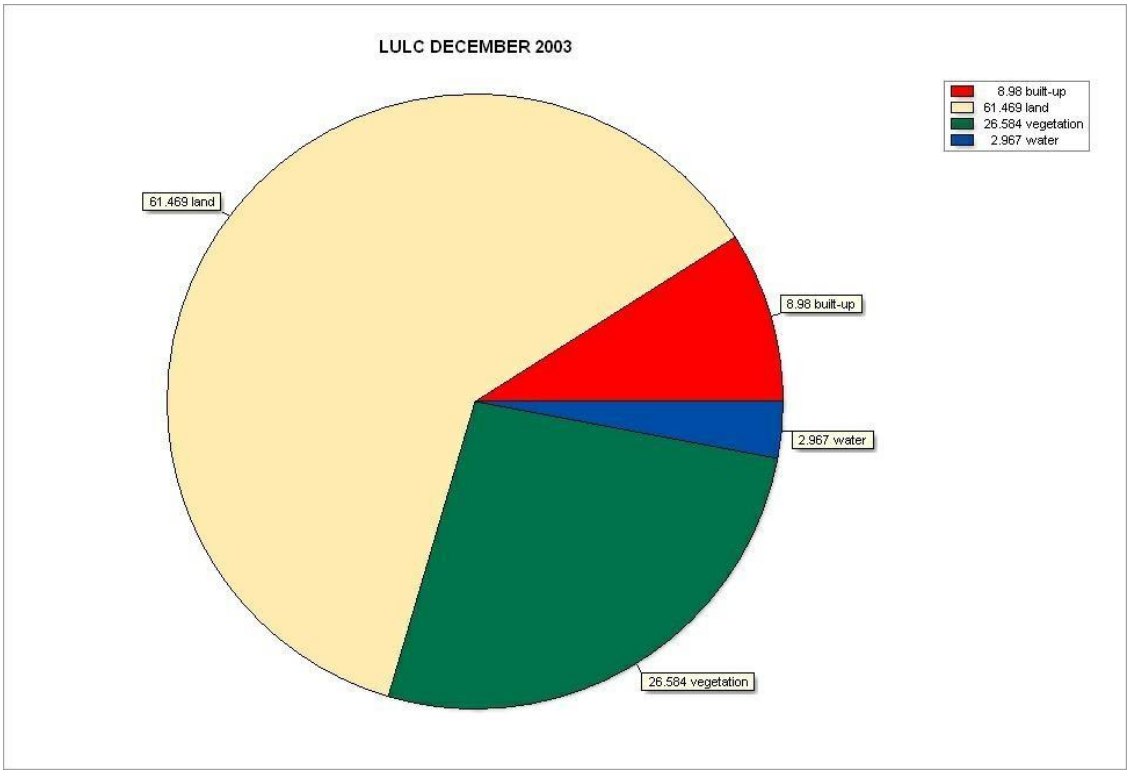


Figure 8 Graph LULC 2003 *Source :Author*

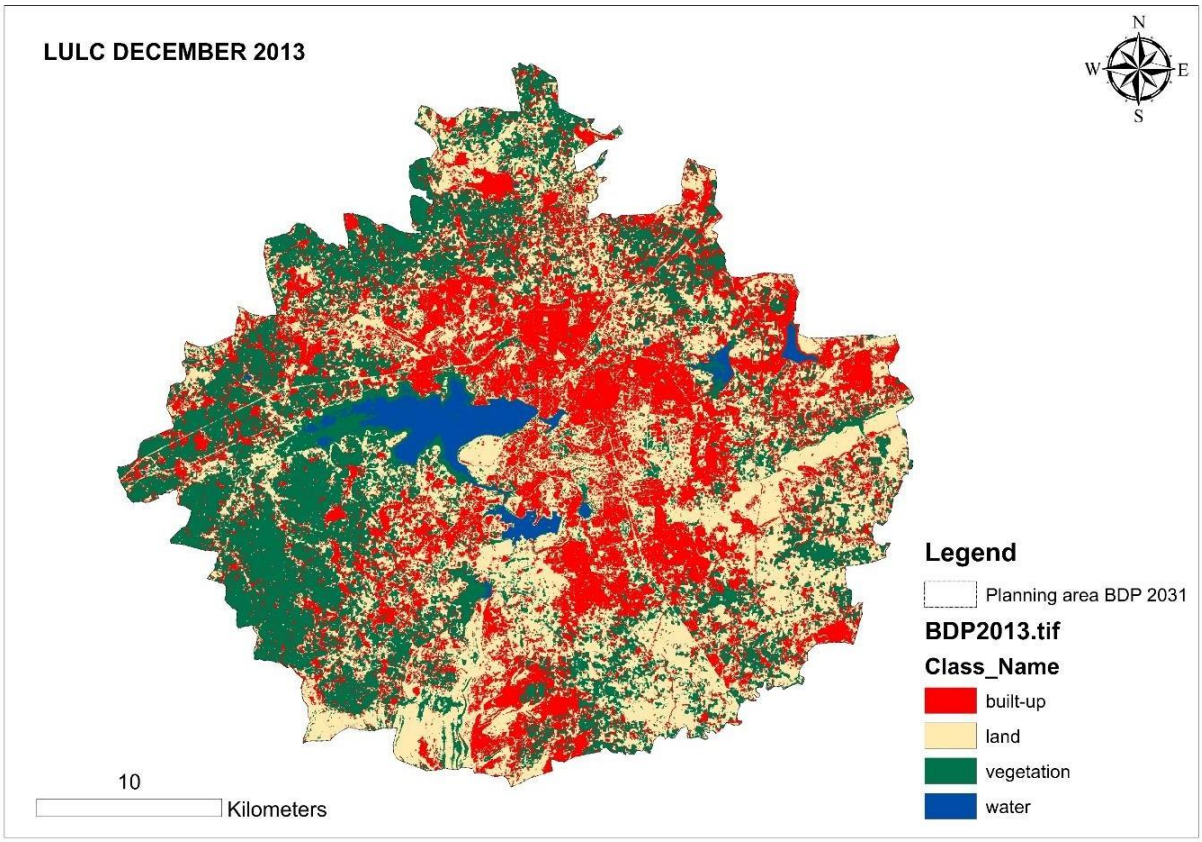


Figure 9 LULC 2013 *Source -Author*

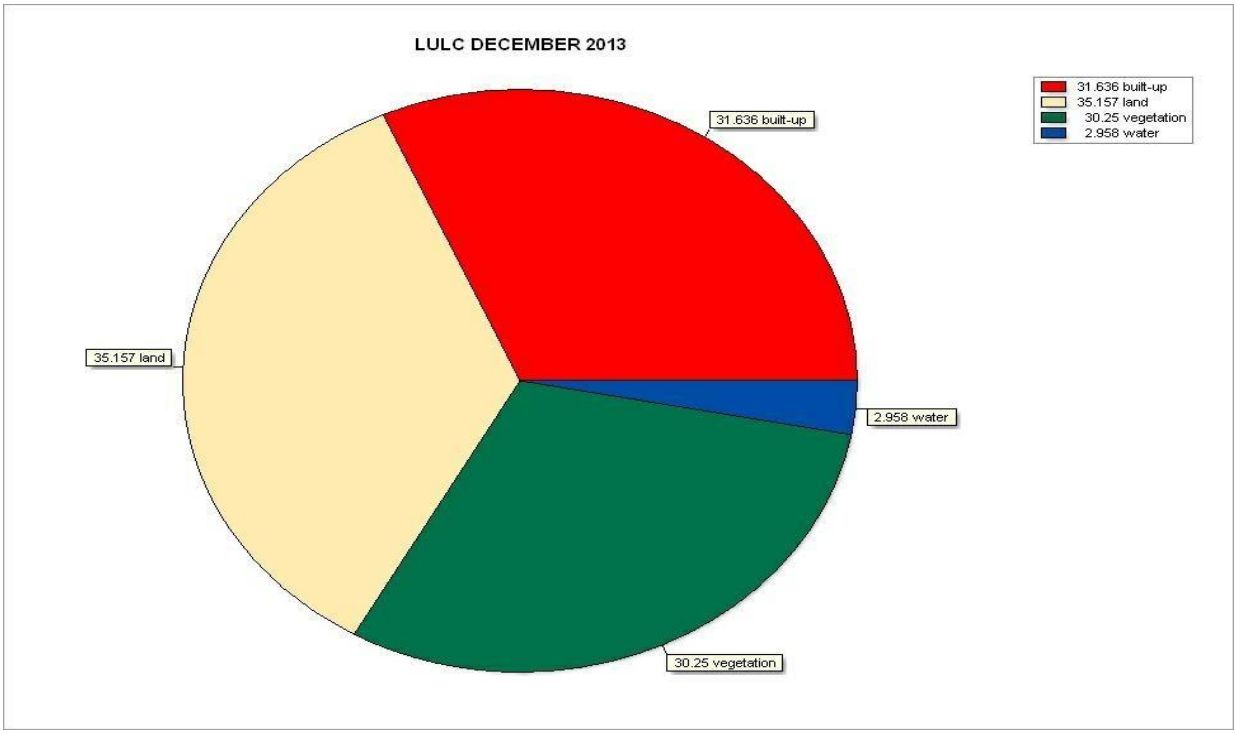


Figure 10 Graph LULC 2013 *Source :Author*

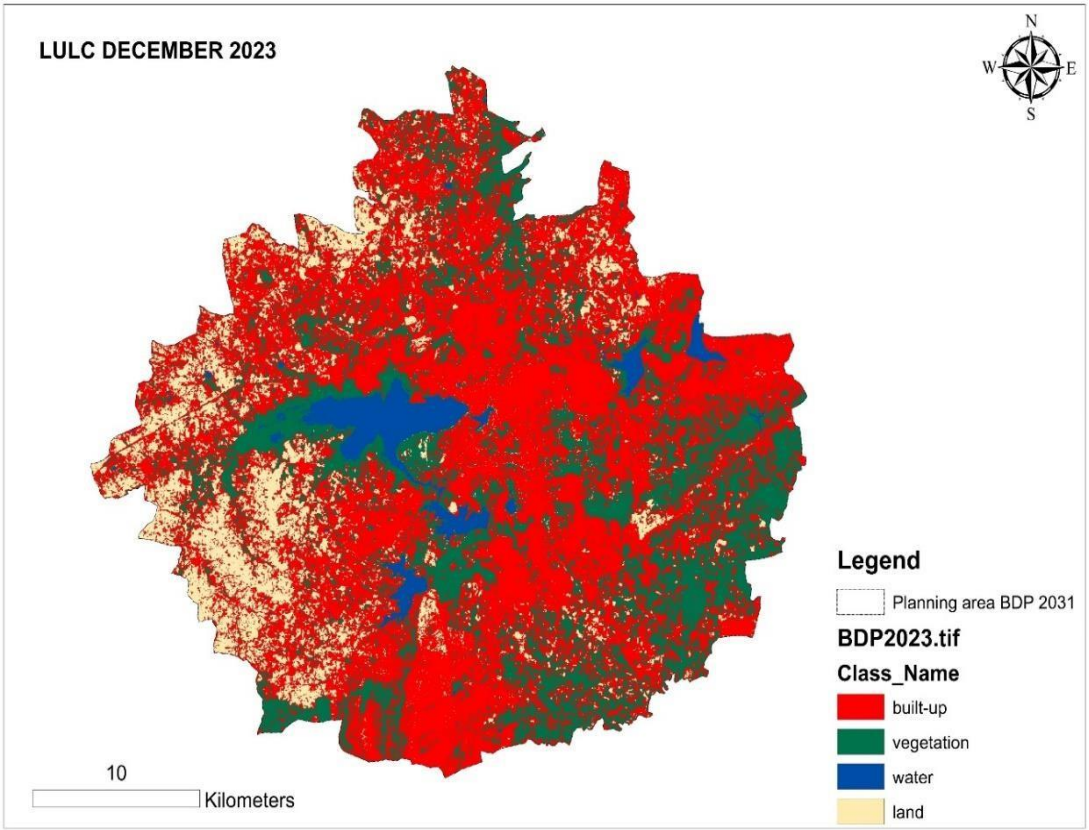


Figure 11 LULC 2023 *Source-Author*

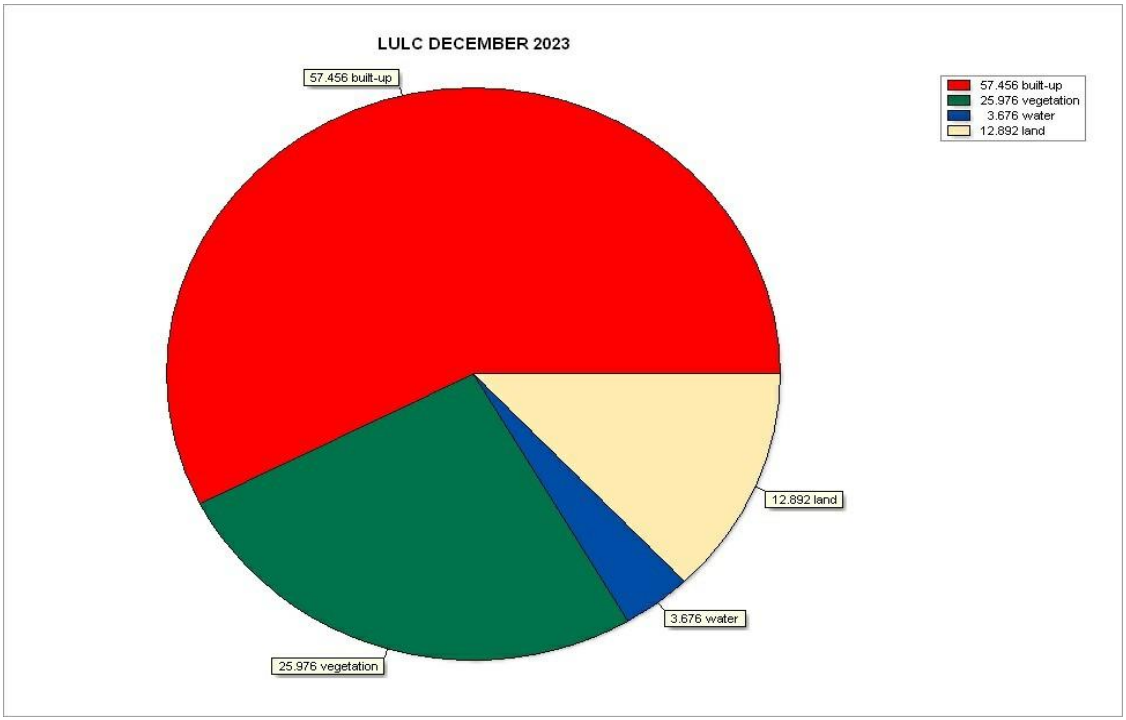


Figure 12 Graph LULC 2023 *Source :Author*

2.6 Comparative analysis between Bhopal Development Plans of 1991, 2005 and Draft of 2031.

2.6.1 BDP 1991

The purpose of Development Plan, limitations within which plan is being evolved, population projections, plan period, estimates of various needs of the city particularly during the plan period (Pradesh D. o., 1991). The main aims and objectives which are attempted to be achieved in preparation of Development Plan for Bhopal are as follows:

- Integration of various units of 'Bhopal Capital Region'.
- Development of Inter-city transportation and communication network to discharge regional functions with efficiency.
- Give shape to the urban structure with the city functions being acquired by Bhopal in the

process of its growth.

- Functional disposition by urban use so as to achieve.
- Efficient and judicious utilization of land.
- Harmonious and coherent inter-relationship between various uses and activities.
- Functional distribution of work centers and living areas, minimize travel distances and increase efficient functioning of activities, and
- Compact city development.
- Hierarchical city structure in terms of self-contained planning unit, and ensure disposition of services and amenities on the basis of hierarchy of the planning entities.
- Gradual removal of existing disorder.
- Functionally efficient transportation network and circulation system, ensuring safe and at the same time speedy movement of urban and regional traffic.
- Open ended circulation pattern to provide for the growth of the city even after the plan period.
- Proper system to provide movement space for periodic procession related with capital city.
- Separate pedestrian ways, where such traffic is excessive and segregation is desirable.
- Formulation of traffic operation plan to maximize the efficiency of the transportation system.
- Effective and direct linkages between the work centers and living areas through effective mass transportation system.

Concept

Figure 2.8 entails Concept of Bhopal Development Plan 1991

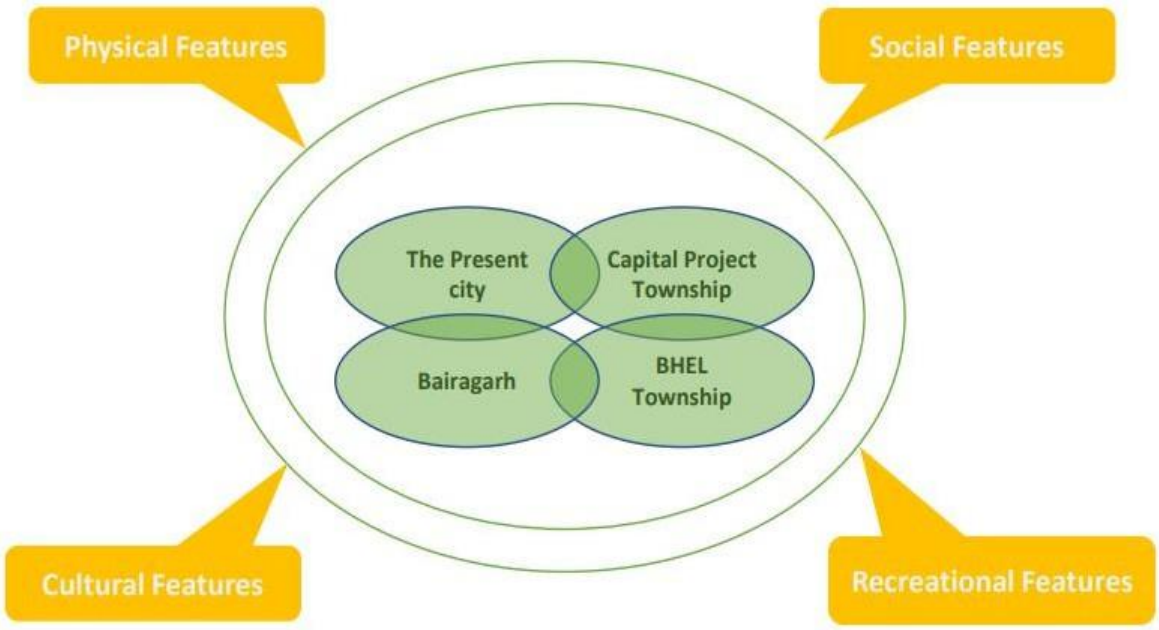


Figure 13 Concept of Bhopal Development Plan 1991 *Source :Author*

Basic Considerations

Detailed studies in respect of land use pattern, traffic and transportation, physiography, housing and services and work centers have brought on many significant problems being experienced by the city. These studies have also brought out opportunities available for proper development of Bhopal in future. A simultaneous study of both, problems as well as opportunities has thrown up following basic points which will form guiding factors for preparation of the Development Plan for Bhopal.

(a) Development of a new city level shopping centers to relieve congestion in the present city center and provide for growth of commercial activities.

(b) Development of a civic center and specific areas for social and cultural activities to provide for cultural and emotional integration of various townships.

(c) Development of 'administrative center' to accommodate various public and semi-public offices of State, regional and local level.

(d) Efficient use of Government land and properties by putting them to most proper use.

(e) Encouragement for establishment of small industrial units by provision of flatted factories at suitable places.

(f) Development of land for industries in such a way that future growth even beyond the plan period is possible without creating conflict in land use pattern.

(g) Provision of proper circulation pattern which will enable the through traffic to by-pass city.

(h) Provide as far as possible, direct links in between various townships.

(i) Prescribe street lines for narrow but important roads of the city and enforce the same even beyond the plan period for new constructions or renovations

(j) Rational distribution of residential densities so as to minimize disparities.

(k) Ensure proper urban environment by-

(i) Location of obnoxious industries at proper place

(ii) Improvement and clearance of slum areas by providing an environmental improvement and by construction of cheap houses to suit the paying capacity of the poor slum dwellers.

(l) Development of urban scape of Bhopal in tune with the intrinsic quality of land form so as to enhance the natural scenic beauty of the city.

(m) Provision of integrated water supply and sewerage system for the whole city particularly for the colonies which are at present physically un-coordinated and are devoid of services.

2.6.2 BDP 2005

The Development Plan for Bhopal 2005 is evolved on the basis of the BDP-1991 and envisions a system of self-contained sub-cities, to accommodate the future growth of city's population, based on planned intervention in critical areas/sectors of urban development like the provision of effective mass transport system, provision of physical and social infrastructure and the provision of public utility systems to guide its development along desirable directions (Pradesh D. o., Bhopal Development Plan 2005, 2005). The Bhopal Development Plan 2005 thus comprises of a set of coordinated development policies,

concerned with all aspects of development and is derived from the following basic principles in addition to above: -

(a) City Structure Need to be Multifunctional

The city of Bhopal will continue to be developed as the Capital City of Madhya Pradesh. But it also needs to be designed as a National Level City in the context of the long-range perspective of its growth and strategic role in the national and global economy. It must therefore, develop as a multi-nucleated city in terms of its role as the center for Education, Health, Manufacturing, Regional Centre for distribution of goods and services, trade and commerce and service industries. The BDP-2005 conceives city of Bhopal as a network of self-contained sub-cities each containing sectors, sub-sectors and neighborhoods. Each sub-city will be self-sustainable in terms of social facilities, day to day recreation and other amenities. Water supply and urban waste/ sewage management will be determined by two cycles a city level cycle of 'Sustainable' development and subcity level system of re-cycling to reduce intra-sub-city networking. The system of sub cities will be interlinked by strong Rail road transport network supported by secondary road network. Wholesale and bulk traffic generating activities are proposed to be shifted to a peripheral transport network.

(b) The Development Plan to Control Strategic Issues

- Compactness
- Flexibility
- Compatibility

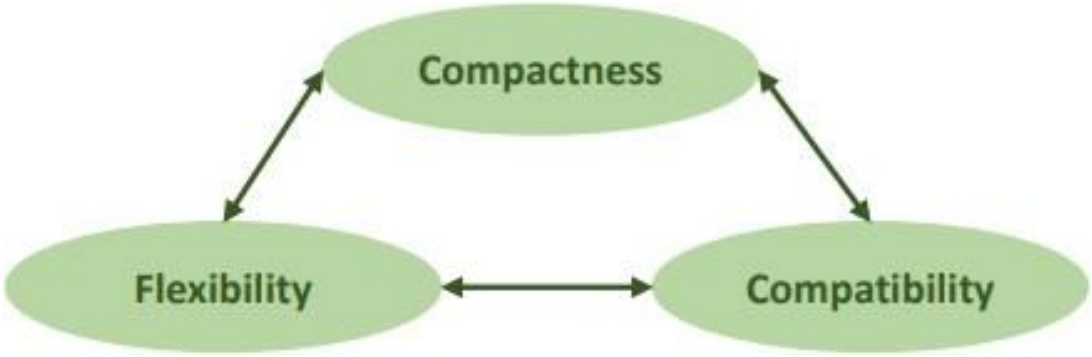


Figure 14 BDP 2005 Framework *Source: Author*

The city's urban form will have to be compact so as to minimize the distance and the cost of movement. The compactness is also called for to achieve closeness of living areas with access to various facilities and achieving efficient use of urban land. Flexibility is called for to absorb and assimilate forces of desirable change. Here the approach to mixed land use is called for, maintaining

high level of mutual compatibility (Figure 1.16 explains the framework of Bhopal Development plan 2005). The compatibility needs to be achieved in terms of maintaining spatial relationship among group of activities attaining reasonable level of performance standards, accessibility and parking standards, and adequacy of utilities and service infrastructure.

Concept

The Present city structure of Bhopal is identifiable in terms of self-contained sub- cities/townships. On the logic of its continuity of sub-city structure theme, it is considered appropriate to perpetuate the present sub-city structure in the shape of self-sufficient sub-cities, to regulate the future city growth. The proposed sub-city's configuration derives it inter sub- city accessibility through regional Rail Road transport corridor. As against, existing five sub- cities, (Parent City, BHEL, BHEL SERVICE Township, Capital Township and Bairagarh) the development plan envisages additional two sub-cities to accommodate around 10 lakh additional population, on located around Misrod towards Mandi Deep, beyond university in the South and the other between Chhola. Road and Narsinghgarh (Airport) Road in the North- West. These two sub-cities are meant to cater the growth needs of the State Capital upto 2005 as well as that of the mother city.

City Infrastructure and Services Strategy

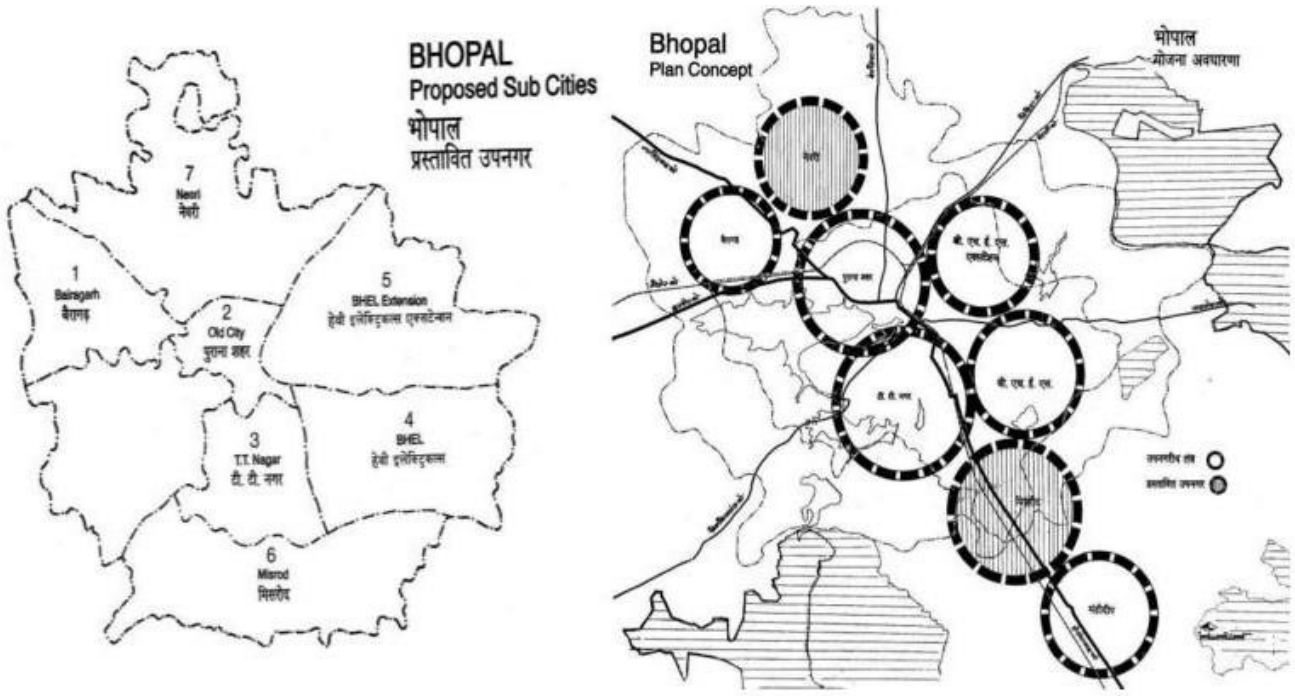


Figure 15 ***Proposed Sub-Cities of Bhopal*** ***Source-BDP 2005***

2.7 Selected Study Corridors

2.7.1 MP Nagar Commercial Corridor

- **Permissible FSI**: 3.0
- **Zone Type**: Commercial/Mixed Use
- **Characteristics**: High-density commercial development, established business district

2.7.2 Hoshangabad Road Corridor

- **Permissible FSI**: 2.5
- **Zone Type**: Commercial/Residential Mixed

Characteristics: Major arterial road with mixed development

2.7.3 Kolar Road Area

- **Permissible FSI**: 2.0
- **Zone Type**: Residential/Commercial
- **Characteristics**: Emerging commercial hub with residential neighborhoods

2.7.4 Ayodhya Bypass Zone

- **Permissible FSI**: 2.0
- **Zone Type**: Planned Development
- **Characteristics**: New town development with planned infrastructure

2.7.5 Bhojtal (Upper Lake) Region

- **Permissible FSI**: 0.5
- **Zone Type**: Ecological/Recreational
- **Characteristics**: Environmentally sensitive area with development restrictions

2.7.6 Findings and Discussion

- The comparative analysis highlights that Delhi's **conditional FSI** approach ensures balanced urban intensification, Mumbai's **premium FSI** and **TDR** mechanisms generate fiscal resources, and Pune's **transit-linked incentives** foster sustainable growth. Bhopal can synthesize these models through:

- Corridor-specific FSI release plans.
- Incentive-based redevelopment models.
- Establishment of a Lake Protection Fund for Bhojtal.
- Key findings include:
- FSI and zoning reforms significantly influence land price gradients and development intensity.
- Spatial spillovers exist between corridors, requiring integrated policy calibration.
- Expert consensus validates that current BDP–2031 FSI caps are rigid and non-responsive to market demand.
- Stakeholders support a hybrid model combining regulatory controls with fiscal incentives.

CHAPTER 3
DATA COLLECTION AND DATA ANALYSIS- Hedonic and Regression analysis

3.1Concept of Regression Analysis

- **Regression analysis** is a statistical technique used to examine the relationship between a **dependent variable** and one or more **independent variables**. (Gujarati, 2004).
- It helps to:
- Predict values
- Identify influencing factors
- Quantify relationships
  In this study:
- Dependent variable → **Land Price (P)**
- Independent variables → **FAR, Distance, Land Use**
- This approach is based on the **hedonic pricing theory**, which states that property values are determined by their characteristics (Rosen, 1974).

3.3 DEFINATION

"Regression analysis is a statistical method for estimating the relationships among variables." — Mostly Harmless Econometrics

Hedonic Pricing Framework

Regression is based on **Hedonic Pricing Theory**:
"The price of a good is determined by its characteristics." — Hedonic Prices and Implicit Markets
In urban planning:
FAR → development intensity
Distance → accessibility
Land use → zoning regulation

Components of Regression Equation

$$P_i = \alpha + \beta_1 FAR_i + \beta_2 Distance_i + \beta_3 LandUse_i + \varepsilon_i$$

Coefficient	Meaning
(β1)	Impact of FAR
(β2)	Impact of distance
(β3)	Impact of land use

- **Intercept:** α
  Mathematical meaning

$$\alpha = E(P_i, | , FAR_i = 0 Distance_i = 0 LandUse_i = 0)$$

Interpretation

Baseline land value

Price when all explanatory variables are zero (reference case)

Economic meaning

Captures:

City-level demand

Environmental quality

Location prestige

Unobserved amenities

Important:

Zero values may not be realistic, but α is still essential for estimation.

Error Term (ε)

- Captures unobserved factors ,Example:
  - Amenities
  - Market speculation
  - Environmental quality

3.4 Analaysis of Narmadapuram

Hoshangabad(Narmadapuram)

Anlaysis report of data by regression tool in excel software

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.78298
R Square	0.61305
Adjusted F	0.60096
Standard E	17932.3
Observati	100

ANOVA

	df	*SS*	*MS*	*F*	*gnificance F*
Regressior	3	4.9E+10	1.6E+10	50.6983	1E-19
Residual	96	3.1E+10	3.2E+08		
Total	99	8E+10			

	Coefficients	*ndard Err*	*t Stat*	*P-value*	*.ower 95%*	*Jpper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	37121.4	9134.21	4.06399	9.9E-05	18990.1	55252.6	18990.1	55252.6
Permissibl	28974.2	3853.72	7.5185	2.9E-11	21324.6	36623.8	21324.6	36623.8
Distance_t	-163.22	48.9016	-3.3377	0.0012	-260.29	-66.152	-260.29	-66.152
land use v	3622.08	4391.26	0.82484	0.41151	-5094.5	12338.7	-5094.5	12338.7

Regression Analysis Report

(Hoshangabad Road – 100 Buildings)

$$P_i = \alpha + \beta_1(FAR_i) + \beta_2(Distance_i) + \beta_3(LandUse_i) + \varepsilon_i$$

Indicator	Value	Interpretation

Multiple R	0.783	Strong correlation between observed and predicted land prices
R Square	0.613	**61.3% of variation** in land prices explained by the model
Adjusted R Square	0.601	Good explanatory power after adjustment
Standard Error	17,932	Acceptable prediction error for urban land data
Indicator	Value	
F-statistic	50.70	
Significance F	$\mathbf{1.0 \times 10^{-19}}$	
Observations	100	Adequate sample size for robust inference

Interpretation
Since **Significance F $\ll$ 0.01**, the regression model is **highly statistically significant**.
The independent variables **jointly have a significant influence on land prices**.

Coefficient-wise Interpretation
(a)Intercept (α)
Coefficient: ₹37,121
p-value: 0.000099 (**significant**)
Meaning:
There exists a statistically significant **base land value**, even in the absence of FAR benefits and locational advantages.

(b) Permissible FAR $(\boldsymbol{\beta_1})$

- **Coefficient: +₹28,974**
- **p-value:** 2.93×10^{-11} (**highly significant**)
- **Interpretation:**
  Permissible FAR has a **strong and positive impact** on land prices.
- **A one-unit increase in FAR increases land price by approximately ₹28,974 per sq.m.**
- This confirms that **development potential is a major determinant of land value** along Hoshangabad Road

(c) Distance to Main Road (Accessibility) $(\boldsymbol{\beta_2})$

- **Coefficient: −₹163.22**
- **p-value:** 0.0012 (**significant**)

Interpretation:
Distance from the main road has a **negative and statistically significant effect**.
For every additional meter away from the main road, land price decreases by about ₹163 per sq.m.
This supports **Alonso's Bid-Rent Theory**, highlighting the importance of accessibility

(d) Land-Use Variable ($\boldsymbol{\beta_3}$)

- **Coefficient:** +₹3,622
- **p-value:** 0.412 (**not significant**)

Interpretation:
Land-use category does **not exert an independent statistically significant effect** once FAR and accessibility are controlled for.

Estimated Regression Equation

$$\widehat{P_i} = 37121.36 + 28974.21(FAR_i) - 163.22(Distance_i) + 3622.08(LandUse_i)$$

- **Key Findings**
- The regression model is **statistically robust and well-fitted**.
- **Permissible FAR is the strongest determinant** of land price.
- **Accessibility significantly influences land values**, with prices declining as distance from the main road increases.
- **Land-use classification alone does not significantly affect prices** once FAR and accessibility are accounted for.
- Planning regulations and transport accessibility jointly shape land-price formation along the corridor.

Top Feasible Combinations (Highest Market-Aligned Collector Rates)
Figure 2.1 Proposed FAR table with land use

Table 3

FAR	Distance (m)	Land Use
3.0	**10**	**Commercial**
3.0	25	Commercial
2.5	10	Residential
2.5	25	Commercial
2.8	25	Residential

Interpretation

FAR is the strongest driver

Each +0.5 FAR increases value by nearly ₹14,500.

Distance matters significantly

Moving 50 meters away reduces value by ~₹8,000.

Commercial zoning adds ~₹3,622 premium.

Table 4

Variable	Best Balanced Value
FAR	**2.5 – 3.0**
Distance Control	**≤ 30 meters**
Zoning	**Mixed / Commercial corridor zoning**

In 2025-26 guideline rate - ₹30000 *to* ₹70000 *per sq.m* (as per mpigr website)

Recommended Revised Collector Rate:

₹1,15,000 *to* ₹1,20,000 *per sq.m*

This reflects:

- 25–35% upward revision
- Market-aligned valuation
- Avoids speculative overheating

Conclusion:

Simulation of FAR, zoning, and accessibility parameters indicates that land values along Hoshangabad Road can reach
₹1.26 lakh per sq.m under maximum development intensity. However, a balanced regulatory framework with FAR between 2.5 and 3.0 and controlled commercial zoning suggests a feasible collector guideline rate of ₹1.15–1.20 lakh per sq.m, ensuring revenue optimization without excessive market distortion.

3.4 Analysis of Narmadapuram

Table 5:Narmadapuram

Corridors	Coefficients	Estimated Regression Equation	Variable	Best Balanced Value	Recommended Revised Collector Rate VS Prevalent Guideline Rate	Conclusions
Hoshangabad (Narmadapuram)	α =37121.36 (β_1)=28974.21 (β_2)=-163.22 (β_3)=3622.08	$\hat{P}_i$ $= 37121.36 + 28974.21(FAR_i)$ $- 163.22(Distance_i)$ $+ 3622.08(LandUse_i)$	FAR	**2.5 – 3.0**	₹1,15,000 to ₹1,20,000 per sq.m This reflects: •25–35% upward revision •Market-aligned valuation •Avoids speculative overheating	Simulation of FAR, zoning, and accessibility parameters indicates that land values along Hoshangabad Road can reach ₹1.26 lakh per sq.m under maximum development intensity.
		Key Findings: **Permissible FAR is the strongest determinant** of land price. **Accessibility significantly influences land values**, with prices declining as distance from the main road increases. **Land-use classification alone does not significantly affect prices** once FAR and accessibility are accounted for. Planning regulations and transport accessibility jointly shape land-price formation along the corridor.	Distance Control	**≤ 30 meters**	In 2025-26 guideline rate - ₹30000 to ₹70000 per sq.m Reference: https://www.mpigr.gov.in/#/guidline-view	However, a balanced regulatory framework with FAR between 2.5 and 3.0 and controlled commercial zoning suggests a feasible collector guideline rate of ₹1.15–1.20 lakh per sq.m, ensuring revenue optimization without excessive market distortion.
			Zoning	**Mixed / Commercial corridor zoning**		

3.5 Analysis of Maharana Pratap nagar(MP nagar)

Table 6: MP Nagar

Corridors	Coefficients	Estimated Regression Equation	Parameter	Suggested Value	Recommended Revised Collector Rate VS Prevalent Guideline Rate	Conclusions
Maharana Pratap nagar **(MP nagar)**	$\alpha = 54051.52$ (β_1)=28200.24 (β_2)=-8553.34 (β_3)=-255.32	$\widehat{P_i} = 54051.52 + 28200.24(FAR_i) - 8553.34(LandUse_i) - 255.32(Distance_i)$	FAR	3.0 – 3.5	**Recommended Revised Collector Guideline (MP Nagar)** Instead of ₹1,64,000 (max simulation), a realistic policy-feasible rate: ₹1,40,000–₹1,50,000 *per sq.m*	• Simulation of FAR, zoning regulation, and accessibility parameters for MP Nagar indicates that land values may reach ₹1.64 lakh per sq.m under maximum development intensity (FAR 4.0). However, a balanced regulatory framework with FAR between 3.0 and 3.5 and core commercial zoning suggests a feasible collector guideline rate of approximately ₹1.40–1.50 lakh per sq.m, ensuring revenue optimization without excessive urban congestion
		Key Findings **Permissible FAR is the strongest and most consistent determinant** of land prices. **Accessibility (distance to main road) significantly affects land value**, with prices declining as distance increases. **Land-use classification does not independently explain price variation** once FAR and accessibility are considered. The corridor shows **moderate price heterogeneity**, influenced by both planning controls and location	Distance Premium Zone	≤ 30m	In 2025-26 guideline rate - **₹60000–₹1,35,000 *per sq.m*** Reference: https://www.mpigr.gov.in/#/guidline-view	
			Zoning	Mixed but structure		

3.6 Analysis of Kolar

Table 7 :Kolar

Corridors	Coefficients	Estimated Regression Equation	Parameter	Recommended	Recommended Revised Collector Rate VS Prevalent Guideline Rate	Conclusions
Kolar	$\alpha = 55477.28$ (β_1)=13333.48 (β_2)=4201.67 (β_3)=-266.22	$\widehat{P_i} = 55477.28 + 13333.48(FAR_i) + 4201.67(LandUse_i) - 266.22(Distance_i)$	FAR	**2.5 – 3.0**	Feasible policy value: ₹90,000–₹95,000 per sq.m This reflects: • Almost three times revision is required in prevalent guideline rate. Avoids speculative overheating	Simulation results indicate that Kolar Road land values may reach ₹1.03 lakh per sq.m under maximum FAR (3.5) and high accessibility conditions. However, a balanced FAR of 2.5–3.0 combined with mixed zoning suggests a feasible collector guideline rate of approximately ₹90,000–₹95,000 per sq.m, ensuring revenue alignment with market fundamentals while maintaining urban livability.
			Distance Premium	≤ 30m main spine	In 2025-26 guideline rate - collector guideline rate is ₹15000–₹78,000 per sq.m	**Key Findings** The regression model is **statistically robust and well-fitted**. **Permissible FAR significantly increases land prices**, confirming the capitalization of development potential. **Accessibility (distance to main road) is a strong negative determinant** of land value. **Land-use classification alone does not significantly influence prices** once FAR and accessibility are controlled for. Kolar Road exhibits **moderate land-price sensitivity** compared to prime commercial corridors.
			Zoning	Mixed but residential-dominant		

3.7 Analysis of Ayodhya bypass *Table 8*

Corridors	Coefficients	Estimated Regression Equation	Parameter	Suggested Value	Recommended Revised Collector Rate VS Prevalent Guideline Rate	Conclusions
Ayodhya Bypass	$\alpha = 59587.40$ (β_1)=6554.11 (β_2)=−714.03 (β_3)=−281.17	$\widehat{P_i}$ $= 59587.40 + 6554.11(FAR_i)$ $- 714.03(LandUse_i)$ $- 281.17(Distance_i)$	FAR	2.5 – 3.0	**Recommended Revised Collector Guideline (MP Nagar)** Instead of ₹1,64,000 (max simulation), a realistic policy-feasible rate: ₹ ₹80,000–₹90,000 per sq.m	• The revised collector guideline rate for Ayodhya Bypass should be rationalized to ₹80,000–₹90,000 per sq.m, reflecting realistic market behavior driven primarily by accessibility rather than FAR intensity
			Distance Premium	20–30 m (prime corridor)	In 2025-26 guideline rate - ₹6400–₹35000 per sq.m Reference: https://www.mpigr.gov.in/#/guidline-view	**Key Findings** The regression model is **statistically robust** and explains a substantial share of land-price variation. **Permissible FAR positively influences land prices**, but with a **moderate magnitude** compared to prime corridors. **Accessibility (distance to main road) is the most influential variable**, with a strong negative impact on land value. **Land-use classification alone does not significantly determine prices** once FAR and accessibility are included. Ayodhya Bypass shows characteristics of a **growth corridor**, where location and infrastructure access dominate pricing.
			Zoning	Residential dominant		

3.8 Analysis of bhojtaal region

Table 9:Bhojtaal Region

Corridors	Coefficients	Estimated Regression Equation	Parameter	Recommended	Recommended Revised Collector Rate VS Prevalent Guideline Rate	Conclusions
Bhojtaal region(bairagarh region)	$\alpha = 115733.31$ $(\beta_1) = -12809.48$ $(\beta_2) = -7326.51$ $(\beta_3) = -373.41$	$\widehat{P_i} = 115733.31 - 12809.48(FAR_i) - 7326.51(LandUse_i) - 373.41(Distance_i)$	FAR	0.5 – 1.0	**Recommended Collector Guideline (Bhojtal)** Instead of allowing density increase, collector guideline should reflect amenity premium. ₹95,000–₹1,05,000 *per sq.m*	he Bhojtal region exhibits an amenity-driven valuation structure wherein increases in FAR and commercial zoning significantly reduce land values. The model indicates that optimal pricing occurs under low-density residential development (FAR 0.5–1.0).
		Key Findings **Accessibility (distance to main road) is the most influential determinant** of land prices in the Bhojtal–Bairagarh area. **Permissible FAR does not significantly influence land prices**, reflecting eco-sensitive planning controls. **Land-use classification has no independent pricing effect** once accessibility is accounted for. The area exhibits **amenity-driven baseline values**, rather than development-driven value formation.	Land Use	Residential	In 2025-26 guideline rate - ₹10000–₹80000 *per sq.m*	A collector guideline rate of ₹95,000–₹1.05 lakh per sq.m is recommended, consistent with environmental preservation and sustainable urban planning principles..
			Distance	≤ 30m		

CHAPTER 4
DIFFERENCE IN DIFFERENCES ANALYSIS

4.1 Concept of Difference in Differences (DiD) Analysis

To adopt the alternative way to isolate the effect of some independent variables on the price determination process (Dubé et al., 2014). According to Gibbons and Machin (2008), the Difference-in-Differences (DID) estimator approach is an efficient spatiotemporal framework within which to evaluate the impact of changing amenities over time while controlling adequately for spatial amenities that remain fixed over time (Dubé et al., 2014).

By this approach, the dependent variable is seen as the result of a ‘‘quasi-experiment’’ since the changes in the spatial amenities, which stem from a public decision, are clearly exogenous to buyers and sellers(Dubé et al., 2014). The DID estimator allows to compare the effect of an exogenous change on the dependent variable by comparing the difference in the level of this variable before and after a given critical date, noted “t”, between a treatment group, the group that experienced a change of the environmental amenities and a control group, which does not experience any change(Dubé et al., 2014).

The difference in behavior within the group before and after the change may then represent the net impact of the exogenous change in the environmental amenities on house prices(Dubé et al., 2014). The DID estimator has the advantage of eliminating the problem related to the omission of important variables that are constant over time, and some possible problems related to the functional form(Dubé et al., 2014). Moreover, the DID estimator allows to control adequately for the remaining spatial autocorrelation among the error terms when it is not correlated with the independent variables(Dubé et al., 2014).

The DID estimator is a simple extension of the well-known repeat-sales (RS) approach which is used to develop a general price index of the evolution of real estate(Dubé et al., 2014).

However, researchers must be aware that the validity of the DID estimator is based on three important assumptions (Dubé et al., 2014). The first is that the coefficients, reflecting preferences, are constant over time(Dubé et al., 2014). The second one is that if no specific information is available documenting the possible changes in amenities, it is assumed that they remain constant over time(Dubé et al., 2014). The third assumption is that even if a sale occurs more than once over time, the frequency of observations follows a random process and is not attributable to any specific characteristic that would make that property prone to frequent resales (Dubé et al., 2014).

4.2 Analysis

- Difference-in-Differences (DiD) is an econometric technique used to isolate the effect of specific independent variables on the process of price determination. It is particularly useful in situations where controlled experiments are not feasible, making it a **quasi-experimental approach** (Dubé et al., 2014).
- According to Gibbons and Machin (2008), the DiD estimator provides an effective **spatiotemporal framework** for evaluating changes in land or property values over time. It allows researchers to measure the impact of changing amenities—such as infrastructure improvements or zoning reforms—while controlling for spatial characteristics that remain constant over time (Dubé et al., 2014).
- In this approach, the dependent variable (e.g., land price) is treated as the outcome of a **quasi-experiment**, where changes in environmental or planning conditions are considered exogenous. These changes are typically the result of public policy decisions and are not influenced by individual market participants such as buyers or sellers (Dubé et al., 2014).

The DiD method estimates the effect of such changes by comparing variations in the dependent variable across two dimensions:

Time Dimension: Before and after a specific intervention period (t)
Group Dimension: Between a treatment group (affected by the change) and a control group (unaffected by the change)

The DiD estimator is expressed as:

$$\delta_{DiD} = (Y_{T,post} - Y_{T,pre}) - (Y_{C,post} - Y_{C,pre})$$

Let: Treatment corridor = areas affected by FAR/zoning change

Control corridor = unaffected areas (e.g., Bhojtal)

Step 1: Before–After difference (Treatment)

$$\Delta P_{Treatment} = P^{T}_{After} - P^{T}_{Before}$$

Step 2: Before–After difference (Control)

$$\Delta P_{Control} = P^{C}_{After} - P^{C}_{Before}$$

Step 3: Difference-in-Differences

$$DiD = (\Delta P_{Treatment}) - (\Delta P_{Control})$$

Table 10

Historical and Present Collector Guideline Dataset

Corridor	2005 Rate (₹/sq.m)	2025 Rate (₹/sq.m)
MP Nagar	6,000	145,000
Hoshangabad Road	2,200	115,000
Kolar Road	2,100	92,000
Ayodhya Bypass	2,000	90,000
Bhojtal (Control)	3,000	100,000

Zone-wise Price Change

Corridor	2005 Price	2025 Price	Increase
MP Nagar	6,000	145,000	139,000
Hoshangabad Road	2,200	115,000	112,800
Kolar Road	2,100	92,000	89,900
Ayodhya Bypass	2,000	90,000	88,000
Bhojtal	3,000	100,000	97,000

Average Treatment vs Control
Treatment (4 corridors)

2005 average

$$(\mathbf{6000} + \mathbf{2200} + \mathbf{2100} + \mathbf{2000})/\mathbf{4}$$
$$= 3075$$

2025 average

$$(\mathbf{145000} + \mathbf{115000} + \mathbf{92000} + \mathbf{90000})/\mathbf{4}$$

=110,500

Increase $\mathbf{110500 - 3075 = Rs\ 107,425}$

- **Control (Bhojtal)**
- Increase
- $100000 - 3000 = 97{,}000$

Difference-in-Differences Effect
\delta_{DID}=(Y_{T,post}-Y_{T,pre})-(Y_{C,post}-Y_{C,pre})

$$DID = 107425 - 97000$$

= **10,425 ₹ / sq.m**

Group	2005	2025	Change
Treatment Corridors	₹3,075	₹110,500	₹107,425
Control Corridor	₹3,000	₹100,000	₹97,000
Difference-in-Differences Effect			**₹10,425 / sq.m**

Percentage Impact of FAR/Zoning Reform

$$Impact\% = \frac{10425}{97000} \times 100$$

%10.7≈
Meaning:
FAR and zoning reforms contributed about 11% additional land price growth beyond normal market appreciation.

Comparison of Hedonic Regression Results

Corridor	FAR coefficient (₹ increase per FAR)	Interpretation
MP Nagar	**+28,200**	Strongest FAR capitalization
Hoshangabad	**+28,974**	Very strong development premium
Kolar	**+13,333**	Moderate FAR impact
Ayodhya Bypass	**+6,554**	Weak FAR impact
Bhojtal	**–12,809**	FAR reduces value (eco restriction)

Interpretation-:Average value per FAR-64252/4=Rs 16063
Commercial CBD corridors
MP Nagar + Hoshangabad
→ FAR strongly capitalized into land value.
Emerging corridors
Kolar + Ayodhya
→ FAR influence moderate.
Ecological corridor
Bhojtal
→ FAR negatively related to land value.

Difference-in-Differences result:

$$DID = 10{,}425₹/sq.m$$

Meaning:
Average FAR (in 2005)- 01
Average FAR (in 2025-26)-(1.25-3)-> 02
This implies $10{,}425₹/sq.m$ per FAR
FAR/Zoning reforms caused **additional price growth**.
Policy impact ≈ **10.7%**

Comparison

- **Rs 16063** $/sq.m$ **per increase in FAR as per hedonic pricing model**
- $\mathbf{10,425₹}/sq.m$ **per increase in FAR as per DID difference in differences**

4.3 Conclusion:

The Difference-in-Differences analysis estimates the causal impact of zoning and FAR liberalization on land prices in Bhopal. Between 2005 and 2025, land prices increased across all corridors due to urban expansion and inflation. However, treatment corridors with higher permissible FAR experienced a greater increase compared to the eco-restricted Bhojtal region.
After controlling for overall market growth, the DiD estimator indicates that planning regulations contributed an additional ₹10,425 per sq.m increase in land prices, equivalent to approximately 11% of the total price appreciation. This confirms that development rights embedded in zoning regulations are capitalized into urban land values.

CHAPTER 5
DELPHI SURVEY ANALYSIS

The main objective of the Delphi Survey Analysis is to understand two aspects:

1. Effect of FAR on Land pricing.
2. Effect of zoning regulations on Land pricing.

Both the parameters will be analyzed for our subject study area and its relevance.

Overview

The Delphi Method is a widely recognized technique used to collect and refine expert opinions on a specific subject through a series of structured questionnaire rounds (Touran et al., 2009). The method was initially developed during the 1950s by the United States Air Force for forecasting and strategic decision-making purposes (Touran et al., 2009).

Fundamentally, the Delphi Method functions as a systematic communication process designed to achieve consensus among experts on complex issues (Touran et al., 2009). The process involves distributing questionnaires to a selected panel of experts over multiple rounds. After each round, participants are provided with a summary of the collective responses, enabling them to reconsider their viewpoints in light of the opinions shared by other experts (Touran et al., 2009). This iterative approach encourages independent thinking and allows participants to modify their responses without the pressure commonly associated with face-to-face discussions. As the process continues, expert opinions gradually converge, while differences in perspectives and uncertainties can also be identified and analyzed (Touran et al., 2009).

The effectiveness of the Delphi Method largely depends on the careful selection of experts possessing relevant knowledge and professional experience (Touran et al., 2009). Participant anonymity is maintained throughout the process to minimize the influence of personal bias, dominance, or criticism, thereby encouraging honest and unbiased responses (Touran et al., 2009).

A facilitator or coordinator is responsible for collecting, organizing, and reviewing all responses received from the expert panel (Touran et al., 2009). Irrelevant or repetitive information is filtered before the summarized findings are redistributed to participants for further evaluation and feedback. This process continues until a reasonable level of agreement is achieved or sufficient insight into expert perspectives has been obtained (Touran et al., 2009).

Expert Selection

For the Delphi panel, we assembled a list of 17 experts with significant knowledge in Architecture, Engineering, Construction, Finance, Design, Data Analyst, Urban Planning and Development, ensuring diverse perspectives. We requested their participation via WhatsApp, assuring them that their identities would remain anonymous and their opinions would be used solely for academic purposes. The panel included individuals from various sectors:

- Architecture and Construction – 5 Experts
- Design and Engineering – 4 Experts
- Urban Planning and Development– 3 Experts
- Finance, Real Estate Consultants and Data Analyst – 3 Experts
- Academia and Research – 2 Experts

The diversity of panel ensured comprehensive insights.

Justification and Reason for Expert selection

1. Diverse Expertise

The Delphi panel consisted of professionals from multiple disciplines to ensure a comprehensive understanding of the research problem and to capture diverse perspectives related to urban land pricing, zoning regulations, and FSI policies.

- Architecture and Construction:
  Experts from the architecture and construction sector contributed practical knowledge regarding building structures, construction practices, redevelopment potential, and the lifecycle of urban infrastructure. Their insights were particularly useful in understanding redevelopment possibilities within older CBD areas and evaluating suitable construction approaches for urban regeneration.
- Design and Engineering:
  Professionals from design and engineering fields provided perspectives related to technological advancement, infrastructure utilization, and the impact of transport infrastructure such as metro systems on urban living conditions. Their observations also helped assess changes in quality of life and living costs associated with infrastructure development.
- Urban Planning and Development:
  Urban planning experts offered valuable insights into spatial planning, land-use distribution, future urban growth patterns, and the implications of zoning regulations on sustainable development. Their expertise also supported the evaluation of environmental impacts and long-term urban expansion trends.

- Finance, Real Estate Consultants, and Data Analysts:
  Experts from finance and real estate sectors contributed market-oriented perspectives related to land valuation, investment behaviour, market demand, and speculative activities. Their practical experience in urban development projects strengthened the understanding of economic and real-estate dynamics influencing land pricing.
- Academia and Research:
  Researchers and academicians provided theoretical and empirical viewpoints related to urban economics, planning theory, and land-value mechanisms. Their contribution helped establish an academic foundation for interpreting the survey findings and validating the research framework.

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2. Panel Size and Anonymity

- Panel Size:
  A panel comprising 17 experts was selected to ensure adequate representation from different professional backgrounds. All experts participated in the first round of the Delphi survey. The selected panel size was considered appropriate for obtaining diverse opinions while maintaining efficiency in data collection and analysis.
- Anonymity:
  Anonymity was maintained throughout the Delphi process to encourage independent and unbiased responses from the participants. This approach minimized the influence of hierarchy, dominance, and peer pressure, thereby improving the reliability and credibility of the collected expert opinions.

The multidisciplinary composition of the panel ensured a holistic understanding of the study objectives. The Delphi survey was conducted using Google Forms, enabling systematic interaction with experts and facilitating the collection of informed opinions on key issues related to zoning regulations, FSI policies, and urban land pricing dynamics.

5.1 Round 1

The Questionnaire for Round 1 is kept at **Annexure 1**. After approaching the experts, all of them responded. The summarized responses are:

[Rate 1a to 1d on a scale of 1-5, where 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree]

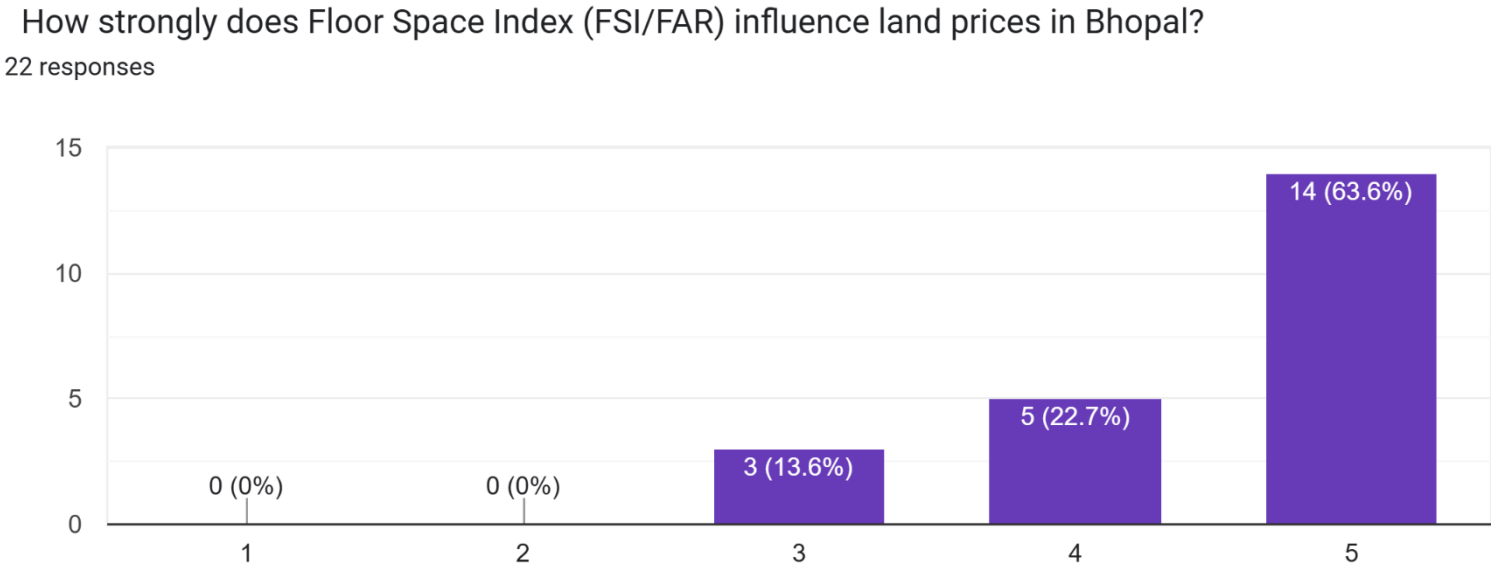


Figure 16

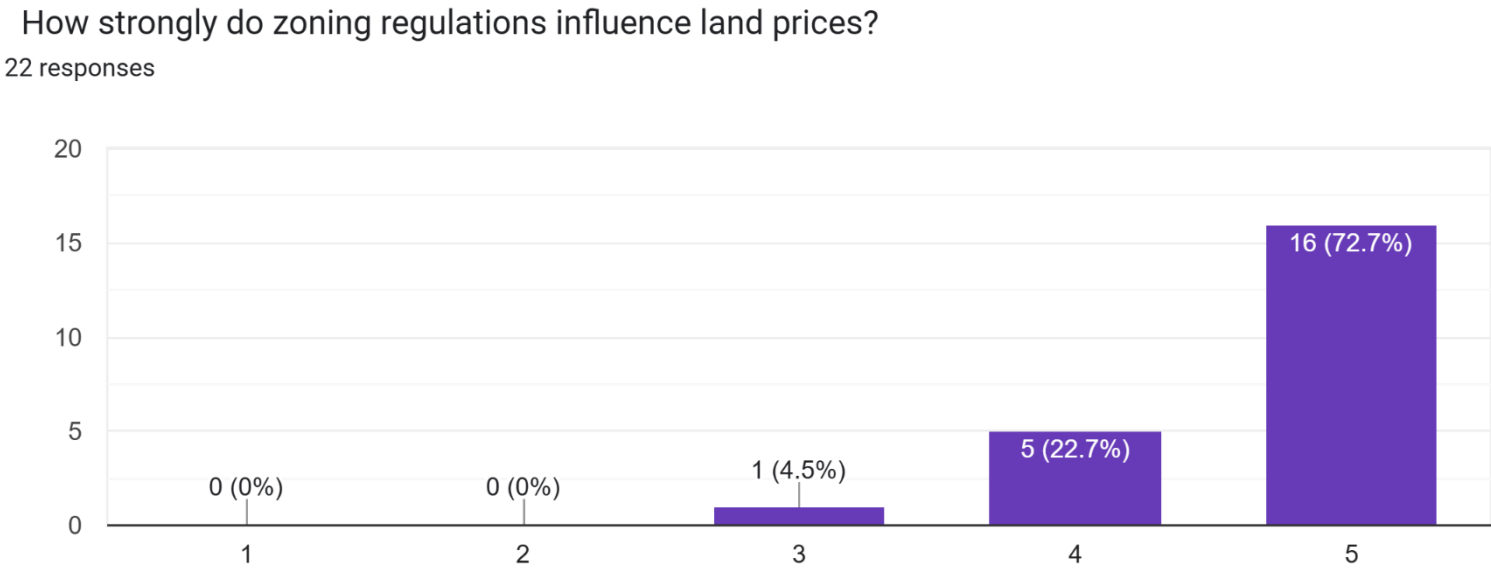
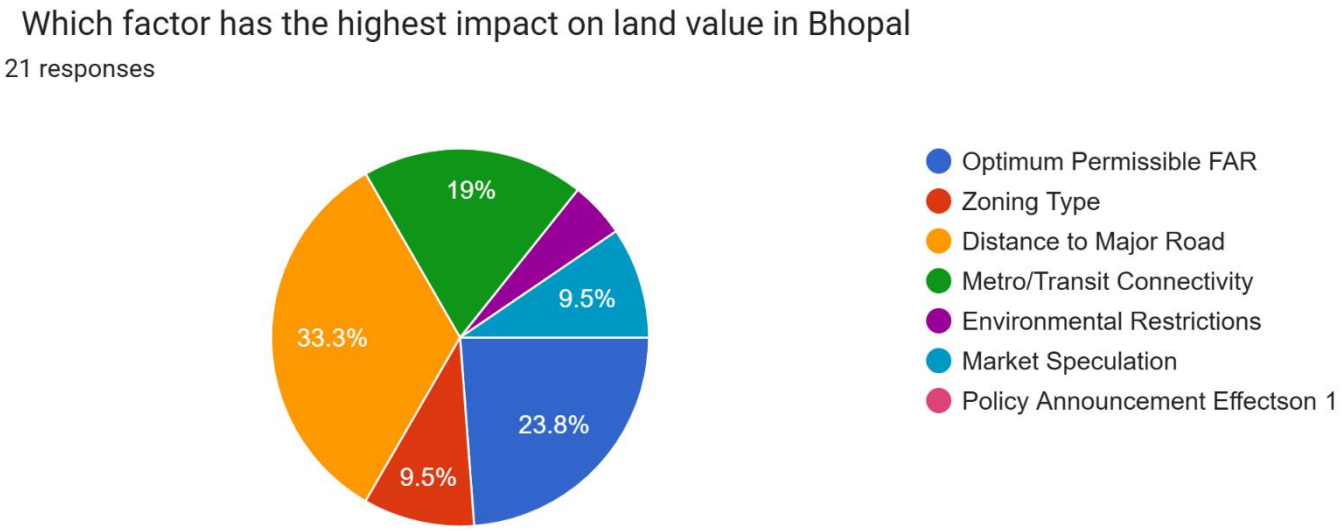


Figure 17

Source - Author



Source - Author

Figure 18

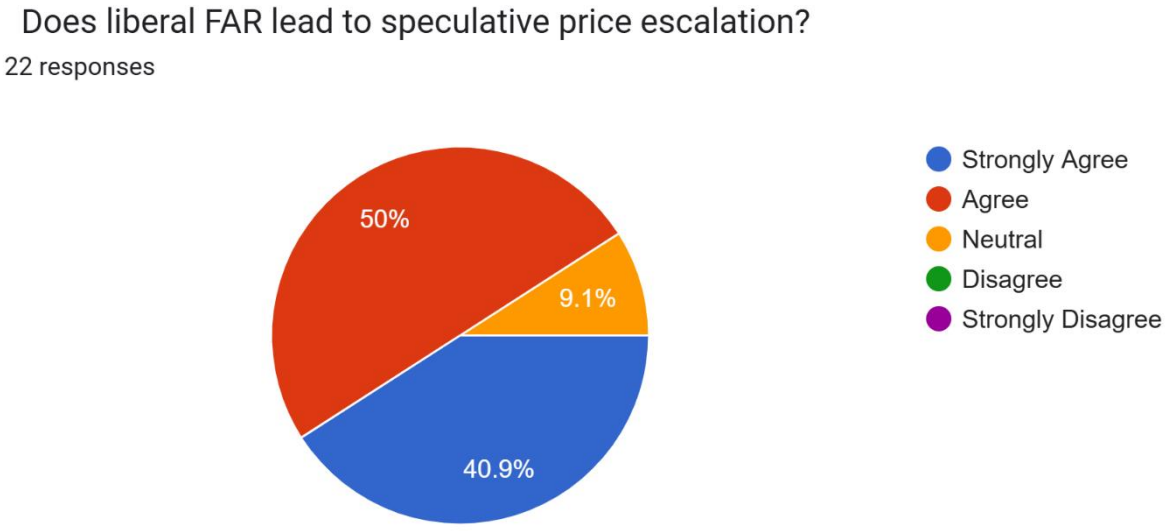


Figure 19



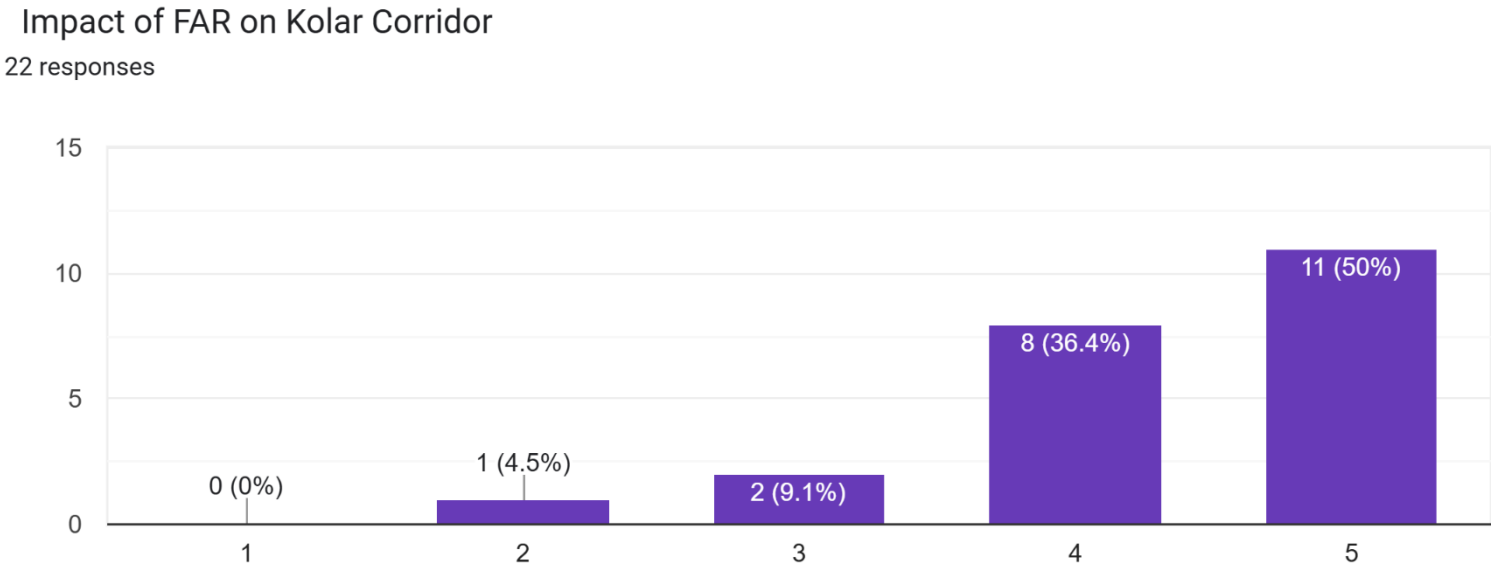


Figure 20

Source - Author

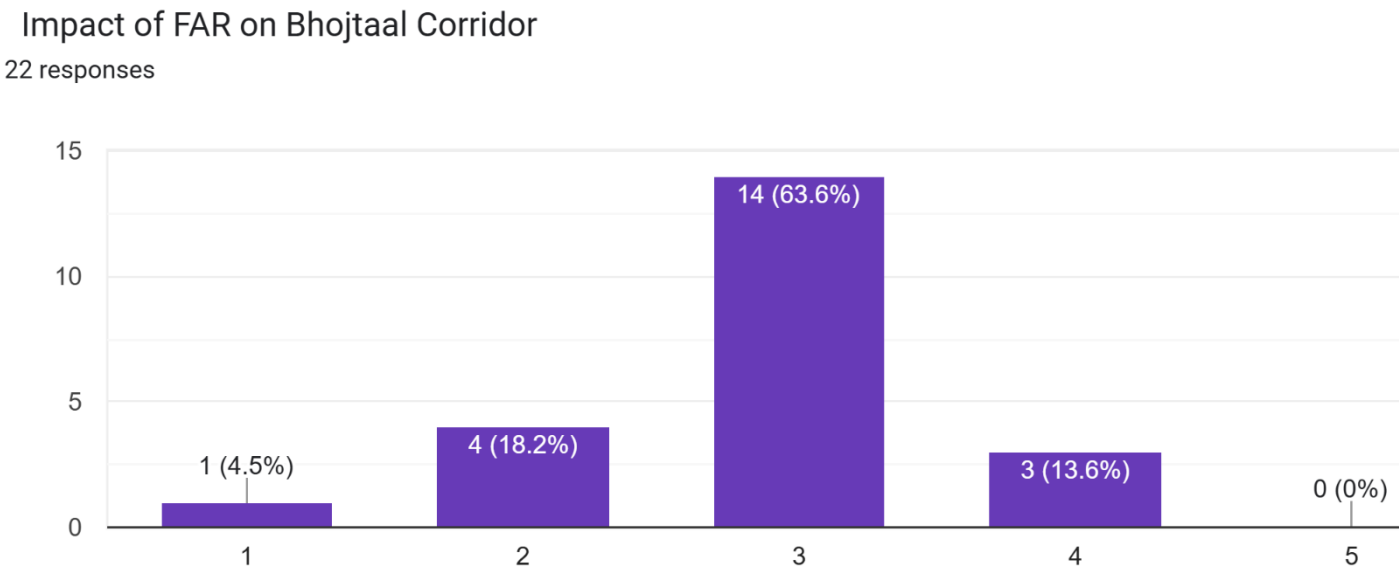


Figure 21

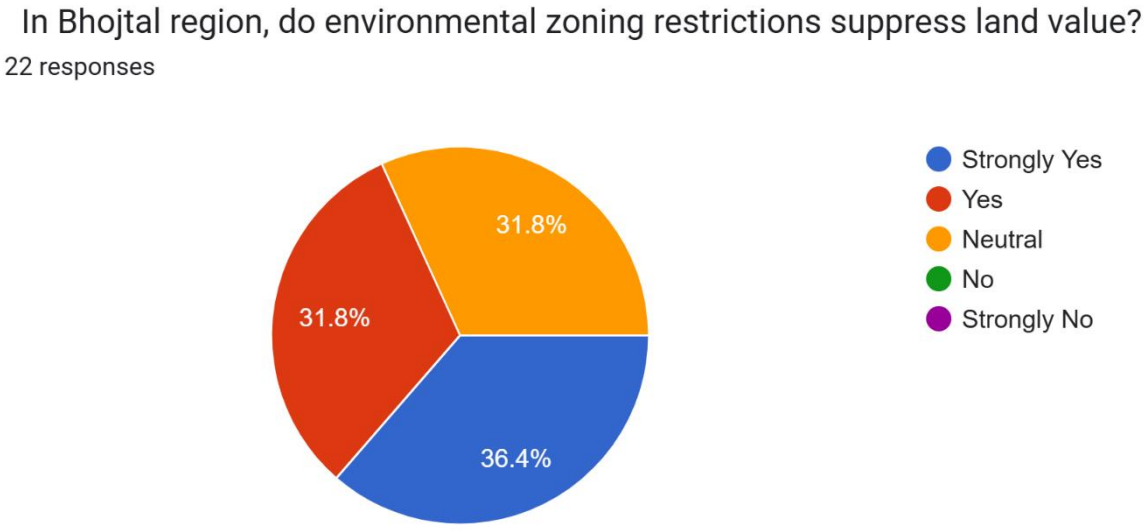


Figure 22

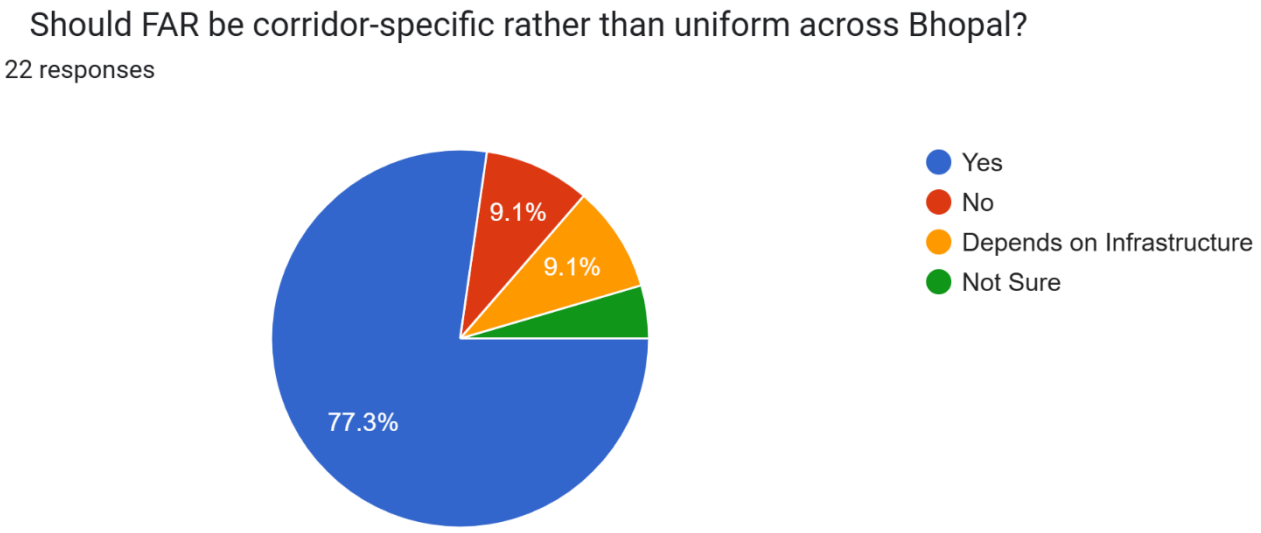


Figure 23

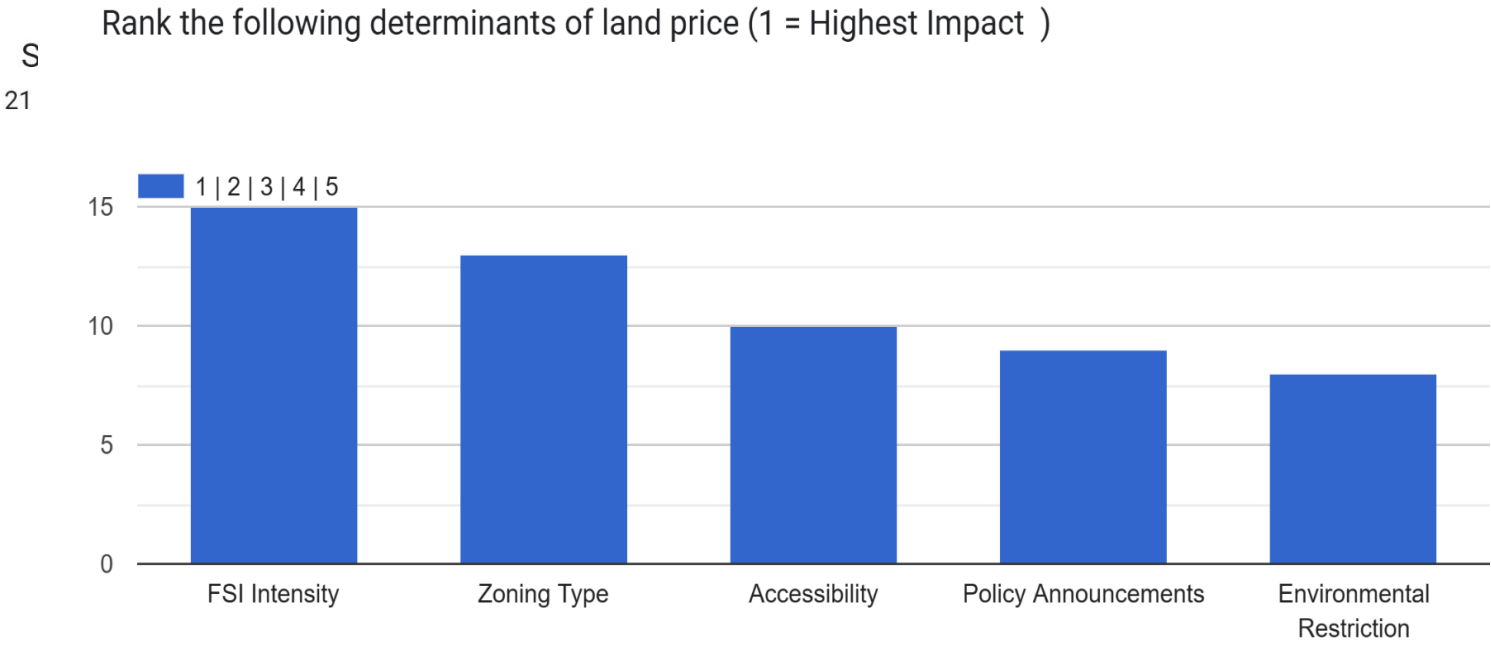


Figure 24

What major reforms are required in Bhopal's zoning and FAR policy? 9 responses

- Vertical development
- FAR should be based on the basis of specific location type not only with the landuse. 2. Higher density should have higher FAR with the required height to consume complete far
- Zonning Area should have fundamental FAR .and It should vary according to building use. Landuse is different than Building use.For Same Landuse we can do different building activity like Hotel,Shops,Nursing Home, Residence.Hotel Would need more vertical development .It must get much higher FAR as compared to Residence or Shops. Parking cluster should be provided in every zonning plan.irrespective of Landuse.These cluster can use for multilevel parking or on ground parking to compensate individual building parking requirements.
- FAR shall be increased by compairing the other well developed cities
- Incentive planning and landuse
- Development based FSI capture mechanism

Any additional comments or recommendations? 5 responses

- A balanced approach towards environmental zoning restrictions and FSI norms.
- Increase far and vertical development
- Parking cluster should be mandatory for every landuse.
- There should be discussion regarding the low density areas in bhopal and there shall be proper planning for their development as the low density areaa are getting developed in haphazard manner.

Data processing from Google form responses

Overview

The responses collected through the Google Form questionnaires were systematically organized and processed for further analysis. This involved several key steps to ensure that both quantitative and qualitative data were accurately represented and utilized.

Steps involved

1. **Organization in Excel Sheet:**
   - All responses recorded through the Google Forms were transferred and organized into a Microsoft Excel sheet.
2. **Extraction of Quantitative Responses:**
   - For questions that utilized a scale of 1 to 5, the responses were extracted directly as recorded in the form. These responses were then entered into the Excel sheet without any modifications.
3. **Conversion of Qualitative and subjective Responses:**
   - For questions with subjective answers or options exceeding four choices, the given options were converted into a specific range.
   - Appropriate scales or weightage values were assigned to these options.
   - Using these assumed scales, further calculations were performed to quantify the qualitative data.
4. **Finding the Most Common Value:**
   - The statistical tool used to measure the most common value in the responses for each question was the mean.
   - **Mean**: In statistics, the mean is one of the measures of central tendency, alongside mode and median. It represents the average or most common value in a set of numbers, also referred to as the expected value. The mean was calculated from the given data, considering the maximum weightage assigned to each subset of questions.
   - The percentage calculated from the mean indicated the proportion of respondents agreeing with the average value, providing a perspective for further analysis.

This gave a perspective to further proceed with another confirmatory round and thus, the Ratio Method, was used to list the qestions most important for the data analysis and recommendations of the thesis. The process of Ratio Method is stated below

Ratio Method for Weight Assignment:

- **Step 1:** Rank all items according to their importance.
- **Step 2:** Assign weight to each item based on its rank. The lowest-ranked item received a weight of 10.
- **Step 3:** Assign weights to the rest of the items as multiples of 10.
- **Step 4:** Normalize these raw weights.
- **Note:** The weights do not necessarily increase by 10 points between items. The increase is based on the subjective judgment of the decision-maker, reflecting the difference in importance between items. Ranking the items in the first step helps assign more accurate weights(Touran et al., 2009).

Table 11: *Example of Ratio Method.*

Task/Item	Shortening schedule	Project cost	Agency control	Competition
Ranking	1	2	3	4
Weighting	50	40	20	10
Normalizing	41.7%	33.3%	16.7%	8.3%

Source: (Touran et al., 2009)

- Normalized weights are simply calculated by dividing the raw weight of each item over the sum of the weights for all items(Touran et al., 2009).
- For example, normalized weight for the first item (shortening schedule) is calculated as 50/ (50 + 40 + 20 + 10) = 41.7% (Touran et al., 2009). The sum of normalized weights is equal to 100% (41.7 + 33.3 + 16.7 + 8.3 = 100)(Touran et al., 2009).

The Ratio Method helps in assigning weight to the responses which further helps in decision making and provides guidance either to stop the survey here itself or to proceed for further rounds(Touran et al., 2009

SUMMARY OF ROUND 1- DELPHI SURVEY						Ratio Method		
Sr no.	**Sub set**	**Questions**	**Average Response recorded(sum of responses divided by no person)**	**Maximum Value Assigned**	**Average recorded in Percentage**	**Ranking**	**Weighting**	**Normalizing/Normalized We**
1		**How strongly does Floor Space Index (FSI/FAR) influence land prices in Bhopal?**	93/22=4.22	5	23.80%	1	25	25/115=21.7%
2		How strongly do zoning regulations influence land prices?	**103/22=4.68**	**5**	**10%**	**4**	**10**	**10/115=8.6%**
3		Distance to major road	**4.91**	**5**	**33%**	**2**	**35**	**35/115=30.43%**
4		TOD/metro	**4.18**	**5**	**19%**	**3**	**20**	**17%**
5		Environment restrictions	**3.88**	**5**	**5%**	**6**	**5**	**4%**
6		**Market speculations**	**4**	**5**	**9.50%**	5	10	**8.60%**
7		Policy announcement effects	**4.1**	**5**	**10%**	**5**	**10**	**8.60%**
8		Impact of FAR						
	a	Ayodhya bypass	**3.77**	**5**	**41%**	**3**	**40**	**40/140=28.57%**
	b	MP nagar	**4.59**	**5**	**68%**	**1**	**35**	**25%**
	c	narmadapuram road (hoshangabad)	**4.59**	**5**	**68%**	**1**	**35**	**25%**
	d	kolar	**4.32**	**5**	**50%**	2	25	21.70%
	e	**bhojtaal region**	**2.77**	5	**13.60%**	4	5	3.57%
9		In Bhojtal region, do environmental zoning restrictions suppress land value?	**2.86**	**5**	**37%**			
10		Should FAR be corridor-specific rather than uniform across Bhopal?	**2.24**	**5**	**77%**			

11		Should Bhopal adopt Premium FSI / Land Value Capture mechanisms?	**2.29**	**5**	**62%**			

5.3 Conclusion

The conclusion drawn from the above Delphi Survey Analysis based on expert's opinion on various parameters:

1. The top 3 impact of land prices based on opinions are:
    - Distance to major road,
    - FAR and
    - Zoning regulations.
2. Extent to what factors have the existing land prices has affected.
    - Environmental conditon,
    - FAR should be corridor specific
3. Majority of the experts believe that the rise in land values for different land use categories.
4. Most experts believe that the rise in land values for Floor area ratio ,zoning regulations are much more influential.
5. Mp nagar ,hoshangabad have a greater impact of FAR ,followed by kolar and Ayodhya bypass region

CHAPTER -6 (Graphical Analysis)

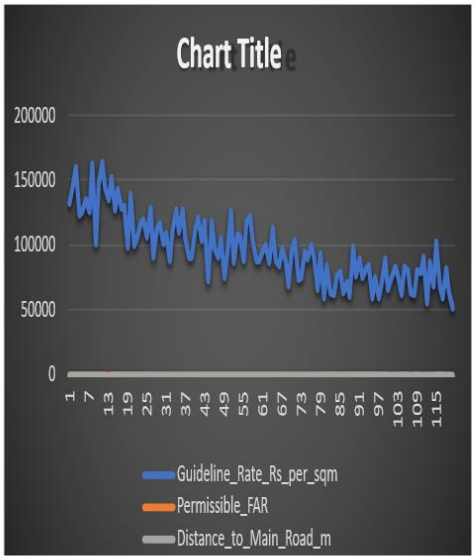
Graphical-analaysis | Maharana Pratap nagar

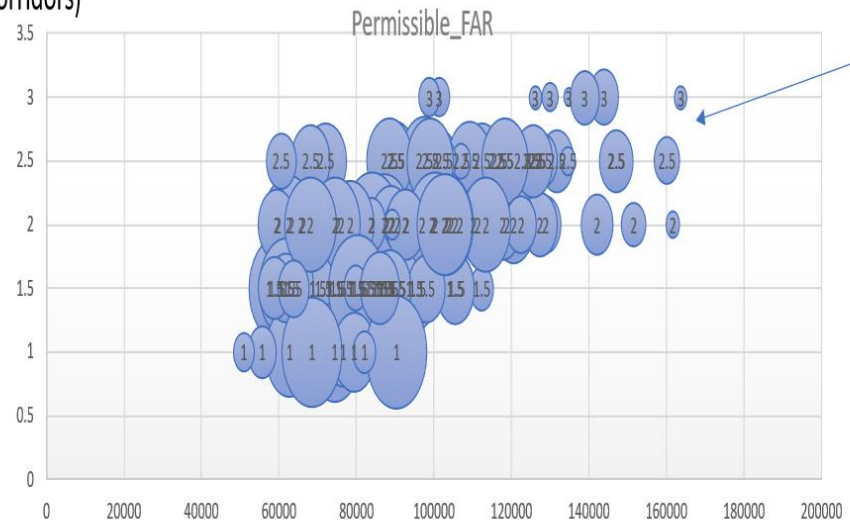
FAR vs Land Price

- FAR range: **1.0 – 3.5**
- High FAR zones (3.0–3.5):
  ₹1.30 – ₹1.60 lakh / sq.m
- Medium FAR (2.0–2.5):
  ₹90,000 – ₹1.20 lakh / sq.m
- Low FAR (1–1.5):
  ₹60,000 – ₹90,000 / sq.m

Result:

MP Nagar shows **very strong FAR capitalization** (strongest among all corridors)





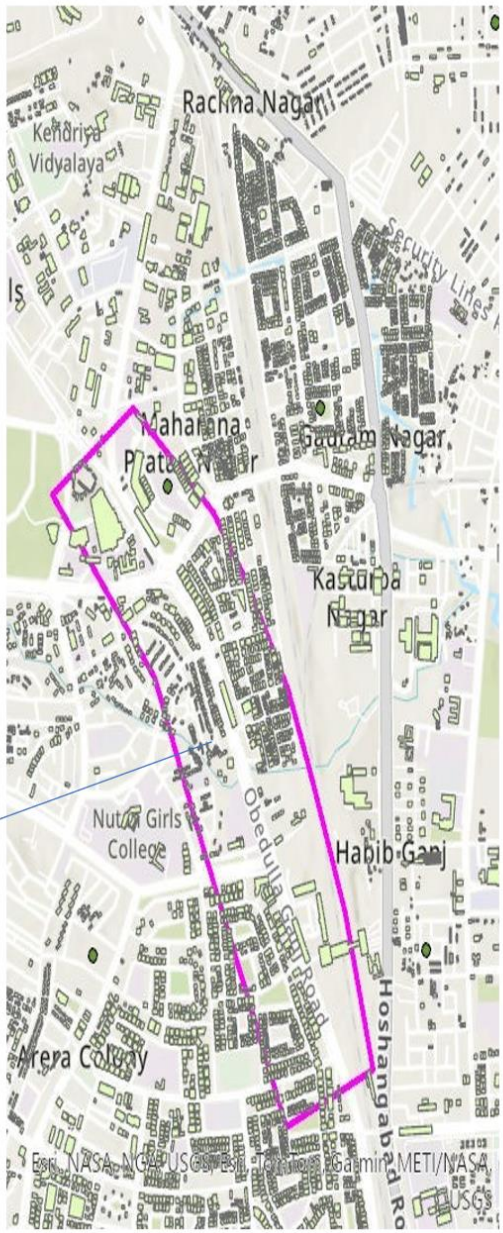


Figure 25:Graphical analysis-MP Nagar *Source : By Author*

Hoshangabad(narmadapuram)

1. FAR vs Land Price Relationship

The graphical and regression analysis shows a **strong positive relationship between FAR and land price**.

•Properties with FAR **2.5–3.0** show prices:

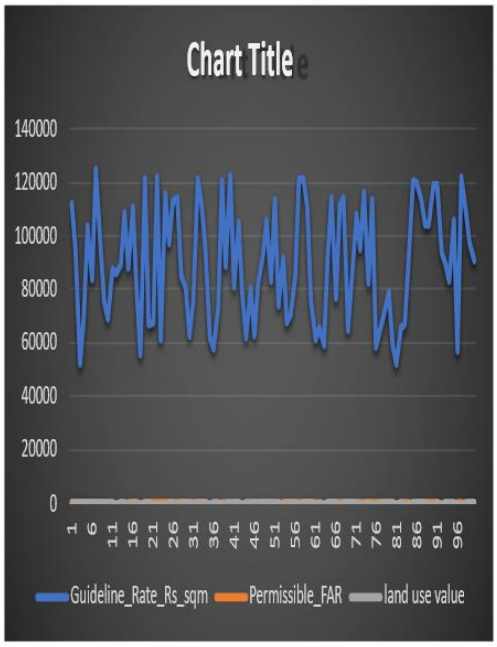
₹1.10 lakh – ₹1.25 lakh / sq.m

•Properties with FAR **1.5–2.0** show lower prices:

₹70,000 – ₹90,000 / sq.m

Result:

Increase in FAR significantly increases land value due to higher development potential.





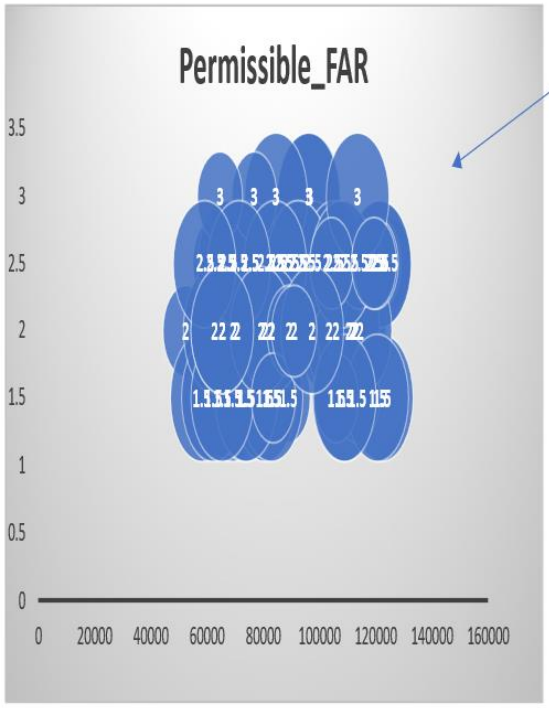


Figure 26:Graphical Analysis *Source :By Author*

KOLAR

FAR vs Land Price

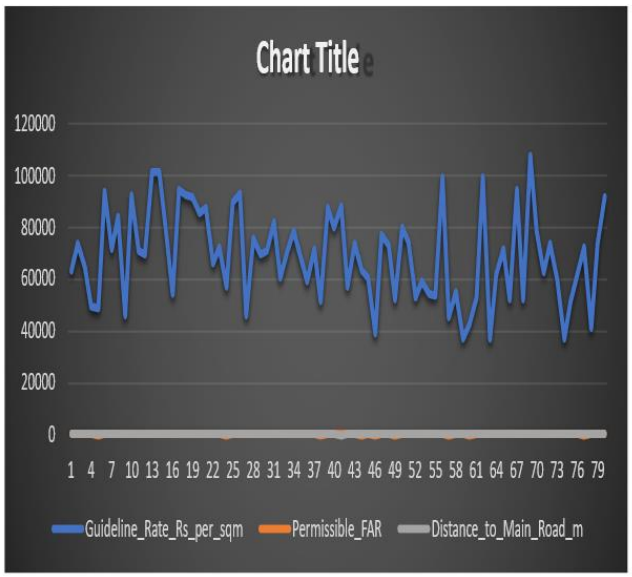
•FAR range: **1.0 – 2.5**

•FAR 2.5:
₹90,000 – ₹1,10,000 / sq.m

•FAR 2.0:
₹70,000 – ₹90,000 / sq.m

•FAR 1.0–1.5:
₹40,000 – ₹70,000 / sq.m

Result:
Positive relationship exists, but **weaker than MP Nagar & Hoshangabad**



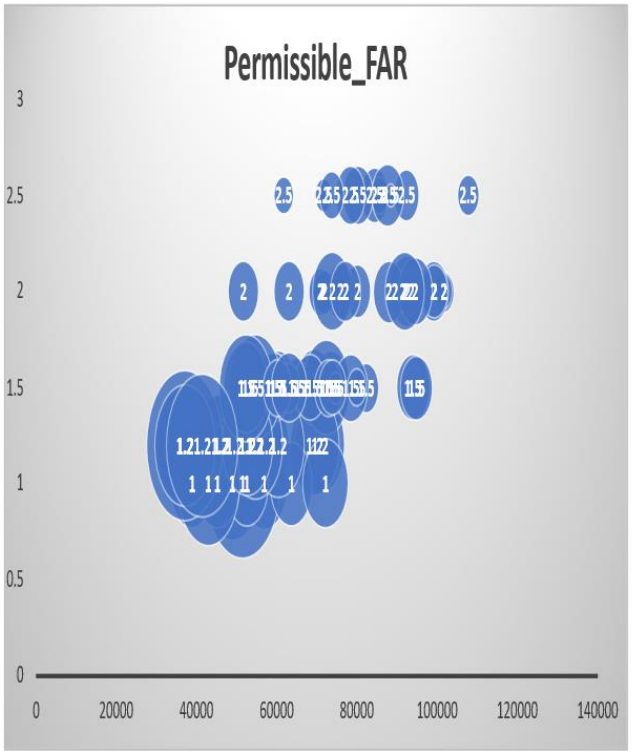




Figure 27 *Source:Author*

For Ayodhya bypass

FAR vs Land Price

•FAR range: **1.0 – 3.0**

•FAR 3.0:

₹80,000 – ₹1,00,000 / sq.m

•FAR 2.0–2.5:

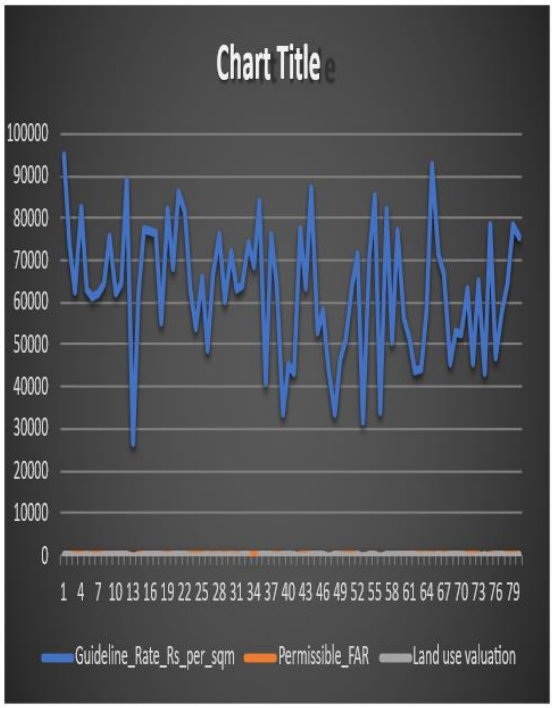
₹60,000 – ₹85,000 / sq.m

•FAR 1.0–1.5:

₹40,000 – ₹65,000 / sq.m

Result:

Positive relationship exists, but **not very strong**





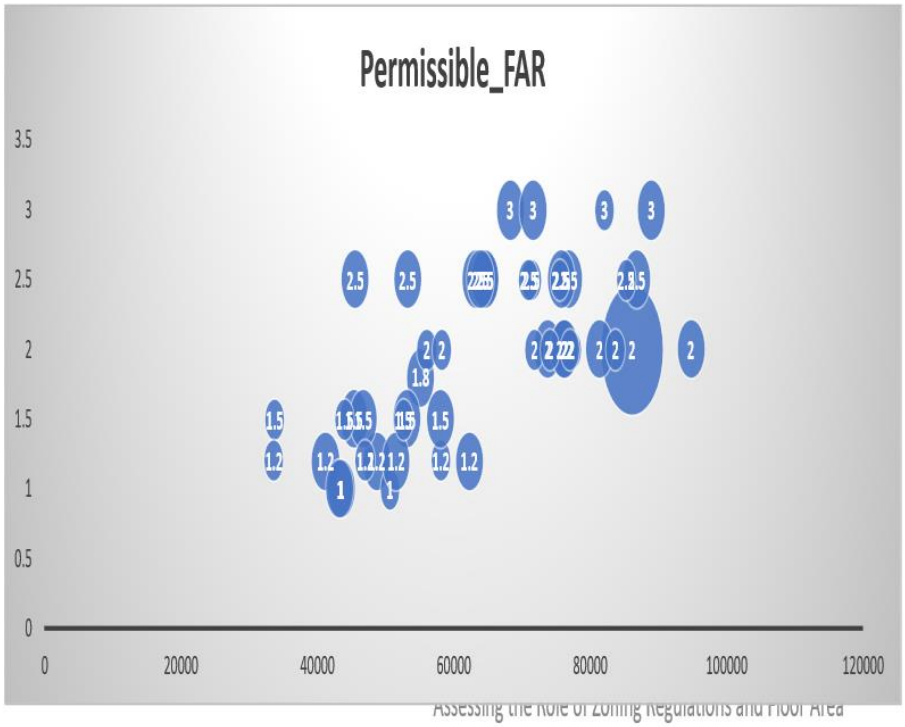


Figure 28 Ayodhya Bypass *Source:Author*

Bhojtaal(bairagarh region)

FAR vs Land Price

•FAR range: **0.5 – 1.5**

•FAR 1.5:

₹80,000 – ₹1,00,000 / sq.m

•FAR 1.0:

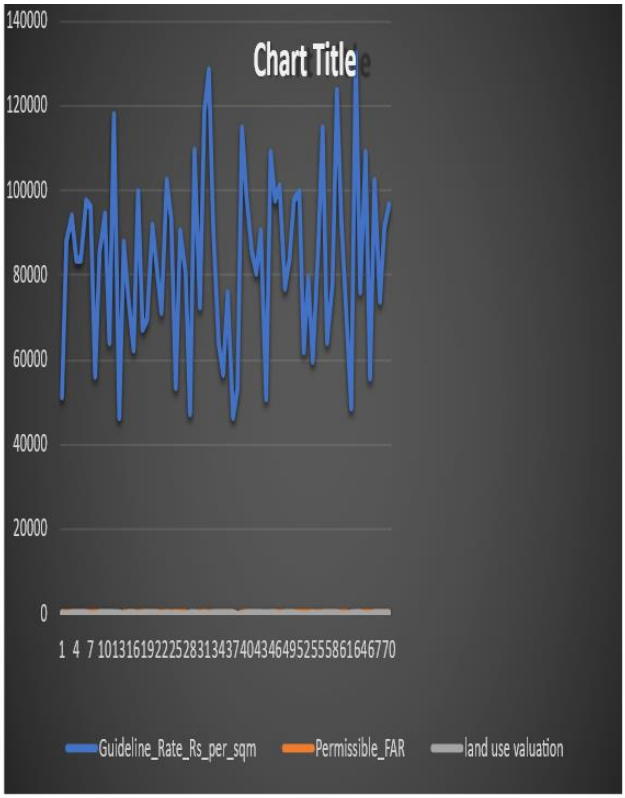
₹60,000 – ₹85,000 / sq.m

•FAR 0.5–0.8:

₹40,000 – ₹70,000 / sq.m

Key Result:

FAR increase does **NOT strongly increase land price**





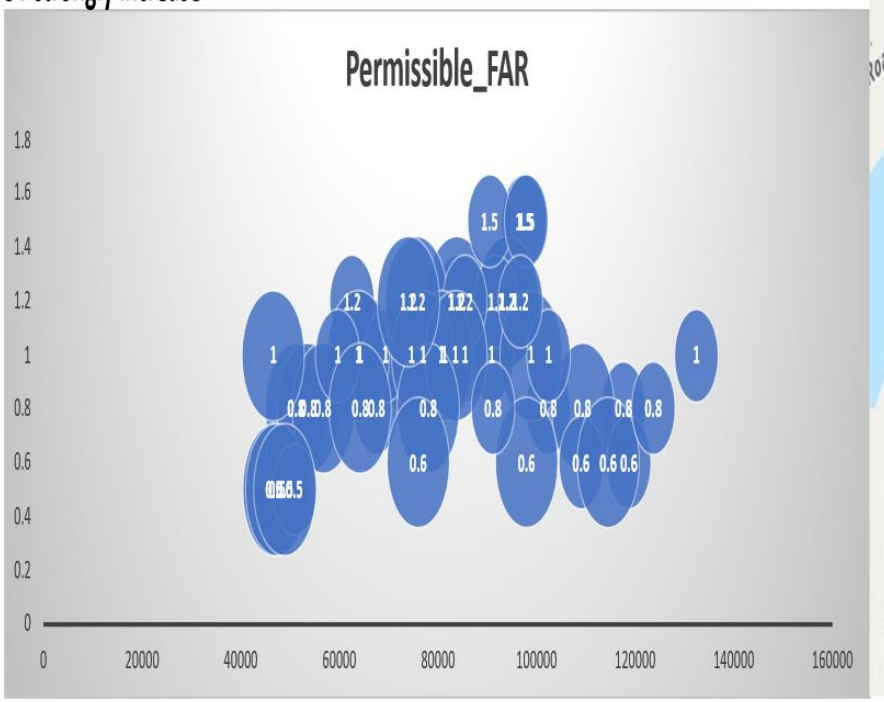


Figure 29 :Bhojtaal Region

CHAPTER 7
Result and Discussion

7.1 Results and Discussion

The present study focuses on evaluating the impact of zoning regulations and Floor Space Index (FSI/FAR) on urban land pricing patterns in Bhopal city. The research combines spatial analysis, regression modelling, GIS-based mapping, Difference-in-Differences (DiD) analysis, and Delphi survey methodology to understand how planning regulations influence land-market dynamics and urban growth patterns. The major findings of the study are summarized as follows:

The initial phase of the study involved a detailed assessment of Bhopal's urban structure, zoning framework, and land-use characteristics. Key corridors including MP Nagar, Hoshangabad Road, Kolar Road, Ayodhya Bypass, and the Bhojtal region were selected based on variations in permissible FSI, land-use intensity, infrastructure accessibility, and development patterns. This assessment helped identify the spatial and economic differences among various planning zones within the city.

The study examined the relationship between zoning regulations, accessibility, and land values through the Hedonic Pricing Model and regression analysis. The findings revealed that higher permissible FSI, proximity to major roads, and commercial or mixed-use zoning significantly increase land values. Among all variables, FSI emerged as one of the strongest determinants influencing urban land prices.

A comparative analysis of development plans and zoning regulations demonstrated a gradual transition in Bhopal from conventional low-density development toward corridor-based mixed-use growth. The analysis of Bhopal Development Plans (1991, 2005, and Draft 2031) indicated increasing emphasis on compact urban growth, transit-oriented development, and environmental protection.

The GIS-based Land Use Land Cover (LULC) analysis identified substantial urban expansion between 2003 and 2023, particularly along Kolar Road, Hoshangabad Road, and Ayodhya Bypass corridors. The results showed that infrastructure accessibility and zoning flexibility encouraged outward urban growth and increased development intensity in peripheral areas.

The Difference-in-Differences (DiD) analysis confirmed that zoning liberalization and increased FAR permissions contribute significantly to land-value appreciation. Treatment corridors with higher permissible FAR recorded substantially greater increases in land prices compared to environmentally restricted zones such as the Bhojtal region. The analysis estimated that planning regulations contributed nearly 11% additional increase in land values beyond general market appreciation.

The Delphi Survey analysis provided expert-based validation of the quantitative findings. Experts identified accessibility to major roads, FAR, zoning regulations, infrastructure availability, and market speculation as the most influential factors affecting land prices in Bhopal. The survey also emphasized the importance of corridor-specific FSI allocation, mixed-use development, parking infrastructure, and environmental protection mechanisms.

Based on the findings, different planning and development scenarios were evaluated for major urban corridors. Commercial corridors such as MP Nagar and Hoshangabad Road demonstrated higher redevelopment potential due to liberal FSI, strong accessibility, and mixed-use activity. In contrast, eco-sensitive areas surrounding Bhojtal and Van Vihar required stricter zoning controls and environmentally sensitive planning approaches.

The study further proposed a GIS-based planning regulation framework for Bhopal

city. The proposal included corridor-based FSI allocation, Transit-Oriented Development (TOD) overlays, eco-sensitive zoning buffers, redevelopment priority areas, infrastructure-linked development controls, and Transferable Development Rights (TDR) mechanisms. These proposals were designed to achieve balanced urban growth, reduce speculative land pricing, and improve infrastructure efficiency.

The overall findings indicate that zoning regulations and FSI policies act not only as planning tools but also as economic instruments that shape urban development patterns, investment decisions, and land-market behaviour. The study demonstrates that strategic planning interventions, when integrated with infrastructure development and environmental protection measures, can support sustainable and equitable urban growth in Bhopal city.

The study concludes that future urban development in Bhopal should adopt a corridor-specific and infrastructure-linked planning approach rather than a uniform citywide regulatory framework. Such an approach can help optimize land use, improve urban efficiency, preserve ecological assets, and maintain balanced land-value appreciation across different urban zones

7.2 Recommendations

7.2.1 Corridor-Based FSI Allocation

A uniform citywide FSI policy should be avoided. Instead, corridor-specific FSI regulations should be introduced based on infrastructure capacity, accessibility, and land-use characteristics.

Higher FSI may be permitted in commercially active corridors such as MP Nagar and Hoshangabad Road.

Moderate FSI should be adopted in emerging residential corridors such as Kolar Road.

Restrictive FSI controls must be maintained in eco-sensitive regions surrounding Bhojtal and Van Vihar.

This approach can promote balanced urban growth while reducing speculative land-price escalation.

7.2.2 Infrastructure-Linked Development Control

FSI permissions should be linked with infrastructure carrying capacity.

Additional FSI should only be granted after assessing road width, water supply, drainage, parking availability, and public transport accessibility.

Development impact fees may be introduced to finance infrastructure upgrading in high-growth corridors.

This will ensure sustainable densification and prevent excessive pressure on urban infrastructure.

7.2.3 Transit-Oriented Development (TOD)

The study recommends the integration of TOD principles within the Bhopal Development Plan.

Mixed-use development should be encouraged near major transport corridors.

Additional FSI incentives may be provided within TOD influence zones.

Pedestrian infrastructure and public transport accessibility should be improved.

TOD implementation can reduce traffic congestion and support compact urban development.

7.2.4 Eco-Sensitive Zoning and Environmental Protection

Special planning controls should be implemented in environmentally sensitive areas.

Strict development regulations should be enforced around Bhojtal, Van Vihar, and Kaliyasot regions.

Transferable Development Rights (TDR) mechanisms may be introduced to compensate landowners in restricted zones.

Mandatory green building and rainwater harvesting provisions should be incorporated.

These measures can help preserve ecological assets and improve urban environmental quality.

7.2.5 GIS-Based Monitoring and Digital Planning System

Modern technology-based planning systems should be adopted for better regulation and monitoring.

GIS-based zoning and land-use monitoring systems should be integrated with municipal databases.

Unauthorized constructions and zoning violations should be monitored through satellite-based mapping.

Digital approval and compliance systems should be strengthened.

This can improve transparency, planning efficiency, and governance effectiveness.

7.2.6 Affordable and Inclusive Housing Policies

Rapid land-price appreciation may reduce affordability for lower-income groups.

Inclusionary housing policies should be implemented in high-FSI projects.

Affordable housing incentives and rental housing schemes should be promoted.

Public-private partnerships should be encouraged for socially inclusive development.

This will support equitable urban growth and reduce informal settlement expansion.

7.2.7 Strengthening Planning Regulations and Enforcement

The study highlights the need for stronger implementation mechanisms.

Development Control Regulations (DCR) should be periodically revised.

Coordination between planning authorities, municipal bodies, and infrastructure agencies should be improved.

Performance-based zoning and flexible planning approaches may be introduced.

CHAPTER -8
Proposal

8.1 Hoshangabad (Narmadapuram)

Key Findings:

- Permissible FAR is the strongest determinant of land price.
- Accessibility significantly influences land values, with prices declining as distance from the main road increases.
- Land-use classification alone does not significantly affect prices once FAR and accessibility are accounted for.

Planning regulations and transport accessibility jointly shape land-price formation along the corridor**.**

8.1.1 Proposal

Simulation of FAR, zoning, and accessibility parameters indicates that land values along Hoshangabad Road can reach ₹1.26 lakh per sq.m under maximum development intensity.

However, a balanced regulatory framework with FAR between 2.5 and 3.0 and controlled commercial zoning suggests a feasible collector guideline rate of ₹1.15–1.20 lakh per sq.m, ensuring revenue optimization without excessive market distortion.

Collector guideline rate:

₹1,15,000 to ₹1,20,000 per sq.m

FAR 2.5-3

8.2 Maharana Pratap Nagar (MP nagar)

Key Findings:

- **Permissible FAR is the strongest and most consistent determinant** of land prices.
- **Accessibility (distance to main road) significantly affects land value**, with prices declining as distance increases.
- **Land-use classification does not independently explain price variation** once FAR and accessibility are considered.
- The corridor shows **moderate price heterogeneity**, influenced by both planning controls and location

8.2.1 Proposal

- Simulation of FAR, zoning regulation, and accessibility parameters for MP Nagar indicates that land values may reach ₹1.64 lakh per sq.m under maximum development intensity (FAR 4.0). However, a balanced regulatory framework with FAR between 3.0 and 3.5 and core commercial zoning suggests a feasible collector guideline rate of approximately ₹1.40–1.50 lakh per sq.m, ensuring revenue optimization without excessive urban congestion.

.

Collector guideline rate:

₹1,40000 to ₹1,60,000 per sq.m

FAR 3.0-3.5

8.3 Kolar

Key Findings:

- The regression model is **statistically robust and well-fitted**.
- **Permissible FAR significantly increases land prices**, confirming the capitalization of development potential.
- **Accessibility (distance to main road) is a strong negative determinant** of land value.
- **Land-use classification alone does not significantly influence prices** once FAR and accessibility are controlled for.
- Kolar Road exhibits **moderate land-price sensitivity** compared to prime commercial corridors.

8.3.1 Proposal

Simulation results indicate that Kolar Road land values may reach ₹1.03 lakh per sq.m under maximum FAR (3.5) and high accessibility conditions. However, a balanced FAR of 2.5–3.0 combined with mixed zoning suggests a feasible collector guideline rate of approximately ₹90,000–₹95,000 per sq.m, ensuring revenue alignment with market fundamentals while maintaining urban livability.

Collector guideline rate: ₹90,000 to ₹95,000 per sq.m

FAR 2.5-3

8.4 Ayodhya Bypass

Key Findings:

- The regression model is **statistically robust** and explains a substantial share of land-price variation.
- **Permissible FAR positively influences land prices**, but with a **moderate magnitude** compared to prime corridors.
- **Accessibility (distance to main road) is the most influential variable**, with a strong negative impact on land value.
- **Land-use classification alone does not significantly determine prices** once FAR and accessibility are included.
- Ayodhya Bypass shows characteristics of a **growth corridor**, where location and infrastructure access dominate pricing.

8.4.1 Proposal

The revised collector guideline rate for Ayodhya Bypass should be rationalized to ₹80,000–₹90,000 per sq.m, reflecting realistic market behavior driven primarily by accessibility rather than FAR intensity

primarily by accessibility rather than FAR intensity

Collector guideline rate: ₹80,000 to ₹90,000 per sq.m

FAR 2.5-3

8.5 Bhojtaal region (Bairagarh region)

Key Findings:

- Accessibility (distance to main road) is the most influential determinant of land prices in the Bhojtal–Bairagarh area.
- Permissible FAR does not significantly influence land prices, reflecting eco-sensitive planning controls.
- Land-use classification has no independent pricing effect once accessibility is accounted for.
- The area exhibits amenity-driven baseline values, rather than development-driven value formation.

8.5.1 Proposal

Bhojtal region exhibits an amenity-driven valuation structure wherein increases in FAR and commercial zoning significantly reduce land values. The model indicates that optimal pricing occurs under low-density residential development (FAR 0.5–1.0).

Collector guideline rate: ₹95,000 to ₹1,05,000 per sq.m

FAR 0.5-1

Proposal –Land pricing

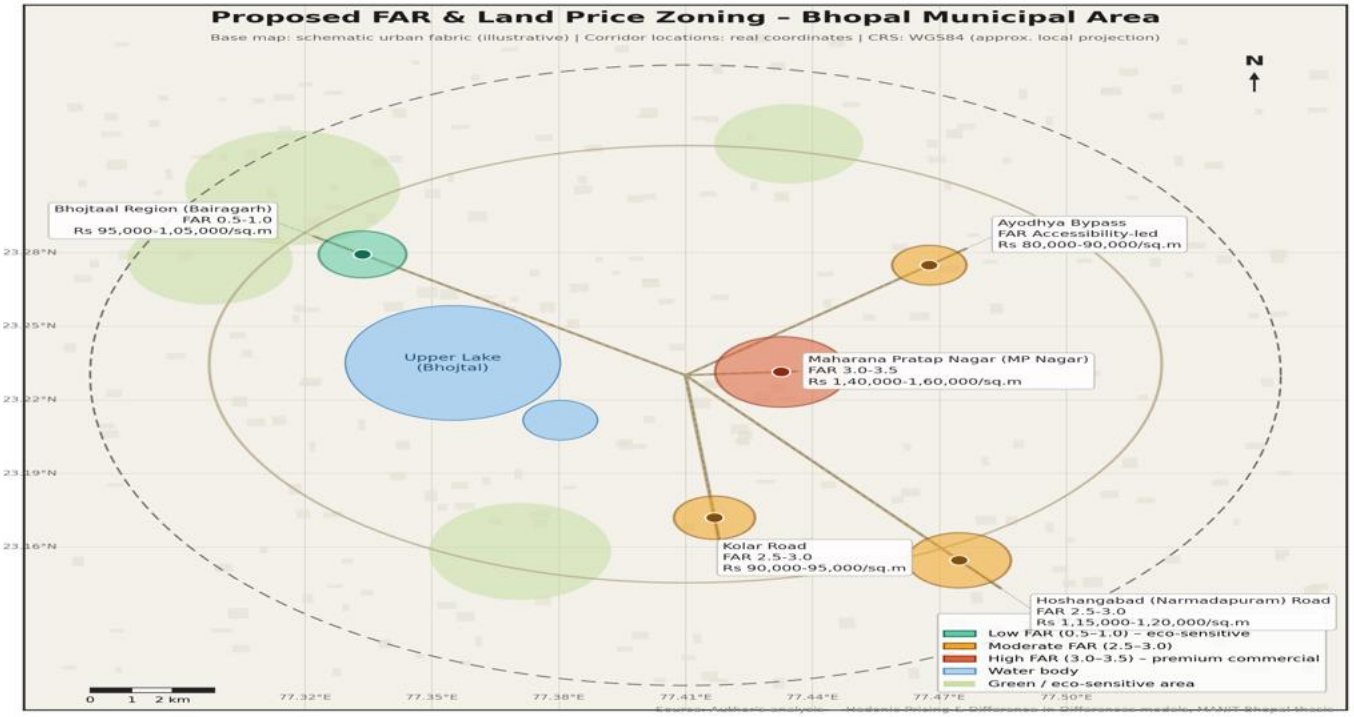


Figure 30 :Proposed FAR and land price zoning

Proposed TDR(Transfer of development Rights)Framework

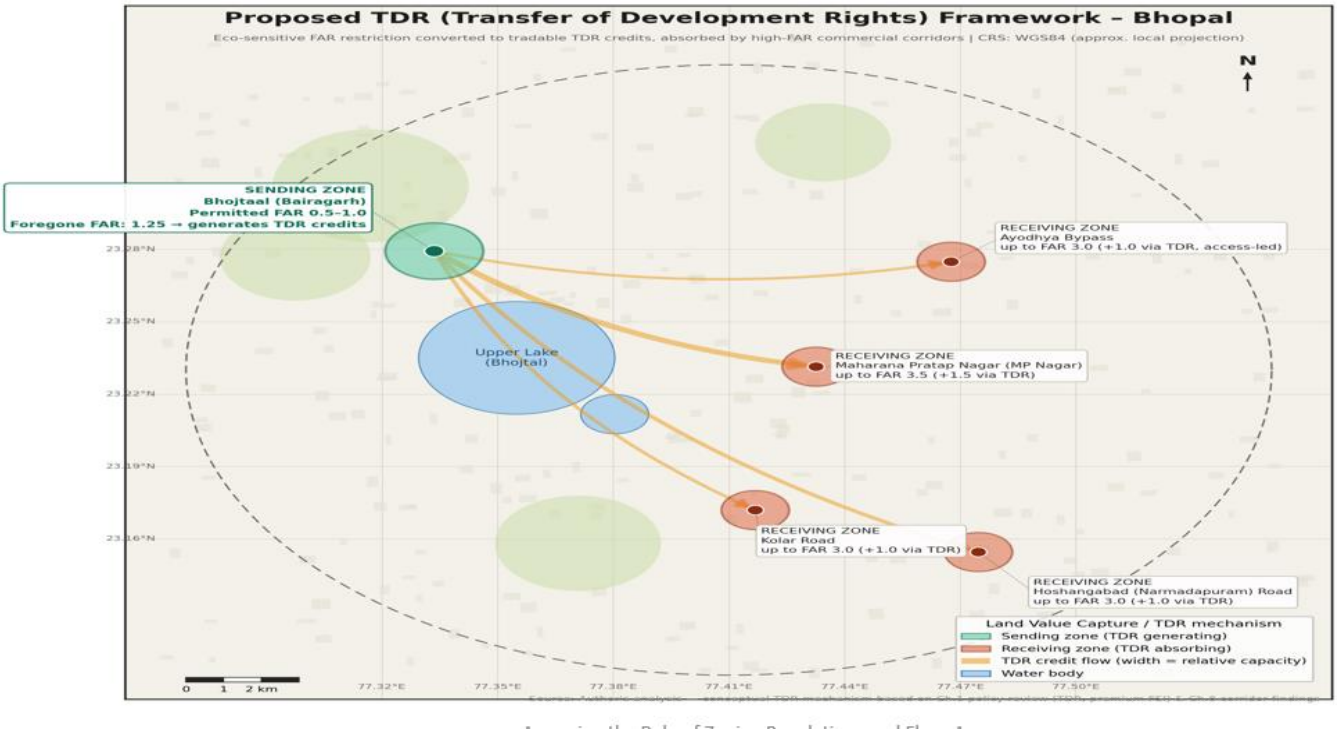


Figure 31 :Bhojtaal Region

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ANNEXURE 1- Delphi Survey analysis questionnaire

Untitled form

This survey is conducted as part of a Master of Planning (Urban Planning) dissertation at MANIT Bhopal titled:

"Assessing the Role of Zoning Regulations and Floor Space Index (FSI) on Urban Land Pricing in Bhopal City."

The purpose of this Delphi survey is to obtain expert consensus on how zoning regulations, FAR/FSI, accessibility, and policy interventions influence land pricing across five major corridors of Bhopal:

- MP Nagar
- Hoshangabad Road
- Kolar Road
- Ayodhya Bypass
- Bhojtal (Upper Lake) Region

All responses will remain anonymous and will be used strictly for academic research purposes.

arjunsingham89@gmail.com Switch account

Not shared

Email

Your answer

Email

Your answer

Name

Your answer

Designation

Your answer

How strongly does Floor Space Index (FSI/FAR) influence land prices in Bhopal?

	1	2	3	4	5	
Very Low Influence	◯	◯	◯	◯	◯	Very High Influence

How strongly do zoning regulations influence land prices?

	1	2	3	4	5	
Very Low Influence	◯	◯	◯	◯	◯	Very High Influence

Which factor has the highest impact on land value in Bhopal

- ◯ Optimum Permissible FAR
- ◯ Zoning Type
- ◯ Distance to Major Road
- ◯ Metro/Transit Connectivity

Which factor has the highest impact on land value in Bhopal

- ◯ Optimum Permissible FAR
- ◯ Zoning Type
- ◯ Distance to Major Road
- ◯ Metro/Transit Connectivity
- ◯ Environmental Restrictions
- ◯ Market Speculation
- ◯ Policy Announcement Effectson 1

Does liberal FAR lead to speculative price escalation?

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

Impact of FAR on MP Nagar Corridor

	1	2	3	4	5	
Low	◯	◯	◯	◯	◯	High

Impact of FAR on Hoshangabad road Corridor

	1	2	3	4	5	
Low	◯	◯	◯	◯	◯	High

Impact of FAR on MP Nagar Corridor

	1	2	3	4	5	
Low	◯	◯	◯	◯	◯	High

Impact of FAR on Hoshangabad road Corridor

	1	2	3	4	5	
Low	◯	◯	◯	◯	◯	High

Impact of FAR on Kolar Corridor

	1	2	3	4	5	
Low	◯	◯	◯	◯	◯	High

Impact of FAR on Ayodhya Bypass corridor

	1	2	3	4	5	
low	◯	◯	◯	◯	◯	high

Impact of FAR on Bhojtaal Corridor

	1	2	3	4	5	
Low	◯	◯	◯	◯	◯	High

In Bhojtal region, do environmental zoning restrictions suppress land value?

- ◯ Strongly Yes
- ◯ Yes

In Bhojtal region, do environmental zoning restrictions suppress land value?

- ◯ Strongly Yes
- ◯ Yes
- ◯ Neutral
- ◯ No
- ◯ Strongly No

Should FAR be corridor-specific rather than uniform across Bhopal?

- ◯ Yes
- ◯ No
- ◯ Depends on Infrastructure
- ◯ Not Sure

Should Bhopal adopt Premium FSI / Land Value Capture mechanisms?

- ◯ Strongly Yes
- ◯ Yes
- ◯ Neutral
- ◯ No
- ◯ Strongly No

Rank the following determinants of land price (1 = Highest Impact)

	1 | 2 | 3 | 4 | 5
FSI Intensity	◯
Zoning Type	◯
Accessibility	◯

Rank the following determinants of land price (1 = Highest Impact)

	1 | 2 | 3 | 4 | 5
FSI Intensity	◯
Zoning Type	◯
Accessibility	◯
Policy Announcements	◯
Environmental Restriction	◯

What major reforms are required in Bhopal's zoning and FAR policy?

Your answer

Any additional comments or recommendations?

Your answer

Submit

Clear form

Annexure 2

ID	Building	Segment	Frontage	Guideline_Rate_Rs_per_sqm	Permissible_FAR	Distance_to_Main_Road_m	Parcel_Area_sqm	Total_Land_Value_Rs	Total_Floor_Value_Rs
1	HoshangabadRd_Building_1	Segment C (near transit)	Corner plot	94446	2	9	295	27861570	55723140
2	HoshangabadRd_Building_2	Segment B (main)	Regular frontage	94426	2	23	657	62037882	124075764
3	HoshangabadRd_Building_3	Segment A (prime)	Corner plot	121845	3	14	622	75787590	227362770
4	HoshangabadRd_Building_4	Segment B (main)	Regular frontage	110939	2.5	14	331	36720809	91802022.5
5	HoshangabadRd_Building_5	Segment C (near transit)	Prime frontage	118945	2	17	1039	123583855	247167710
6	HoshangabadRd_Building_6	Segment D (market)	Regular frontage	71899	2	7	655	47093845	94187690
7	HoshangabadRd_Building_7	Segment C (near transit)	Regular frontage	95627	2.5	15	465	44466555	111166387.5
8	HoshangabadRd_Building_8	Segment A (prime)	Regular frontage	135939	2.5	12	486	66066354	165165885
9	HoshangabadRd_Building_9	Segment A (prime)	Regular frontage	124541	2.5	2	674	83940634	209851585
10	HoshangabadRd_Building_10	Segment C (near transit)	Service lane	83654	2	19	850	71105900	142211800
11	HoshangabadRd_Building_11	Segment E (inner lane)	Regular frontage	79487	1	71	1024	81394688	81394688
12	HoshangabadRd_Building_12	Segment B (main)	Regular frontage	99268	2.5	15	511	50725948	126814870
13	HoshangabadRd_Building_13	Segment A (prime)	Prime frontage	135706	2.5	1	1060	143848360	359620900
14	HoshangabadRd_Building_14	Segment E (inner lane)	Prime frontage	65246	1.5	44	943	61526978	92290467
15	HoshangabadRd_Building_15	Segment C (near transit)	Regular frontage	91184	2.5	10	370	33738080	84345200
16	HoshangabadRd_Building_16	Segment A (prime)	Regular frontage	112454	3	5	1150	129322100	387966300
17	HoshangabadRd_Building_17	Segment E (inner lane)	Regular frontage	55056	1	56	1188	65406528	65406528
18	HoshangabadRd_Building_18	Segment D (market)	Regular frontage	76910	1.5	31	303	23303730	34955595
19	HoshangabadRd_Building_19	Segment A (prime)	Regular frontage	127868	2.5	7	1069	136690892	341727230
20	HoshangabadRd_Building_20	Segment D (market)	Corner plot	93302	1.5	19	883	82385666	123578499

21	HoshangabadRd_Building_21	Segment A (prime)	Regular frontage	119914	3	12	410	49164740	147494220
22	HoshangabadRd_Building_22	Segment D (market)	Regular frontage	72693	2	24	432	31403376	62806752
23	HoshangabadRd_Building_23	Segment E (inner lane)	Corner plot	72277	1	71	321	23200917	23200917
24	HoshangabadRd_Building_24	Segment C (near transit)	Regular frontage	94474	2	9	670	63297580	126595160
25	HoshangabadRd_Building_25	Segment D (market)	Corner plot	91899	2	19	892	81973908	163947816
26	HoshangabadRd_Building_26	Segment D (market)	Regular frontage	90147	2	16	614	55350258	110700516
27	HoshangabadRd_Building_27	Segment B (main)	Regular frontage	110080	1.5	19	1064	117125120	175687680
28	HoshangabadRd_Building_28	Segment A (prime)	Regular frontage	115855	2	3	377	43677335	87354670
29	HoshangabadRd_Building_29	Segment C (near transit)	Regular frontage	89931	2	18	520	46764120	93528240
30	HoshangabadRd_Building_30	Segment D (market)	Regular frontage	70197	2	20	1060	74408820	148817640
31	HoshangabadRd_Building_31	Segment B (main)	Regular frontage	105708	1.5	6	724	76532592	114798888
32	HoshangabadRd_Building_32	Segment B (main)	Regular frontage	92911	2	11	884	82133324	164266648
33	HoshangabadRd_Building_33	Segment F (fringe)	Regular frontage	39736	1	180	399	15854664	15854664
34	HoshangabadRd_Building_34	Segment B (main)	Corner plot	123938	2.5	22	865	107206370	268015925
35	HoshangabadRd_Building_35	Segment A (prime)	Regular frontage	138299	3	11	923	127649977	382949931
36	HoshangabadRd_Building_36	Segment D (market)	Service lane	75343	2.5	28	212	15972716	39931790
37	HoshangabadRd_Building_37	Segment E (inner lane)	Regular frontage	68032	1	47	879	59800128	59800128
38	HoshangabadRd_Building_38	Segment C (near transit)	Regular frontage	90592	2.5	19	476	43121792	107804480
39	HoshangabadRd_Building_39	Segment D (market)	Regular frontage	87340	1.5	37	1051	91794340	137691510
40	HoshangabadRd_Building_40	Segment B (main)	Regular frontage	116103	2.5	9	601	69777903	174444757.5
41	HoshangabadRd_Building_41	Segment D (market)	Service lane	67274	2	26	699	47024526	94049052
42	HoshangabadRd_Building_42	Segment C (near transit)	Regular frontage	95677	2.5	3	601	57501877	143754692.5
43	HoshangabadRd_Building_43	Segment D (market)	Regular frontage	75600	1.5	23	1163	87922800	131884200

63	HoshangabadRd_Building_63	Segment A (prime)	Regular frontage	112479	2	4	429	48253491	96506982
64	HoshangabadRd_Building_64	Segment C (near transit)	Prime frontage	113929	2.5	3	947	107890763	269726907.5
65	HoshangabadRd_Building_65	Segment F (fringe)	Regular frontage	44823	1.5	98	155	6947565	10421347.5
66	HoshangabadRd_Building_66	Segment F (fringe)	Regular frontage	64168	1.5	189	380	24383840	36575760
67	HoshangabadRd_Building_67	Segment C (near transit)	Regular frontage	87427	2	12	576	50357952	100715904
68	HoshangabadRd_Building_68	Segment F (fringe)	Prime frontage	44749	1	58	1127	50432123	50432123
69	HoshangabadRd_Building_69	Segment A (prime)	Regular frontage	137122	3	7	1093	149874346	449623038
70	HoshangabadRd_Building_70	Segment E (inner lane)	Regular frontage	59817	1	16	554	33138618	33138618
71	HoshangabadRd_Building_71	Segment D (market)	Regular frontage	70412	1.5	29	159	11195508	16793262
72	HoshangabadRd_Building_72	Segment B (main)	Regular frontage	108888	2.5	5	580	63155040	157887600
73	HoshangabadRd_Building_73	Segment C (near transit)	Regular frontage	87143	2	6	967	84267281	168534562
74	HoshangabadRd_Building_74	Segment E (inner lane)	Regular frontage	52914	1	26	686	36299004	36299004
75	HoshangabadRd_Building_75	Segment C (near transit)	Service lane	72843	2	5	798	58128714	116257428
76	HoshangabadRd_Building_76	Segment A (prime)	Regular frontage	112502	2	4	493	55463486	110926972
77	HoshangabadRd_Building_77	Segment C (near transit)	Regular frontage	89491	2	5	830	74277530	148555060
78	HoshangabadRd_Building_78	Segment A (prime)	Prime frontage	154380	2.5	7	164	25318320	63295800
79	HoshangabadRd_Building_79	Segment E (inner lane)	Regular frontage	58924	1	27	1107	65228868	65228868
80	HoshangabadRd_Building_80	Segment E (inner lane)	Corner plot	62761	1	16	767	48137687	48137687
81	HoshangabadRd_Building_81	Segment C (near transit)	Regular frontage	104065	2	6	615	63999975	127999950
82	HoshangabadRd_Building_82	Segment E (inner lane)	Regular frontage	67749	2	54	317	21476433	42952866
83	HoshangabadRd_Building_83	Segment A (prime)	Service lane	99099	2.5	7	220	21801780	54504450
84	HoshangabadRd_Building_84	Segment A (prime)	Prime frontage	139971	2.5	2	1121	156907491	392268727.5

84	23.27201	77.46376	89546	2.5	0	105	Residentia	1.57E+08	3.92E+08
85	23.27256	77.46461	120588	1.5	1	142	Commerci	35580524	71161048
86	23.27243	77.46438	120037	2.5	0.5	146	Mixed Use	5935415	5935415
87	23.27355	77.46482	113447	3	1	116	Institution	17857242	26785863
88	23.27418	77.4651	104355	2.5	0.5	86	Mixed Use	14260930	7130465
89	23.27462	77.46543	104416	2	0	110	Residentia	63995670	95993505
90	23.27445	77.46619	119286	2	0	47	Residentia	58468168	87702252
91	23.27588	77.46647	119275	2.5	0.5	57	Mixed Use	65620922	1.31E+08
92	23.27611	77.46671	93765	1.5	0	73	Residentia	54810865	1.1E+08
93	23.27652	77.46685	89153	2	0.5	106	Mixed Use	21952058	54880145
94	23.2768	77.46754	83424	1.5	0.5	126	Mixed Use	34374921	51562382
95	23.27774	77.46786	105955	1.5	0.5	137	Mixed Use	35628558	35628558
96	23.2783	77.46876	56897	2	0	91	Residentia	37911335	75822670
97	23.27837	77.46907	121668	2.5	0	56	Residentia	48186762	48186762
98	23.27904	77.46889	108856	1.5	1	58	Commerci	94935225	1.9E+08
99	23.27975	77.46995	97240	2	1	76	Institution	9899006	14848509
100	23.27941	77.46983	90918	2	0.5	134	Mixed Use	1.39E+08	2.78E+08

Kolar

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Building_I	Building_N	Segment	Frontage	Latitude	Longitude	Guideline_	Permissibl	Distance_to_Main_R		Land_Use	Parcel_Are	Total_Lan	Total_Floor_
1	Kolar_Buil	Kolar Mair	Service lar	23.23483	77.41996	63060	2	23	0	Residentia	193	12170580	24341160
2	Kolar_Buil	Kolar Com	Prime fror	23.23381	77.42067	73626	1.5	35	1	Commerci	905	66631530	99947295
3	Kolar_Buil	Kolar Com	Regular fr	23.23386	77.42121	64951	1.5	21	0.5	Mixed Use	1024	66509824	99764736
4	Kolar_Buil	Kolar Resi	Corner plc	23.2331	77.42059	49447	1.2	36	0	Residentia	161	7960967	9553160
5	Kolar_Buil	Kolar Fring	Regular fr	23.23305	77.42208	48960	1	84	0	Residentia	729	35691840	35691840
6	Kolar_Buil	Kolar Mair	Regular fr	23.23196	77.42238	93935	1.5	27	1	Commerci	206	19350610	29025915
7	Kolar_Buil	Kolar Mair	Regular fr	23.23087	77.42197	71367	2	12	0.5	Mixed Use	1075	76719525	1.53E+08
8	Kolar_Buil	Kolar Mair	Regular fr	23.22993	77.42362	84442	2.5	19	0.5	Mixed Use	904	76335568	1.91E+08
9	Kolar_Buil	Kolar Resi	Regular fr	23.23018	77.42313	45786	1.2	62	0	Residentia	882	40383252	48459902
10	Kolar_Buil	Kolar Com	Prime fror	23.22918	77.42363	92522	2	32	0.5	Mixed Use	487	45058214	90116428
11	Kolar_Buil	Kolar Resi	Prime fror	23.22864	77.42448	70773	1.2	61	0.5	Mixed Use	744	52655112	63186134
12	Kolar_Buil	Kolar Resi	Prime fror	23.2278	77.42393	69457	1.5	36	1	Commerci	122	8473754	12710631
13	Kolar_Buil	Kolar Mair	Prime fror	23.22661	77.42412	101686	2	10	0.5	Mixed Use	411	41792946	83585892
14	Kolar_Buil	Kolar Mair	Prime fror	23.22714	77.42481	101710	2	7	1	Institution	940	95607400	1.91E+08
15	Kolar_Buil	Kolar Com	Regular fr	23.22633	77.42539	80149	2	17	0.5	Mixed Use	430	34464070	68928140
16	Kolar_Buil	Kolar Fring	Regular fr	23.2256	77.42586	54439	1.2	41	0.5	Mixed Use	667	36310813	43572976
17	Kolar_Buil	Kolar Mair	Regular fr	23.22514	77.42636	94847	1.5	26	0.5	Mixed Use	1188	1.13E+08	1.69E+08
18	Kolar_Buil	Kolar Mair	Regular fr	23.22374	77.42714	92385	2.5	16	0.5	Mixed Use	940	86841900	2.17E+08
19	Kolar_Buil	Kolar Mair	Prime fror	23.2244	77.42653	91508	2	11	0	Residentia	1057	96723956	1.93E+08
19	Kolar_Buil	Kolar Mair	Prime fror	23.2244	77.42653	91508	2	11	0	Residentia	1057	96723956	1.93E+08
20	Kolar_Buil	Kolar Mair	Regular fr	23.22285	77.42673	85621	2.5	8	1	Commerci	455	38957555	97393888
21	Kolar_Buil	Kolar Mair	Regular fr	23.22249	77.42772	87627	2.5	25	0	Residentia	926	81142602	2.03E+08
22	Kolar_Buil	Kolar Com	Regular fr	23.22201	77.42797	66506	1.5	15	1	Commerci	914	60786484	91179726
23	Kolar_Buil	Kolar Resi	Prime fror	23.21999	77.42833	72294	1.5	56	1	Commerci	412	29785128	44677692
24	Kolar_Buil	Kolar Resi	Regular fr	23.22111	77.42819	56865	1	52	1	Commerci	292	16604580	16604580
25	Kolar_Buil	Kolar Mair	Regular fr	23.21983	77.42938	89466	2	4	1	Commerci	150	13419900	26839800
26	Kolar_Buil	Kolar Mair	Regular fr	23.2185	77.42976	93526	2	11	0.5	Mixed Use	1057	98856982	1.98E+08
27	Kolar_Buil	Kolar Resi	Regular fr	23.2184	77.42976	46279	1.2	65	0.5	Mixed Use	978	45260862	54313034
28	Kolar_Buil	Kolar Mair	Regular fr	23.219	77.43134	75933	2	20	1	Institution	909	69023097	1.38E+08
29	Kolar_Buil	Kolar Resi	Prime fror	23.21718	77.43016	69446	1.2	62	1	Commerci	276	19167096	23000515
30	Kolar_Buil	Kolar Com	Corner plc	23.21608	77.43142	71112	2	11	1	Commerci	732	52053984	1.04E+08
31	Kolar_Buil	Kolar Mair	Regular fr	23.21595	77.43116	82240	1.5	15	0	Residentia	1130	92931200	1.39E+08
32	Kolar_Buil	Kolar Com	Regular fr	23.21553	77.43143	60402	1.5	33	1	Institution	445	26878890	40318335
33	Kolar_Buil	Kolar Com	Prime fror	23.2145	77.43168	70971	2	14	0	Residentia	327	23207517	46415034
34	Kolar_Buil	Kolar Mair	Regular fr	23.21387	77.43295	78458	1.5	29	1	Commerci	261	20477538	30716307
35	Kolar_Buil	Kolar Com	Regular fr	23.21395	77.43267	68346	1.5	28	1	Commerci	474	32396004	48594006
36	Kolar_Buil	Kolar Resi	Regular fr	23.21318	77.4331	59045	1.5	31	0	Residentia	536	31648120	47472180
37	Kolar_Buil	Kolar Mair	Regular fr	23.21221	77.43351	71852	2	12	1	Commerci	640	45985280	91970560

33	Kolar_Buil	Kolar Com	Prime fror	23.2145	77.43168	70971	2	14	0	Residentia	327	23207517	46415034
34	Kolar_Buil	Kolar Mair	Regular fr	23.21387	77.43295	78458	1.5	29	1	Commerci	261	20477538	30716307
35	Kolar_Buil	Kolar Com	Regular fr	23.21395	77.43267	68346	1.5	28	1	Commerci	474	32396004	48594006
36	Kolar_Buil	Kolar Resi	Regular fr	23.21318	77.4331	59045	1.5	31	0	Residentia	536	31648120	47472180
37	Kolar_Buil	Kolar Mair	Regular fr	23.21221	77.43351	71852	2	12	1	Commerci	640	45985280	91970560
38	Kolar_Buil	Kolar Fring	Regular fr	23.21156	77.43422	51481	1	144	1	Commerci	1192	61365352	61365352
39	Kolar_Buil	Kolar Mair	Corner plc	23.21101	77.4349	87986	2	24	0.5	Mixed Use	118	10382348	20764696
40	Kolar_Buil	Kolar Mair	Regular fr	23.21014	77.43495	79958	1.5	8	1	Commerci	831	66445098	99667647
41	Kolar_Buil	Kolar Mair	Corner plc	23.20968	77.43571	88375	2.5	3	0	Residentia	1106	97742750	2.44E+08
42	Kolar_Buil	Kolar Resi	Regular fr	23.20911	77.43613	57430	1.2	50	1	Institution	311	17860730	21432876
43	Kolar_Buil	Kolar Com	Prime fror	23.20901	77.4358	73863	2	38	1	Institution	315	23266845	46533690
44	Kolar_Buil	Kolar Resi	Regular fr	23.20732	77.43648	63651	1	45	0	Residentia	366	23296266	23296266
45	Kolar_Buil	Kolar Resi	Regular fr	23.20753	77.43709	60440	1.2	68	0	Residentia	497	30038680	36046416
46	Kolar_Buil	Kolar Fring	Regular fr	23.20719	77.43741	38935	1	48	0	Residentia	932	36287420	36287420
47	Kolar_Buil	Kolar Mair	Regular fr	23.20554	77.43754	77235	2	23	1	Commerci	170	13129950	26259900
48	Kolar_Buil	Kolar Mair	Regular fr	23.20533	77.4385	72903	1.5	20	1	Commerci	207	15090921	22636382
49	Kolar_Buil	Kolar Resi	Service lar	23.20472	77.43816	52530	1	47	1	Institution	106	5568180	5568180
50	Kolar_Buil	Kolar Mair	Regular fr	23.20392	77.43855	80275	2.5	22	1	Commerci	431	34598525	86496313
51	Kolar_Buil	Kolar Mair	Regular fr	23.20316	77.43917	74645	1.5	6	0	Residentia	1074	80168730	1.2E+08
52	Kolar_Buil	Kolar Resi	Regular fr	23.20232	77.43934	52678	1.2	28	0.5	Mixed Use	90	4741020	5689224
57	Kolar_Buil	Kolar Resi	Regular fr	23.19992	77.44178	45206	1	49	1	Commerci	1131	51127986	51127986
58	Kolar_Buil	Kolar Resi	Prime fror	23.19851	77.44121	54775	1.5	70	1	Institution	362	19828550	29742825
59	Kolar_Buil	Kolar Fring	Service lar	23.19852	77.4423	37176	1.2	81	1	Institution	175	6505800	7806960
60	Kolar_Buil	Kolar Fring	Service lar	23.19794	77.44226	42916	1	100	0.5	Mixed Use	280	12016480	12016480
61	Kolar_Buil	Kolar Resi	Service lar	23.19731	77.44294	52677	1.2	65	0	Residentia	697	36715869	44059043
62	Kolar_Buil	Kolar Mair	Prime fror	23.19622	77.44346	99261	2	17	0.5	Mixed Use	1148	1.14E+08	2.28E+08
63	Kolar_Buil	Kolar Fring	Regular fr	23.1959	77.44331	37086	1.2	145	1	Institution	837	31040982	37249178
64	Kolar_Buil	Kolar Mair	Service lar	23.19521	77.44359	61742	2.5	9	0	Residentia	404	24943768	62359420
65	Kolar_Buil	Kolar Mair	Service lar	23.19417	77.44436	71682	2.5	7	0.5	Mixed Use	113	8100066	20250165
66	Kolar_Buil	Kolar Resi	Regular fr	23.19365	77.44461	52393	1.5	51	1	Commerci	1074	56270082	84405123
67	Kolar_Buil	Kolar Mair	Regular fr	23.19349	77.44491	94535	2	28	1	Commerci	1158	1.09E+08	2.19E+08
68	Kolar_Buil	Kolar Resi	Corner plc	23.19238	77.44563	52387	1.5	73	0.5	Mixed Use	181	9482047	14223071
69	Kolar_Buil	Kolar Mair	Prime fror	23.19214	77.44581	107708	2.5	11	0	Residentia	199	21433892	53584730
70	Kolar_Buil	Kolar Mair	Regular fr	23.19137	77.44645	78368	2.5	21	0	Residentia	1000	78368000	1.96E+08
71	Kolar_Buil	Kolar Com	Regular fr	23.1906	77.44689	62835	1.5	15	0	Residentia	1073	67421955	1.01E+08
72	Kolar_Buil	Kolar Com	Regular fr	23.19011	77.44674	73965	1.5	19	1	Commerci	664	49112760	73669140
73	Kolar_Buil	Kolar Com	Regular fr	23.18957	77.44718	60229	1.5	20	0	Residentia	113	6805877	10208816
74	Kolar_Buil	Kolar Fring	Service lar	23.18883	77.44789	37163	1.2	93	1	Commerci	120	4459560	5351472
75	Kolar_Buil	Kolar Com	Service lar	23.18824	77.44825	51714	2	23	1	Commerci	353	18255042	36510084
76	Kolar_Buil	Kolar Com	Regular fr	23.18781	77.4486	63046	1.5	31	0	Residentia	429	27046734	40570101
72	Kolar_Buil	Kolar Com	Regular fr	23.19011	77.44674	73965	1.5	19	1	Commerci	664	49112760	73669140
73	Kolar_Buil	Kolar Com	Regular fr	23.18957	77.44718	60229	1.5	20	0	Residentia	113	6805877	10208816
74	Kolar_Buil	Kolar Fring	Service lar	23.18883	77.44789	37163	1.2	93	1	Commerci	120	4459560	5351472
75	Kolar_Buil	Kolar Com	Service lar	23.18824	77.44825	51714	2	23	1	Commerci	353	18255042	36510084
76	Kolar_Buil	Kolar Com	Regular fr	23.18781	77.4486	63046	1.5	31	0	Residentia	429	27046734	40570101
77	Kolar_Buil	Kolar Resi	Prime fror	23.18683	77.44949	72153	1	51	0	Residentia	432	31170096	31170096
78	Kolar_Buil	Kolar Fring	Regular fr	23.18635	77.44989	41465	1.2	131	0	Residentia	1134	47021310	56425572
79	Kolar_Buil	Kolar Mair	Regular fr	23.18556	77.44902	73725	2.5	14	0.5	Mixed Use	897	66131325	1.65E+08
80	Kolar_Buil	Kolar Com	Prime fror	23.18517	77.45007	91941	2	38	1	Institution	426	39166866	78333732

MP Nagar

Building_I	Building_N	Segment	Frontage	Latitude	Longitude	Guideline_	Permissibl	Distance_t	land use v	Land_Use	Parcel_Are	Total_Lan	Total_Floo
1	MP_Rani_	MP Nagar	Prime fror	23.26193	77.39421	131657	2.5	23	0	Residentia	673	88605161	2.22E+08
2	MP_Rani_	MP Nagar	Regular fr	23.26203	77.39477	146976	2.5	14	0.5	Mixed Use	730	1.07E+08	2.68E+08
3	MP_Rani_	MP Nagar	Prime fror	23.26155	77.39548	160129	2.5	13	0.5	Mixed Use	1130	1.81E+08	4.52E+08
4	MP_Rani_	MP Nagar	Regular fr	23.2614	77.39578	122847	2.5	13	0	Residentia	176	21621072	54052680
5	MP_Rani_	MP Nagar	Regular fr	23.26215	77.39561	126131	3	3	1	Commerci	1254	1.58E+08	4.75E+08
6	MP_Rani_	MP Nagar	Regular fr	23.26182	77.39583	134589	2.5	5	1	Commerci	158	21265062	53162655
7	MP_Rani_	MP Nagar	Corner plc	23.26123	77.3961	125164	2.5	4	1	Institution	354	44308056	1.11E+08
8	MP_Rani_	MP Nagar	Corner plc	23.26116	77.39602	161631	2	4	0	Residentia	335	54146385	1.08E+08
9	MP_Rani_	MP Nagar	Service lar	23.26119	77.39627	101283	3	9	1	Commerci	602	60972366	1.83E+08
10	MP_Rani_	MP Nagar	Prime fror	23.26123	77.39658	147127	2.5	23	1	Commerci	1340	1.97E+08	4.93E+08
11	MP_Rani_	MP Nagar	Prime fror	23.26101	77.39634	163716	3	3	1	Commerci	719	1.18E+08	3.53E+08
12	MP_Rani_	MP Nagar	Corner plc	23.26007	77.39631	143889	3	18	1	Institution	219	31511691	94535073
13	MP_Rani_	MP Nagar	Regular fr	23.26048	77.39769	134758	3	2	1	Commerci	1142	1.54E+08	4.62E+08
14	MP_Rani_	MP Nagar	Prime fror	23.26033	77.39764	151540	2	12	0.5	Mixed Use	1295	1.96E+08	3.92E+08
15	MP_Rani_	MP Nagar	Regular fr	23.26059	77.39763	126525	2.5	17	1	Commerci	727	91983675	2.3E+08
16	MP_Rani_	MP Nagar	Regular fr	23.26029	77.39784	142074	2	21	0.5	Mixed Use	283	40206942	80413884
17	MP_Rani_	MP Nagar	Corner plc	23.25915	77.39828	128150	2.5	17	1	Commerci	349	44724350	1.12E+08
18	MP_Rani_	MP Nagar	Regular fr	23.25958	77.39785	129952	3	5	1	Commerci	1064	1.38E+08	4.15E+08
18	MP_Rani_	MP Nagar	Regular fr	23.25958	77.39785	129952	3	5	1	Commerci	1064	1.38E+08	4.15E+08
19	MP_Rani_	MP Nagar	Service lar	23.26016	77.39807	98835	3	9	1	Institution	1182	1.17E+08	3.5E+08
20	MP_Rani_	MP Nagar	Regular fr	23.25929	77.39853	138829	3	17		Commerci	750	1.04E+08	3.12E+08
21	MP_Rani_	MP Nagar	Regular fr	23.25912	77.39824	99822	2	7	0.5	Mixed Use	1478	1.48E+08	2.95E+08
22	MP_Rani_	MP Nagar	Regular fr	23.25934	77.39917	105525	2	24	0	Residentia	1303	1.37E+08	2.75E+08
23	MP_Rani_	MP Nagar	Corner plc	23.26018	77.39906	116785	2.5	26	0.5	Mixed Use	1060	1.24E+08	3.09E+08
24	MP_Rani_	MP Nagar	Corner plc	23.25855	77.39883	118844	2	17	0.5	Mixed Use	450	53479800	1.07E+08
25	MP_Rani_	MP Nagar	Regular fr	23.25857	77.3993	105799	1.5	26	0.5	Mixed Use	919	97229281	1.46E+08
26	MP_Rani_	MP Nagar	Prime fror	23.25868	77.39928	128806	2	19	1	Commerci	1422	1.83E+08	3.66E+08
27	MP_Rani_	MP Nagar	Regular fr	23.25861	77.39949	90289	2.5	27	1	Institution	827	74669003	1.87E+08
28	MP_Rani_	MP Nagar	Regular fr	23.25855	77.39976	112425	2.5	34	1	Commerci	272	30579600	76449000
29	MP_Rani_	MP Nagar	Regular fr	23.25824	77.40018	116155	2.5	24	0.5	Mixed Use	1412	1.64E+08	4.1E+08
30	MP_Rani_	MP Nagar	Regular fr	23.25857	77.40034	101681	2.5	22	1	Commerci	1186	1.21E+08	3.01E+08
31	MP_Rani_	MP Nagar	Corner plc	23.25772	77.40003	109292	2.5	39	1	Institution	1429	1.56E+08	3.9E+08
32	MP_Rani_	MP Nagar	Service lar	23.25754	77.40072	87629	1.5	20	1	Commerci	256	22433024	33649536
33	MP_Rani_	MP Nagar	Regular fr	23.25687	77.40054	111304	2	36	0.5	Mixed Use	1361	1.51E+08	3.03E+08
34	MP_Rani_	MP Nagar	Prime fror	23.25691	77.40024	127355	2	24	1	Institution	1125	1.43E+08	2.87E+08
35	MP_Rani_	MP Nagar	Regular fr	23.25713	77.40115	110183	2	28	1	Commerci	1083	1.19E+08	2.39E+08
36	MP_Rani_	MP Nagar	Prime fror	23.25749	77.40063	126781	2.5	12	1	Commerci	259	32836279	82090698
37	MP_Rani_	MP Nagar	Regular fr	23.25672	77.40122	104382	2	17	1	Commerci	1438	1.5E+08	3E+08

36	MP_Rani_	MP Nagar	Prime fror	23.25749	77.40063	126781	2.5	12	1	Commerci	259	32836279	82090698
37	MP_Rani_	MP Nagar	Regular fr	23.25672	77.40122	104382	2	17	1	Commerci	1438	1.5E+08	3E+08
38	MP_Rani_	MP Nagar	Regular fr	23.25707	77.4019	90632	1.5	32	0.5	Mixed Use	527	47763064	71644596
39	MP_Rani_	MP Nagar	Regular fr	23.25652	77.40213	90031	2.5	39	0.5	Mixed Use	736	66262816	1.66E+08
40	MP_Rani_	MP Nagar	Regular fr	23.25687	77.4018	112308	1.5	11	0.5	Mixed Use	655	73561740	1.1E+08
41	MP_Rani_	South MP	Prime fror	23.2558	77.40191	120592	2	36	1	Commerci	1053	1.27E+08	2.54E+08
42	MP_Rani_	South MP	Regular fr	23.25642	77.40219	103782	2	41	0	Residentia	855	88733610	1.77E+08
43	MP_Rani_	South MP	Prime fror	23.25581	77.40177	118280	2.5	15	1	Commerci	456	53935680	1.35E+08
44	MP_Rani_	South MP	Service lar	23.25588	77.40331	72041	2.5	35	1	Institution	1066	76795706	1.92E+08
45	MP_Rani_	South MP	Prime fror	23.25563	77.40249	117773	2	30	0.5	Mixed Use	1138	1.34E+08	2.68E+08
46	MP_Rani_	South MP	Corner plc	23.25605	77.40345	97535	2.5	49	1	Commerci	1180	1.15E+08	2.88E+08
47	MP_Rani_	South MP	Regular fr	23.25595	77.40308	90394	1.5	38	1	Commerci	502	45377788	68066682
48	MP_Rani_	South MP	Prime fror	23.25542	77.40372	105451	1.5	30	1	Commerci	1299	1.37E+08	2.05E+08
49	MP_Rani_	South MP	Service lar	23.25566	77.40414	75280	1.5	23	0.5	Mixed Use	239	17991920	26987880
50	MP_Rani_	South MP	Regular fr	23.25588	77.40391	92868	2	16	1	Commerci	316	29346288	58692576
51	MP_Rani_	South MP	Prime fror	23.2553	77.4046	125661	2.5	31	1	Commerci	406	51018366	1.28E+08
52	MP_Rani_	South MP	Regular fr	23.25523	77.40376	86843	1.5	49	0.5	Mixed Use	185	16065955	24098933
53	MP_Rani_	South MP	Regular fr	23.255	77.40443	107023	2.5	7	1	Commerci	146	15625358	39063395
54	MP_Rani_	South MP	Prime fror	23.25523	77.40405	106701	2	17	1	Commerci	804	85787604	1.72E+08
55	MP_Rani_	South MP	Service lar	23.2552	77.40411	87702	2	15	0	Residentia	938	82264476	1.65E+08
54	MP_Rani_	South MP	Prime fror	23.25523	77.40405	106701	2	17	1	Commerci	804	85787604	1.72E+08
55	MP_Rani_	South MP	Service lar	23.2552	77.40411	87702	2	15	0	Residentia	938	82264476	1.65E+08
56	MP_Rani_	South MP	Corner plc	23.25428	77.40454	118328	2.5	45	0	Residentia	281	33250168	83125420
57	MP_Rani_	South MP	Prime fror	23.25393	77.40456	122458	2	20	0	Residentia	1333	1.63E+08	3.26E+08
58	MP_Rani_	South MP	Regular fr	23.25434	77.40477	102603	2.5	12	1	Commerci	1449	1.49E+08	3.72E+08
59	MP_Rani_	South MP	Service lar	23.25447	77.40539	87862	1.5	11	1	Commerci	846	74331252	1.11E+08
60	MP_Rani_	South MP	Service lar	23.25384	77.40522	88537	2.5	43	1	Commerci	107	9473459	23683648
61	MP_Rani_	Mid Corric	Prime fror	23.25424	77.40539	95745	1.5	12	0	Residentia	1432	1.37E+08	2.06E+08
62	MP_Rani_	Mid Corric	Regular fr	23.2538	77.40563	99551	2	44	1	Commerci	773	76952923	1.54E+08
63	MP_Rani_	Mid Corric	Prime fror	23.25368	77.40562	87255	2	61	0	Residentia	868	75737340	1.51E+08
64	MP_Rani_	Mid Corric	Prime fror	23.25376	77.40673	113401	2	53	0.5	Mixed Use	1221	1.38E+08	2.77E+08
65	MP_Rani_	Mid Corric	Regular fr	23.25369	77.40672	87774	2	34	1	Residentia	584	51260016	1.03E+08
66	MP_Rani_	Mid Corric	Regular fr	23.25293	77.40692	83956	2	67	0.5	Mixed Use	1207	1.01E+08	2.03E+08
67	MP_Rani_	Mid Corric	Regular fr	23.25312	77.40631	96944	2	36	0	Residentia	85	8240240	16480480
68	MP_Rani_	Mid Corric	Corner plc	23.25219	77.4066	87541	1.5	15	0	Residentia	90	7878690	11818035
69	MP_Rani_	Mid Corric	Service lar	23.25263	77.40686	68208	2.5	31	1	Institution	641	43721328	1.09E+08
70	MP_Rani_	Mid Corric	Regular fr	23.2523	77.40708	99036	2.5	45	0.5	Mixed Use	1400	1.39E+08	3.47E+08
71	MP_Rani_	Mid Corric	Prime fror	23.25212	77.4071	102993	2	63	0.5	Mixed Use	469	48303717	96607434
72	MP_Rani_	Mid Corric	Service lar	23.25283	77.40727	74264	1.5	17	0.5	Mixed Use	887	65872168	98808252
73	MP_Rani_	Mid Corric	Regular fr	23.25257	77.408	75111	2	25	0.5	Mixed Use	642	48221262	96442524

72	MP_Rani_	Mid Corric	Service lar	23.25283	77.40727	74264	1.5	17	0.5	Mixed Use	887	65872168	98808252
73	MP_Rani_	Mid Corric	Regular fr	23.25257	77.408	75111	2	25	0.5	Mixed Use	642	48221262	96442524
74	MP_Rani_	Mid Corric	Regular fr	23.25243	77.40798	94992	1.5	45	0	Residentia	482	45786144	68679216
75	MP_Rani_	Mid Corric	Regular fr	23.2524	77.40831	88928	2	38	0	Residentia	501	44552928	89105856
76	MP_Rani_	Mid Corric	Corner plc	23.25174	77.40855	100234	2	66	0.5	Mixed Use	284	28466456	56932912
77	MP_Rani_	Mid Corric	Regular fr	23.25156	77.40805	90485	2	14	0	Residentia	992	89761120	1.8E+08
78	MP_Rani_	Mid Corric	Service lar	23.25133	77.40809	65694	2	23	1	Commerci	217	14255598	28511196
79	MP_Rani_	Mid Corric	Regular fr	23.25126	77.40922	92603	2	31	0	Residentia	1217	1.13E+08	2.25E+08
80	MP_Rani_	Mid Corric	Service lar	23.25146	77.40903	59395	1.5	63	0.5	Mixed Use	1378	81846310	1.23E+08
81	MP_Rani_	Near Railw	Regular fr	23.25126	77.40951	83783	2	17	1	Commerci	596	49934668	99869336
82	MP_Rani_	Near Railw	Regular fr	23.2507	77.4091	63006	1.5	35	1	Commerci	1129	71133774	1.07E+08
83	MP_Rani_	Near Railw	Regular fr	23.25126	77.40958	62587	2	57	1	Commerci	187	11703769	23407538
84	MP_Rani_	Near Railw	Regular fr	23.25099	77.40945	76084	2	37	1	Commerci	1132	86127088	1.72E+08
85	MP_Rani_	Near Railw	Corner plc	23.25106	77.40942	78415	2	46	0.5	Mixed Use	1424	1.12E+08	2.23E+08
86	MP_Rani_	Near Railw	Service lar	23.25121	77.40971	63184	2	3	1	Institution	1216	76831744	1.54E+08
87	MP_Rani_	Near Railw	Regular fr	23.25009	77.40925	71481	1.5	24	0.5	Mixed Use	1131	80845011	1.21E+08
88	MP_Rani_	Near Railw	Regular fr	23.2506	77.4103	60573	2.5	19	1	Commerci	334	20231382	50578455
89	MP_Rani_	Near Railw	Corner plc	23.25012	77.41027	98051	1.5	28	1	Commerci	1198	1.17E+08	1.76E+08
90	MP_Rani_	Near Railw	Service lar	23.25035	77.41066	76757	1.5	28	0	Residentia	1051	80671607	1.21E+08
91	MP_Rani	Near Railw	Prime fror	23.24997	77.41139	89230	2	5	1	Commerci	1304	1.16E+08	2.33E+08
93	MP_Rani_	Near Railw	Corner plc	23.24959	77.41106	80867	1.5	25	0	Residentia	854	69060418	1.04E+08
94	MP_Rani_	Near Railw	Regular fr	23.2502	77.41185	84418	1.5	14	1	Institution	577	48709186	73063779
95	MP_Rani_	Near Railw	Service lar	23.24937	77.41154	59790	2	14	0.5	Mixed Use	865	51718350	1.03E+08
96	MP_Rani_	Near Railw	Regular fr	23.24951	77.41227	74512	2	53	0.5	Mixed Use	441	32859792	65719584
97	MP_Rani_	Near Railw	Service lar	23.24913	77.41165	59477	2	29	1	Commerci	850	50555450	1.01E+08
98	MP_Rani_	Near Railw	Regular fr	23.2487	77.41233	69971	1.5	26	1	Institution	202	14134142	21201213
99	MP_Rani_	Near Railw	Corner plc	23.24903	77.41274	88676	1.5	37	0	Residentia	196	17380496	26070744
100	MP_Rani_	Near Railw	Regular fr	23.24874	77.41238	66172	2	9	1	Commerci	1205	79737260	1.59E+08
101	MP_Rani_	Rani Kaml	Regular fr	23.24801	77.41249	74397	1	60	1	Commerci	868	64576596	64576596
102	MP_Rani_	Rani Kaml	Regular fr	23.24822	77.41299	82522	1.5	10	1	Commerci	1249	1.03E+08	1.55E+08
103	MP_Rani_	Rani Kaml	Regular fr	23.24827	77.41266	76553	1	28	1	Commerci	130	9951890	9951890
104	MP_Rani_	Rani Kaml	Regular fr	23.24783	77.41254	61914	1.5	61	0	Residentia	366	22660524	33990786
105	MP_Rani_	Rani Kaml	Regular fr	23.24785	77.41357	83003	1.5	10	1	Institution	1235	1.03E+08	1.54E+08
106	MP_Rani_	Rani Kaml	Regular fr	23.24787	77.41389	80337	1.5	71	0.5	Mixed Use	1267	1.02E+08	1.53E+08
107	MP_Rani_	Rani Kaml	Corner plc	23.24813	77.41409	62805	1	49	1	Commerci	515	32344575	32344575
108	MP_Rani_	Rani Kaml	Regular fr	23.24796	77.41391	61734	1.5	29	1	Commerci	277	17100318	25650477
109	MP_Rani_	Rani Kaml	Regular fr	23.24727	77.41394	79815	1.5	12	1	Institution	1465	1.17E+08	1.75E+08
110	MP_Rani_	Rani Kaml	Regular fr	23.2479	77.41431	79433	1	37	0.5	Mixed Use	1110	88170630	88170630
111	MP_Rani_	Rani Kaml	Prime fror	23.24703	77.4141	90360	1	79	0.5	Mixed Use	1432	1.29E+08	1.29E+08
112	MP_Rani	Rani Kaml	Regular fr	23.24724	77.41398	55678	1	17	0	Residentia	755	42036890	42036890
112	MP_Rani_	Rani Kaml	Regular fr	23.24724	77.41398	55678	1	17	0	Residentia	755	42036890	42036890
113	MP_Rani_	Rani Kaml	Corner plc	23.24727	77.4144	86078	1.5	32	0.5	Mixed Use	499	42952922	64429383
114	MP_Rani_	Rani Kaml	Regular fr	23.24626	77.41544	68521	1	74	1	Commerci	418	28641778	28641778
115	MP_Rani_	Rani Kaml	Prime fror	23.24631	77.41492	102766	2	64	1	Commerci	984	1.01E+08	2.02E+08
116	MP_Rani_	Rani Kaml	Corner plc	23.2464	77.41445	68072	2	56	0	Residentia	1212	82503264	1.65E+08
117	MP_Rani_	Rani Kaml	Service lar	23.24648	77.4151	58839	1.5	23	0	Residentia	346	20358294	30537441
118	MP_Rani_	Rani Kaml	Regular fr	23.2462	77.41573	82107	1	10	1	Commerci	308	25288956	25288956
119	MP_Rani_	Rani Kaml	Prime fror	23.24637	77.41582	63826	1.5	19	1	Commerci	759	48443934	72665901
120	MP_Rani_	Rani Kaml	Regular fr	23.24542	77.41602	50996	1	9	1	Commerci	410	20908360	20908360

Ayodhya Bypass

A	B	C	D	E	F	G	H	I	J	K
Building_I	Building_N	Segment	Frontage	Latitude	Longitude	Guideline_	Permissibl	Land use v	Distance_t	Land_Use
1	Ayodhya_	Ayodhya E	Prime fror	23.28462	77.44505	94736	2	1	27	Commercial
2	Ayodhya_	Commerci	Regular fr	23.28493	77.446	73775	2	1	32	Commercial
3	Ayodhya_	Commerci	Service lar	23.28459	77.44624	62424	2	0	31	Residential
4	Ayodhya_	Commerci	Prime fror	23.28358	77.44794	82317	2.5	0	13	Residential
5	Ayodhya_	Ayodhya E	Regular fr	23.28249	77.44832	63262	2.5	1	11	Commercial
6	Ayodhya_	Ayodhya E	Regular fr	23.28337	77.44903	61277	2	0	23	Residential
7	Ayodhya_	Ayodhya E	Service lar	23.28174	77.44978	62162	2.5	0	33	Residential
8	Ayodhya_	Ayodhya E	Regular fr	23.28095	77.45225	64469	2.5	1	7	Commercial
9	Ayodhya_	Commerci	Regular fr	23.28125	77.45278	75529	2	0.5	10	Mixed Use
10	Ayodhya_	Residentia	Prime fror	23.27971	77.45355	62255	1.2	1	27	Commercial
11	Ayodhya_	Ayodhya E	Service lar	23.27952	77.45452	64567	2.5	1	20	Commercial
12	Ayodhya_	Ayodhya E	Regular fr	23.27961	77.45548	88942	3	1	20	Commercial
13	Ayodhya_	Developin	Service lar	23.27898	77.45648	26660	1	0	102	Residential
14	Ayodhya_	Residentia	Corner plo	23.27801	77.45785	61967	1.2	0	27	Residential
15	Ayodhya_	Commerci	Regular fr	23.27741	77.45837	77200	2	0.5	23	Mixed Use
16	Ayodhya_	Ayodhya E	Regular fr	23.27771	77.45929	76862	2.5	1	34	Institutional
17	Ayodhya_	Ayodhya E	Regular fr	23.27702	77.46009	76298	2	1	23	Institutional
18	Ayodhya_	Residentia	Prime fror	23.27714	77.46166	55102	1.8	1	48	Commercial
19	Ayodhya	Ayodhya E	Regular fr	23.27595	77.46165	81855	2	0	6	Residential

A	B	C	D	E	F	G	H	I	J	K
18	Ayodhya_	Residentia	Prime fror	23.27714	77.46166	55102	1.8	1	48	Commercial
19	Ayodhya_	Ayodhya E	Regular fr	23.27595	77.46165	81855	2	0	6	Residential
20	Ayodhya_	Ayodhya E	Service lar	23.27528	77.46352	68232	3	1	14	Commercial
21	Ayodhya_	Ayodhya E	Regular fr	23.27489	77.46446	86110	2	5	9	Mixed Use
22	Ayodhya_	Ayodhya E	Prime fror	23.27415	77.46526	81322	2	1	25	Commercial
23	Ayodhya_	Ayodhya E	Regular fr	23.27401	77.46538	63245	3	0	21	Residential
24	Ayodhya_	Ayodhya E	Service lar	23.2722	77.46713	53946	3	0	15	Residential
25	Ayodhya_	Ayodhya E	Corner plc	23.27334	77.46778	66000	2	0	9	Residential
26	Ayodhya_	Residentia	Regular fr	23.27179	77.46874	48642	1.2	1	55	Commercial
27	Ayodhya_	Ayodhya E	Regular fr	23.27116	77.46909	66745	3	0	24	Residential
28	Ayodhya_	Commerci	Corner plc	23.27134	77.4705	76182	2	1	43	Institutional
29	Ayodhya_	Ayodhya E	Regular fr	23.27076	77.4716	60518	3	0	33	Residential
30	Ayodhya_	Ayodhya E	Regular fr	23.26998	77.47265	71816	2	0.5	27	Mixed Use
31	Ayodhya_	Commerci	Corner plc	23.26928	77.47344	63060	2.5	0	15	Residential
32	Ayodhya_	Ayodhya E	Regular fr	23.26905	77.4745	63915	2.5	1	20	Institutional
33	Ayodhya_	Ayodhya E	Regular fr	23.26929	77.47534	74110	2	0.5	6	Mixed Use
34	Ayodhya_	Ayodhya E	Regular fr	23.26783	77.47622	68771	3		15	Mixed Use
35	Ayodhya_	Ayodhya E	Prime fror	23.26822	77.47743	83680	2	0.5	7	Residential
36	Ayodhya_	Residentia	Regular fr	23.26753	77.47855	41162	1.2	1	77	Commercial
37	Ayodhya	Commerci	Regular fr	23.26713	77.47901	75759	2.5	1	11	Commercial

A	B	C	D	E	F	G	H	I	J	K
36	Ayodhya_	Residentia	Regular fr	23.26753	77.47855	41162	1.2	1	77	Commercial
37	Ayodhya_	Commerci	Regular fr	23.26713	77.47901	75759	2.5	1	11	Commercial
38	Ayodhya_	Commerci	Service lar	23.26601	77.47947	64350	2	0	26	Residential
39	Ayodhya_	Residentia	Service lar	23.26555	77.4808	33720	1.5	0.5	79	Mixed Use
40	Ayodhya_	Residentia	Service lar	23.26536	77.48227	45346	1.5	1	64	Institutional
41	Ayodhya_	Developin	Regular fr	23.26432	77.48345	43462	1	1	71	Institutional
42	Ayodhya_	Ayodhya E	Regular fr	23.26453	77.48329	77582	3	0	30	Residential
43	Ayodhya_	Commerci	Service lar	23.26348	77.48525	63551	2	0	24	Residential
44	Ayodhya_	Ayodhya E	Regular fr	23.26352	77.4859	86794	2.5	1	28	Commercial
45	Ayodhya_	Residentia	Regular fr	23.26212	77.4867	53105	1.5	1	64	Institutional
46	Ayodhya_	Residentia	Regular fr	23.26265	77.48753	58059	1.2	0.5	59	Mixed Use
47	Ayodhya_	Developin	Regular fr	23.26193	77.48902	44350	1	0	135	Residential
48	Ayodhya_	Developin	Regular fr	23.26098	77.48921	33622	1.2	0.5	56	Mixed Use
49	Ayodhya_	Residentia	Regular fr	23.26055	77.49062	46724	1.5	1	29	Commercial
50	Ayodhya_	Developin	Corner plc	23.26025	77.49144	50980	1.2	0	101	Residential
51	Ayodhya_	Commerci	Service lar	23.25979	77.4927	63846	2.5	0	30	Residential
52	Ayodhya_	Ayodhya E	Regular fr	23.25953	77.49338	71337	2.5	0.5	20	Mixed Use
53	Ayodhya_	Developin	Regular fr	23.25868	77.494	31949	1	0	80	Residential
54	Ayodhya_	Commerci	Regular fr	23.25879	77.49572	70951	2.5	0.5	14	Mixed Use
55	Ayodhya	Ayodhya E	Prime fror	23.25742	77.49672	85243	2.5	0.5	9	Mixed Use

A	B	C	D	E	F	G	H	I	J	K
54	Ayodhya_	Commerci	Regular fr	23.25879	77.49572	70951	2.5	0.5	14	Mixed Use
55	Ayodhya_	Ayodhya E	Prime fror	23.25742	77.49672	85243	2.5	0.5	9	Mixed Use
56	Ayodhya_	Developin	Regular fr	23.2581	77.49721	33992	1	0	80	Residential
57	Ayodhya_	Ayodhya E	Regular fr	23.25645	77.49805	82053	3	0.5	29	Mixed Use
58	Ayodhya_	Developin	Prime fror	23.25551	77.49907	50606	1	0.5	51	Mixed Use
59	Ayodhya_	Commerci	Regular fr	23.25607	77.50036	76977	2	0.5	12	Mixed Use
60	Ayodhya_	Commerci	Regular fr	23.25556	77.5017	56005	2	0.5	17	Mixed Use
61	Ayodhya_	Residentia	Regular fr	23.25503	77.50192	51531	1.2	1	73	Institutional
62	Ayodhya_	Residentia	Regular fr	23.25462	77.50284	43973	1.5	0.5	84	Mixed Use
63	Ayodhya_	Developin	Regular fr	23.25328	77.50373	44234	1.2	0	99	Residential
64	Ayodhya_	Commerci	Service lar	23.25291	77.50456	58207	2	0.5	12	Mixed Use
65	Ayodhya_	Commerci	Prime fror	23.25279	77.50565	92679	2	0	41	Residential
66	Ayodhya_	Ayodhya E	Prime fror	23.25223	77.50671	71591	3	1	14	Institutional
67	Ayodhya_	Ayodhya E	Service lar	23.25157	77.50681	66550	2	0	20	Residential
68	Ayodhya_	Commerci	Service lar	23.2516	77.50924	45546	2.5	1	24	Commercial
69	Ayodhya_	Ayodhya E	Service lar	23.25057	77.50907	53194	2.5	1	14	Commercial
70	Ayodhya_	Residentia	Prime fror	23.24988	77.51059	52581	1.5	0.5	77	Mixed Use
71	Ayodhya_	Ayodhya E	Regular fr	23.24939	77.5113	63151	2.5	0	13	Residential
72	Ayodhya_	Residentia	Regular fr	23.24898	77.5118	45677	1.2	0	47	Residential
73	Ayodhya	Commerci	Regular fr	23.249	77.5138	65149	2	0	11	Residential

72	Ayodhya_	Residentia	Regular fr	23.24898	77.5118	45677	1.2	0	47	Residential	732	33435564	40122677
73	Ayodhya_	Commerci	Regular fr	23.249	77.5138	65149	2	0	11	Residential	120	7817880	15635760
74	Ayodhya_	Developin	Regular fr	23.24768	77.51371	43290	1	1	54	Institutional	929	40216410	40216410
75	Ayodhya_	Ayodhya E	Regular fr	23.24841	77.51527	78471	2	0	27	Residential	1213	95185323	1.9E+08
76	Ayodhya_	Residentia	Regular fr	23.24701	77.51609	46977	1.2	0.5	43	Mixed Use	1144	53741688	64490026
77	Ayodhya_	Residentia	Prime fror	23.24651	77.51665	57982	1.5	1	34	Commercial	677	39253814	58880721
78	Ayodhya_	Commerci	Corner plc	23.24732	77.51747	64520	2.5	0	30	Residential	1476	95231520	2.38E+08
79	Ayodhya_	Ayodhya E	Regular fr	23.24515	77.51919	78289	2	0	12	Residential	879	68816031	1.38E+08
80	Ayodhya_	Ayodhya E	Regular fr	23.24496	77.52006	75580	2.5	0.5	34	Mixed Use	218	16476440	41191100